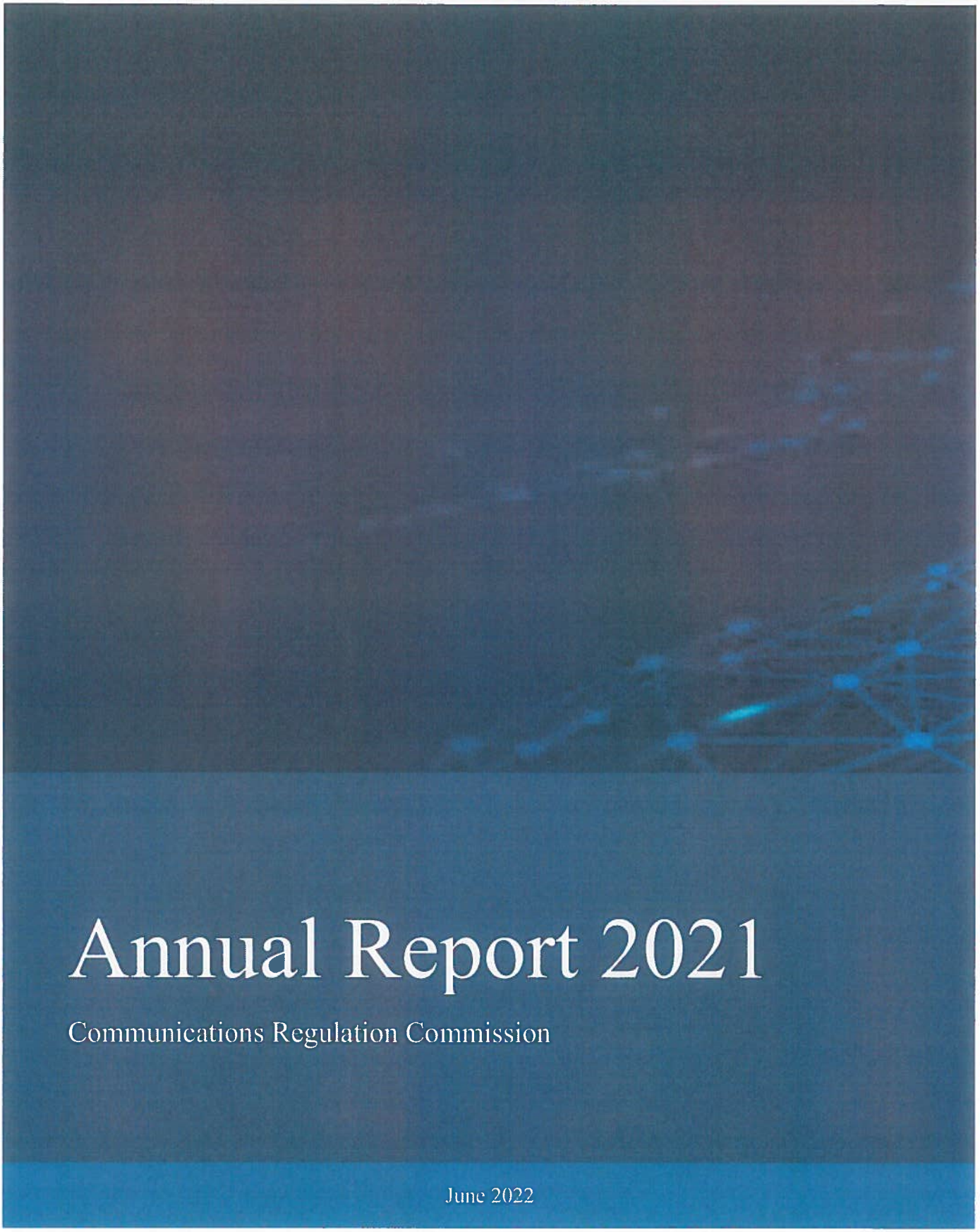


Annual Report 2021

Communications Regulation Commission

June 2022

COMMUNICATIONS REGULATION COMMISSION

ANNUAL REPORT
2021

Table of Contents

INTRODUCTION

This annual report of the Communications Regulation Commission (CRC/the Commission) was prepared pursuant to Article 38 of the Law on Electronic Communications (LEC) and presents an overview of the work performed by CRC in 2021, outlining the main lines in its forthcoming activity.

In implementation of its strategic goals set out in the adopted three-year Strategy for 2019-2021 and in pursuit of its vision, CRC, as a specialised independent public body implementing the policies in the field of electronic communications and postal services as well as the radio spectrum planning and allocation policy in the Republic of Bulgaria, continued in 2021, in the conditions of transparency and equality, in compliance with the Bulgarian and European legislation, to pursue its mission to promote competition on the communications markets in Bulgaria, to increase the investment in the communications sector, to develop new technologies and to protect consumers in Bulgaria.

In 2021, in fulfilment of its mission, the Commission continued to work for the achievement and upgrade of the strategic goals adopted, related to the achievement and promotion of:

- *effective and forward-looking regulatory environment;*
- *sustainable competitive market and consumer protection;*
- *sustainable institutional development and international partnership.*

Both in 2020 and in 2021, the COVID-19 pandemic continued to have an impact on the form and manner of work of the Commission in achieving and implementing the objectives set, which required the use of various approaches in the implementation of activities related to spectrum management, market regulation, networks monitoring and control, regulatory framework, international activity, etc.

Pursuant to the Law on Amendment and Supplement of the Law on Electronic Communications (LASLEC) adopted in 2021, transposing the provisions of the European Electronic Communications Code (the Code), CRC has brought the regulatory framework related to spectrum management into compliance with the LEC provisions.

In fulfilment of Bulgaria's obligations under Directive 2014/53, draft spectrum use rules were notified to the European Commission (EC) under the procedure in accordance with Directive (EU) 2015/1535, before their final adoption.

In order to ensure the conditions for the introduction of 5G networks and the promotion of investment in infrastructure, and on the basis of the amendments and supplements adopted to the Law on Spatial Planning (LSP) and the LEC, CRC adopted a draft Regulation on the content, conditions and procedure of keeping, maintaining and use of the register of transceiver stations on terrestrial networks, the activities under Article 151, Para 1, p. 16 LSP and short-range Wi-Fi access points, which will be finally adopted in 2022.

Activities were also carried out to establish a register of granted rights to use the radio spectrum on the basis of registration and register of transceiver stations on terrestrial networks capable of providing electronic communications services.

Following the public consultation on the announced intention to limit the number of authorisations for use of spectrum in the 2.6 GHz band for a terrestrial network capable of providing electronic communications services with national coverage, CRC provided a 2x20 MHz radio frequency spectrum to each of the three undertakings. This has enabled undertakings to increase the capacity of their networks in densely populated areas to serve the growing data traffic, where demand for services is higher.

In 2021, a number of activities were also carried out related to ensuring the conditions of use of the bands determined in the Radio Spectrum Policy Group's (RSPG) opinion as initial for the introduction of 5G networks - the 700 MHz, 3.6 GHz and 26 GHz bands - for the introduction of 5G in Europe.

On 6 April 2021, following public consultations, CRC run a sealed-bid tender to issue three authorisations for the use of the 3.6 GHz spectrum with national coverage for a period of twenty years. As a result of the tender, 3.6 GHz spectrum use authorisations were issued to the three mobile operators participating in the tender, A1 Bulgaria EAD (A1), Yettel Bulgaria EAD[1] (Yettel) and Bulgarian Telecommunications Company EAD (BTC), as each of them was assigned a spectrum of 100 MHz. This ensured real conditions for the introduction of 5G networks in Bulgaria and high-speed services for consumers, which is a prerequisite for achieving the objectives of the Digital Decade, universal mobile broadband coverage and digital transformation.

During the reporting year, CRC also finalised the public consultations on the prospects and conditions for using the 26 GHz radio spectrum, in which undertakings expressed only a general interest in obtaining spectrum in the 26 GHz band.

In 2021, a third round of analysis and assessment of the wholesale dedicated capacity market and an open procedure for public consultation of the project were launched.

In fulfilment of §356 of the Transitional and Final Provisions of the LASLEC, CRC reviewed the obligations for the provision of public payphones and/or other public access points to voice telephony services of certain quality, provision of a directory and telephone inquiry services imposed as an obligation for the provision of the universal service.

In order to ensure compliance with the legal requirements, the control and monitoring of the regulated tariffs offered by the Bulgarian undertakings related to the provision of roaming services and international calls and SMS messages within the European Economic Area continued throughout the year.

Through the set-up and functioning on-line questionnaires system, the processes for filling in, sending, receiving and processing information received from operators in relation to the annual questionnaires on the undertakings' activity in 2020 and the broadband questionnaire as of 01.07.2021 were automated.

A Plan for Development of the National Radio Frequency Spectrum Monitoring System for civil needs for the period 2021÷2025 was also adopted. The challenges of new digital technologies and the entry of 5G mobile networks led to a significant strengthening of the role of radio spectrum monitoring and control in relation to its effective management to promptly locate and eliminate sources of interference, identify illegal radio-broadcasting equipment and provide quality telecommunications services to end-users.

Despite the difficulties caused by the global COVID-19 epidemic, in order to achieve its strategic objectives, the Commission continued to play an active role in the international activity. Throughout the reporting period, CRC members and experts participated in a number of virtual and attendance meetings and sessions of the Body of European Regulators for Electronic Communications (BEREC), the European Regulators Group for Postal Services (ERGP), the Electronic Communications Committee (ECC), the European Telecommunications Standards Institute (ETSI), the International Telecommunication Union (ITU) and other neighbouring and international organisations with which the Commission is working closely to implement best regulatory practices, exchange experience, and develop and improve the functioning of the internal market for electronic communications networks and services.

[1] As of 01.03.2022, the name of Telenor Bulgaria EAD was changed to Yettel Bulgaria EAD

These results are only part of the overall work of CRC carried out in 2021. On the basis of the objectives pursued and in compliance with the national and European legislation, the Commission is presenting with this report the work carried out under the various lines of activity, in accordance with its functions and powers regulated by the LEC.

I. STATE, DEVELOPMENT AND PROSPECTS OF THE ELECTRONIC COMMUNICATIONS MARKET

Methodological notes on Section I.

The information presented is based on data received by 27.04.2021 from 88.9% of the undertakings registered with CRC as of 31.12.2021. The information has been provided in accordance with model forms for reporting activity related to the provision of electronic communications networks and/or services, established by Decision No 415/09.12.2021 of CRC. A key part of the indicators monitored and included in the forms are defined by various international institutions and organisations to which CRC has a commitment by law to provide data on the electronic communications sector in Bulgaria on a regular basis (ITU, European Commission (EC), BEREC, etc.).

In the summation of rounded amounts and percentages, rounding-related differences may occur due to the use of standard calculation functions of the electronic tables and charts.

The relative shares are presented rounded to one decimal place. As a result of such rounding, the sum of the relative shares may exceed or may be less than 100%.

The total number of undertakings presented in the tables for a particular market segment does not represent the sum of the number of undertakings by individual services included in the segment. Where an undertaking provides more than one of the listed services, it is accounted for only once in the total number of undertakings.

For the purposes of the annual report, the term "subscriber" is defined as "any natural or legal person who is a party to a contract with an undertaking providing public electronic communications services" and shall be considered to be identical to "end-user party to a contract under Article 227" in accordance with the Law on Electronic Communications (version prom. SG, no. 32 of 26 April 2022).

For the calculation of the indicators "penetration (density) by population or household", the preliminary data published by the National Statistical Institute (NSI) from the 2021 census of the population and the housing in the country, according to which, as of 7 September 2021, the population of the country was 6,520,314 persons, and households were 2,813,847 (Population and Demographic Processes in 2021 (nsi.bg)).

1. Volume and structure of the Bulgarian electronic communications market

1.1. Market volume

According to data from the CRC register, as of 31.12.2021, a , total of 1,135 undertakings were registered at CRC with the intention to provide public electronic communications. In implementation of Article 4 of the General Requirements[2] and Decision No 415 of 09.12.2021 of CRC, a total of 1,009 of the undertakings registered as of 31.12.2021 have submitted to the

[2] General requirements for the provision of public electronic communications (prom. SG, no. 24 of 4 March 2008, amended SG, no. 102 of 28 November 2008, amended SG, no. 63 of 7 August 2009, amended SG, no. 19 of 8 March 2011, amended SG, no. 105 of 29 December 2011, amended and suppl. SG, no. 63 of 17 August 2012, amended and suppl. SG, no. 4 of 14 January 2014, amended and suppl. SG, no. 54 of 15 July 2016, amended and suppl. SG, no. 90 of 10 November 2017, amended and suppl. SG, no. 90 of 30 October 2018, amended SG, no. 10 of 1 February 2019, amended and suppl. SG, no. 20 of 10 March 2020, amended and suppl. SG, no. 35 of 10 April 2020, amended and suppl. SG, no. 111 of 31 December 2020, repealed SG, no. 108 of 17 December 2021).

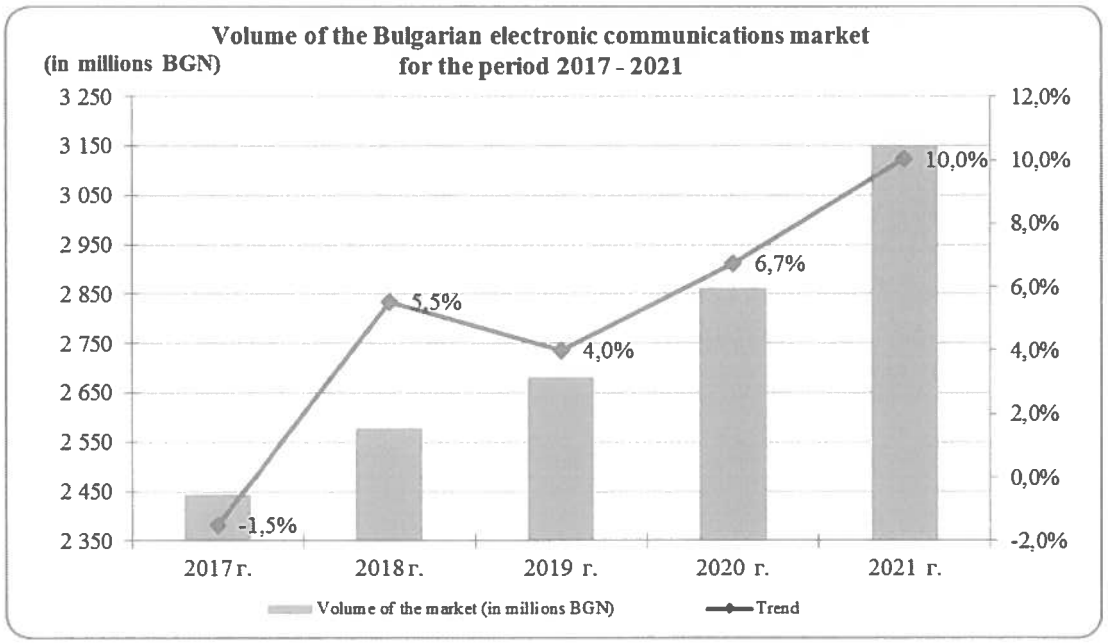
Commission an annual activity report for 2021 (the share of undertakings having submitted reports makes up 88.9% of those registered as of the said date).

In 2021, 863 undertakings performed their activity, including 10 undertakings which suspended their activity on providing public electronic communications during the year and submitted a report pursuant to Article 5 of the General Requirements (as of 31.12.2021, those undertakings were removed from the CRC register). In comparison to the previous reporting period (2020), an increase was observed in 2021 both in the number of undertakings registered at CRC for the provision of public electronic communications (by 0.8%) and in the number of undertakings actually carrying out activity during the year (up by 0.2%).

In 2021, several undertakings providing public electronic communications were acquired or are in the process of being acquired by BTC, namely Networx-Bulgaria EOOD, Online Direct EOOD, TVN Distribution Bulgaria EOOD, Net 1 EOOD, Net Is Sat EOOD, ComNet Sofia EAD, Digital Cable Television EOOD and Telnet OOD. Cetin Bulgaria EAD acquired Raccom EAD and Sofia Communications EAD. The impact of these acquisitions is commented on in the relevant parts concerning the services provided by the undertakings concerned. Also in 2021, A1 Towers was separated from A1 Bulgaria EAD.

In 2021, the total volume of the Bulgarian electronic communications market amounted to BGN 3.148 billion, continuing its upward trend for another consecutive year - the growth reported is 10% as compared to the 2020 data.

Figure 1 presents the dynamics in the volume of electronic communications market in the country for the period 2017-2021.



Note: The data for 2020 have been updated.

Source: Data submitted to CRC

Figure 1

The share of the total volume of the public electronic communications market constituted 2.4% of the total GDP[3] of Bulgaria for 2021, preserving its share in the GDP as compared to 2020.

1.2. Market structure

Information on revenue from the provision of public electronic communications in Bulgaria determined according to the type of services, is provided in Table 1, including the distributed[4] revenue from the provision of bundled services (information on the definition of "bundled services" can be found in point 1.2.1. Bundled Services below).

Table 1

Structure of the public electronic communications market in Bulgaria according to the type of services provided for the period 2019 – 2021

Public electronic communications services	Revenue		
	2019 г.	2020 [1]	2021
	(in millions BGN)		
1. Voice telephony services	1 172,133	1 149,745	1 149,605
1.1. Fixed telephony service through numbers from the NNP and public payphones	114,644	93,016	81,588
1.2. Mobile telephony service through numbers from the NNP	1 042,060	1 037,526	1 023,819
1.3. Other voice services[2]	15,430	19,203	44,199
2. Leased lines services	21,342	19,156	24,757
3. Data transfer and/or Internet access services	998,574	1 196,457	1 451,381
4. Transmission and/or distribution of radio and/or TV programmes services	424,559	427,422	453,187
5. Other services[3]	64,068	68,734	69,302
TOTAL	**2 680,677**	**2 861,514**	**3 148,232**

[1] The data for 2020 have been updated.

[2] Includes revenue from the provision of VoIP services, provision of voice services through trade representation, etc.

[3] The segment includes revenue from the provision of duct network, satellite systems access service, shared use, incuding provision of towers, masts; dark fibre, co-location services other than those provided for interconnection and other services.

Source: Data submitted to CRC

In 2021, the total volume of the electronic communications market continued to be determined mainly by revenue from voice services and data transfer and/or Internet access services.

---

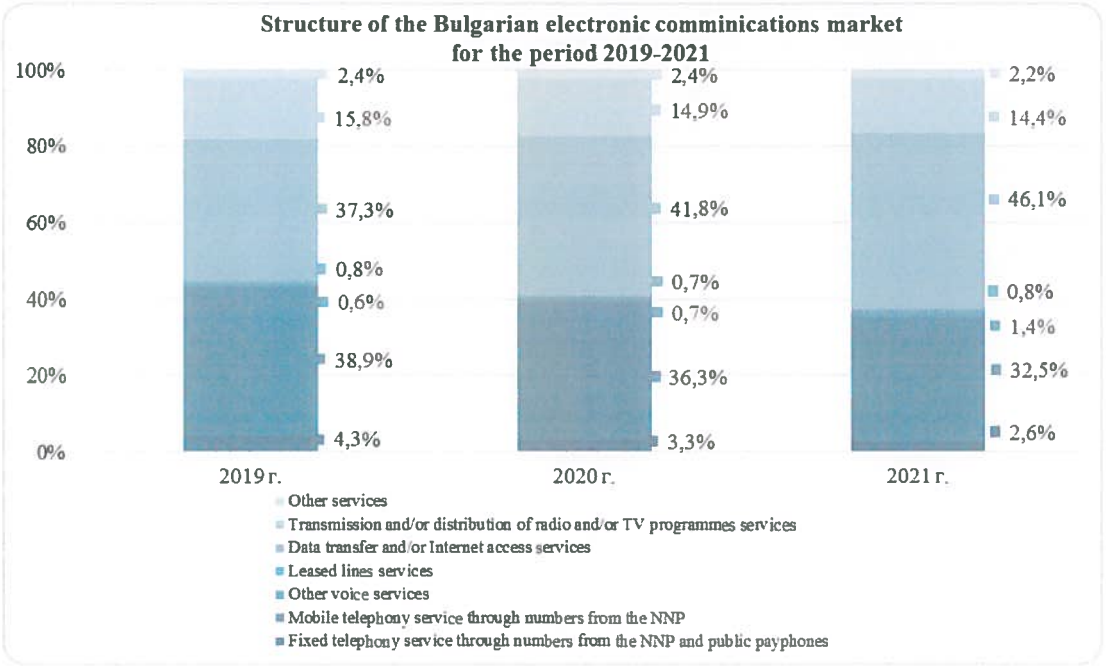
[3]Calculated at current prices. Source: NSI https://www.nsi.bg/bg/content/2206/%D0%B1%D0%B2%D0%BF-%D0%BF%D1%80%D0%BE%D0%B8%D0%B7%D0%B2%D0%BE%D0%B4%D1%81%D1%82%D0%B2%D0%B5%D0%BD-%D0%BC%D0%B5%D1%82%D0%BE%D0%B4-%D0%BD%D0%B0%D1%86%D0%B8%D0%BE%D0%BD%D0%B0%D0%BB%D0%BD%D0%BE-%D0%BD%D0%B8%D0%B2%D0%BE

[4] The breakdown of revenue from bundled services (installation fees and monthly subscription for fixed and mobile telephony services, Internet access and television) by types of services included in the bundle is made and presented in the Annual Report by the undertakings which have submitted the information. The breakdown was made based on evaluation of the prices of standalone services having close or similar characteristics (e.g.: minutes to national fixed and/or mobile networks, Internet download speed, number of television programmes, etc. included in the monthly subscription fee) of services included in the bundled service.

The revenue from the data transfer and/or Internet access services took up a leading position by a share of 46.1% in the total market volume. The relative share of revenue from this market segment within the market structure increased by 4.3 percentage points compared to 2020.

In 2021, the volume of revenue generated from voice telephony services (fixed, mobile and other voice services) remained almost at the level of the previous year (in absolute terms, the decrease was by 0.01%), however, their share of the total public electronic communications market was down by 3.7 percentage points to 36.5%.

Figure 2 presents the dynamics in the relative shares of revenue from electronic communication services within the structure of the electronic communications market for the period 2019 – 2021.



Source: Data submitted to CRC

Figure 2

As compared to the year before, revenue in the following market segments registered a growth in 2021, namely:

- "Data transfer and/or Internet access" – 21.3%; over a one-year period, the relative share of the segment grew by over 4 percentage points. This year, the growth is mainly due to the "Data transfer and/or Internet access via mobile terrestrial networks" group, as its revenue was up by 22.1%;
- "Transmission and/or distribution of radio and TV programmes services" rose by 6%. The growth recorded in this segment was mainly due to the increase in revenue from IPTV (by 18.7% compared to 2020).
- "Leased lines services" grew by 29.2% in 2021 compared to 2020. The growth is mainly due to the group "alternative wholesale leased lines", where revenue rose by 28.4% compared to 2020.
- "Other services" registered a slight growth of 0.8%. The increase in this segment is due to the "Co-location and other forms of shared use, including the provision of access to

towers, masts, etc." service (by 3% since 2020). Revenue from the "Provision of access to duct" service, included in this segment, registered, although minimal, decline of 0.7%, and that from the "Access to satellite systems" dropped by 14.2% since 2020.

The segment which registered a decline in its volume during the reporting period compared to the year before is the "Voice telephony services" – by 0.01% in absolute value, the most significant decrease being observed in the fixed telephony service – 12.3%. VoIP revenue in 2021 doubled compared to the previous year, but this is not enough to make up for the drop in revenue from other services in the segment.

Detailed information on the state and trends of the relevant market segments is provided in points 2 through 5 of this section of the report.

1.2.1. Bundled services

Revenue from bundled services[5] plays a significant role on the electronic communications market in Bulgaria. In 2021, for another consecutive year, consumption of bundled services in Bulgaria increased - as of 31.12.2021, 50% of fixed telephony service subscribers, 76% of mobile telephony service subscribers, 32% of fixed Internet access subscribers, 83% of mobile Internet access subscribers, and 34% of pay TV subscribers used the service in a bundle with other electronic communications services. As a result, the total volume of revenue (from installation fees and monthly subscriptions) gained from bundled services reached BGN 1,432.385 million,[6] which represents a growth of 11.1% compared to the revenue in the previous year.

According to the data submitted to CRC, in 2021, five undertakings launched activity for the provision of a bundled service - double-play package including fixed Internet access and television. In this way, in 2021, the total number of undertakings providing bundled services amounted to 89, which is by 1 less in comparison with the previous year (90 in 2020).

Subscribers of bundled services

The number of subscribers of bundled services toward the end of 2021, according to the data submitted by the undertakings providing public electronic communications in Bulgaria, increased compared to the previous year by 2% to reach 6.660 million. As a result, in the period 2020-2021, the value of the "penetration by population"[7] indicator also grew by 7.8 percentage points, thus reaching 102.1%.

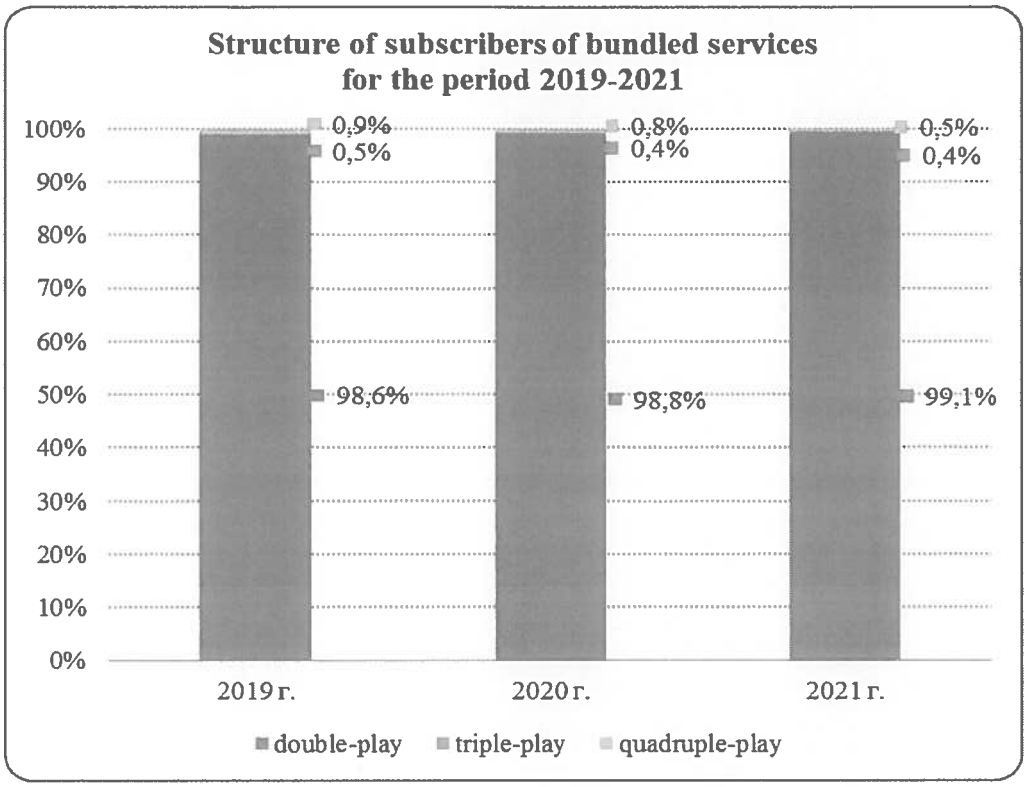
The breakdown of subscribers by types of bundled services, according to the number of electronic communications services included, in Bulgaria is presented in Figure 3.

---

[5] "Bundled services" shall mean commercial offers extended on the basis of a monthly subscription and comprising two or more of the following services: (1) Fixed broadband Internet access, (2) Fixed voice service, (3) Mobile voice service, (4) Mobile broadband Internet access, and (5) Pay TV (cable, satellite or IPTV). "Bundled services" shall include the so called "pure","joint" and "mixed" bundling.

[6] The data are included in the total volume of the electronic communications market, distributed by services but presented with a view to achieving comparability with previous years.

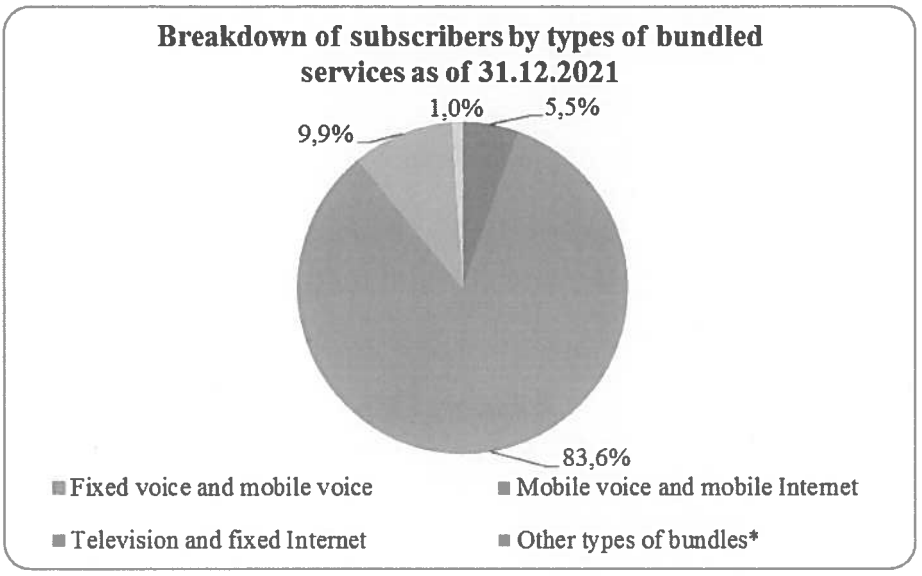
[7] This indicator was calculated as the ratio between the total number of subscribers of bundled services as of 31.12.2021 and the number of population according to preliminary NSI data from the census of the population and housing conducted in the country.
(https://nsi.bg/sites/default/files/files/pressreleases/Census2021_predvaritelna_ocenka.pdf)



Source: Data submitted to CRC

Figure 3

The data presented in Figure 3 confirm the upward trend in the share of packages including two electronic communications services (double-play packages) which has been observed during the recent years. In 2021, double-play packages covered 99.1% of the total number of subscribers of bundled services, as the number of subscribers to this kind of packages increased both in absolute (by 2.3% over a one-year period) and relative terms (by 0.3 percentage points) compared to the 2020 data. In 2021, as it was the case in the year before, the number of subscribers of quadruple-play packages dropped significantly (by 30.5%), mainly as a result of the reduction (by 29.4%) in the number of subscribers of the "Mobile voice, fixed and mobile Internet and television" package. This also affects the share of quadruple-play packages which makes up 0.5%, down by 0.3 percentage points against 2020, at the expense of an increase in the share of double-play packages. The interest in triple-play packages is also decreasing, as shown by the reported lower number of subscribers – by 2.6% compared to 2020. This reduction does not significantly affect their share, which registered a slight decrease of 0.02 percentage points compared to 2020.Figure 4 presents the breakdown of subscribers by the most preferred bundled services in 2021.



Note: "Other types of bundles" include the subscribers of bundled services, the share of which does not exceed 1% of the total number of subscribers of bundled services.

Source: Data submitted to CRC

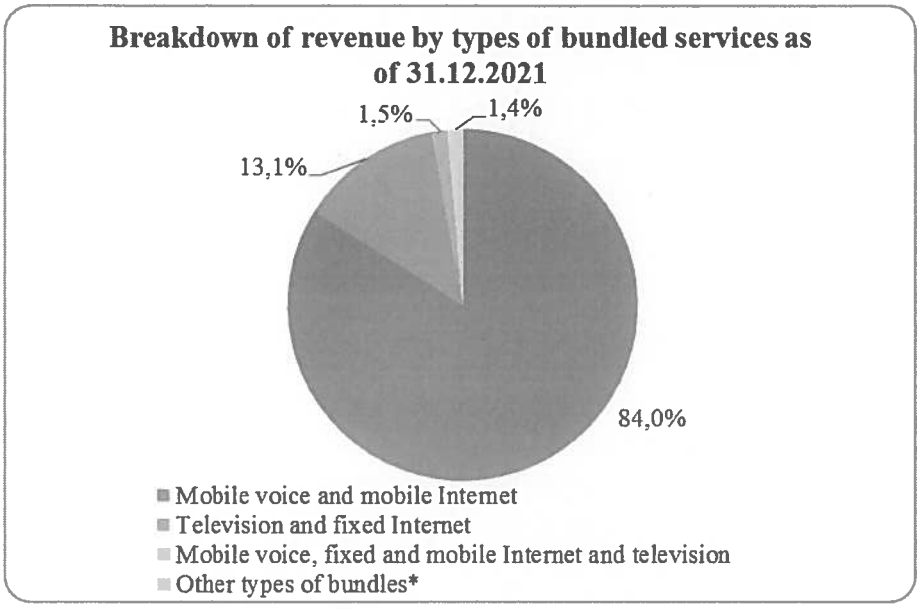
Figure 4

The number of subscribers of the most preferred bundled service – "Mobile voice and mobile Internet access" - grew by 2.7% as compared to 2020, reaching 5.566 million at the end of 2021, which affected their share (83.6%). The number of subscribers of the second most used bundle ("Television and fixed Internet access") amounted to 661 thousand in 2021, registering an increase of 0.4 percentage points in relative terms (their share makes up 9.9%). "Fixed voice service and mobile voice service" bundle, with a relative share of 5.5% of the total number of bundled services subscribers, was used by 364 thousand subscribers (down by 9.4% in absolute value).

Revenue from bundled services

In 2021, revenue from bundled services, as was mentioned above, amounted to BGN 1,432.385 million in 2021, registering a growth of 11.1% year-on-year. The highest share (97.8%) in the total volume of revenue from these services continued to be held by double-play services which, as compared to 2020, reported a growth of 12% in absolute value and by 0.8 percentage points in relative value. The share of revenue from triple-play bundles continued its downward trend in 2021 (by 0.1 percentage points), which is a consequence of the reported 1.6% drop in absolute value. Revenue from quadruple-play bundles dropped by 22.3% versus 2020, occupying 1.5% of the total volume of revenue in the segment (by 0.7 percentage points less compared to 2020).

Figure 5 presents the breakdown of revenue by types of bundled services in 2021.



Note: "Other types of packages" include revenue from packages, the share of which does not exceed 1% of the total revenue from bundled services.

Source: Data submitted to CRC

Figure 5

In 2021, the share of revenue from double-play service including mobile voice service and mobile Internet access grew by 1.3 percentage points from 2020 to reach 84% of the total volume of the revenue from bundles, and the registered growth in absolute value was 12.8%. Revenue from double-play bundled service "television and fixed Internet" reported an increase of 8.9% versus 2020; however, there is a decline of 0.3 percentage points in their share in the total revenue as compared to 2020. The share of quadruple bundled service "mobile voice, fixed and mobile Internet and television" registered a decline of 0.6 percentage points in 2021. In absolute value, the revenue from this bundle dropped by 21%. The highest growth in revenue in 2021, compared to 2020, was reported in triple-play bundle "mobile voice, fixed and mobile Internet" – 42.2%, which had an impact on its share of the total revenue (it made up 0.4%).

Summary

In 2021, the following trends were observed in the "Bundled services" segment:

- the consumption of double-play bundles continued to grow at the expense of triple-play and quadruple-play bundles;
- once again, the most preferred bundled services were those that included mobile service – 89.9% of the total number of subscribers used bundles with mobile voice included, while 84.4% of the subscribers used bundles with mobile Internet included;
- the growth in the total volume of revenue from bundled services was mainly due to the higher revenue generated from bundles with mobile service included (mobile voice and/or mobile Internet).

1.2.2. Investments

In 2021, despite the COVID-19 pandemic, 404 undertakings (by only 1 less than in 2020) invested funds in the construction and maintenance of public electronic communications networks in the amount of BGN 567.258 million, which is by 32% more compared to the previous year's investment.

During the year, BGN 130.589 million were invested in fixed networks for the provision of electronic communication services, of which BGN 69.923 million (by BGN 17.415 million more than the previous year) were invested in next-generation access (NGA) networks.

In 2021, the investments in mobile networks in the amount of BGN 259.418 million made up 46% of the total investments of the undertakings, registering an increase of nearly 78% in absolute terms for a one-year period. This growth is directly linked to investments in the construction and deployment of 5G networks.

2. Voice telephony services

The "voice telephony services" segment includes the following public electronic services: fixed telephony service through geographic numbers from the National Numbering Plan (NNP), "Carrier Selection" service, telephony services via public payphones, mobile telephony service through numbers from the NNP (including SMS[8] and MMS[9]) and other voice services (VoIP services, provision of voice service through commercial representation, etc.).

Table 2 presents summarised information on the reviewed segment in 2021, namely: the number of undertakings which provided services in this market segment, the number of their subscribers/lines that used voice telephony services, and the revenue from services provided.[10]

Table 2

Number of undertakings, subscribers/lines and revenue by type of voice telephony services provided in 2021

Service	Number of undertakings providing the service in 2021	Number of subscribers/lines as of 31.12.2021		Revenue (in millions BGN, excl. VAT)	
		Total [1]	incl. bundled service subscribers	Total [2]	including from bundled services
1. Fixed telephony service through numbers from the NNP and public payphones	30	759,069*	380,907	81.588	4.852
2. Mobile telephony service through numbers from the NNP	4	7,902,756	5,984,743	1,023.819	605.291
3. Other voice services	24	///	///	44.199	///
Total	**51**	///	///	**1, 149.605**	**610.144**

[1] Including subscribers of bundled services.

[2] Including the share of revenue from the provision of voice services bundled with other electronic communication services.

* Number of lines of fixed telephony service subscribers.

Note: The symbol /// used in this document means that the information is not applicable to the indicated parameter or is confidential.

Source: Data submitted to CRC

The total number of undertakings which declared activity on providing services included in the "Voice telephony services" segment in 2021 amounted to 51. Services from the "Mobile telephony service through numbers from the NNP" group were provided by four undertakings. The number of undertakings which declared activity on providing fixed telephony services through numbers from the NNP and via public payphones/telephone booths during the year reached 30, as their number remained unchanged compared to the year before. Twenty-nine of

[8] Short message service.

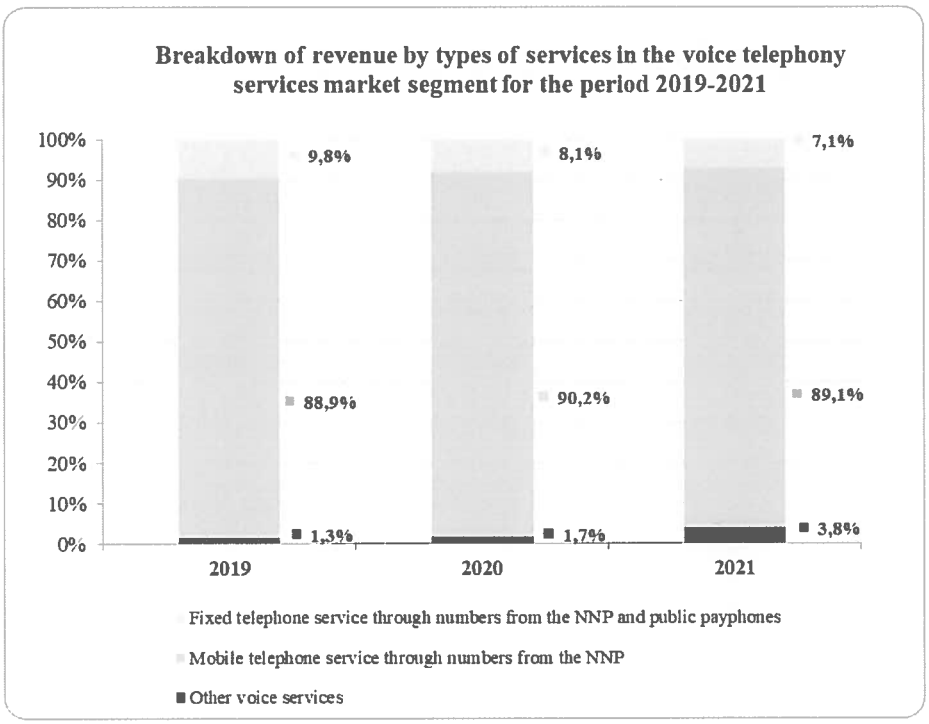
[9] Multimedia messaging service.

[10] Detailed information on the provision of fixed and mobile telephony services is presented in points 2.1 and 2.2.

them provided access to fixed telephony service and/or wholesale services for interconnection of public telephone networks, including Bulgarian Telecommunications Company EAD, which also provided the service through public payphones/telephone booths. In addition to BTC, only one other undertaking declared that it provided fixed telephony service through public payphones/telephone booths.[11] In 2021, the number of undertakings providing other voice services was 24, by three undertakings more than the previous year.

In 2021, the total volume of revenue generated from voice telephony services with revenue from bundled services included, amounted to BGN 1,149.605 million, remaining nearly at the level of the year before (BGN 1,149.745 million) – a change of only 0.01%. Revenue from mobile voice service, accounting for the major share of the "Voice telephony services" segment (89.1%), fell by 1.3% in 2021 compared to 2020, with a 0.4% fall in the previous period (2019-2020). The fixed telephony service, including that provided by public payphones, reported a 12.3% decrease in the volume of revenue generated, with a 18.9% reduction over the previous one-year period. The total reduction in the volume of revenue generated by the provision of telephone services through geographic and mobile numbers from the NNP is compensated by the double increase reported in total revenue from services included in the "Other voice services" group. This growth is entirely due to the increase in revenue from the retail and wholesale VoIP services, which account for the major share in this group - 99.3% in 2021, with a 98.0% share in the previous year.

Figure 6 shows the distribution of revenue from different services in the segment volume for the period 2019-2021.



Source: Data submitted to CRC

Figure 6

[11] In 2020, the number of undertakings which declared activity on providing fixed telephony service through numbers from the NNP and via public payphones/telephone booths reached 30. Of these, 28 undertakings declared activity on providing access to a public telephone service through geographic numbers from the NNP and/or wholesale services for interconnection of public telephone networks. Apart from BTC, only two other undertakings provided a service through public payphones/telephone booths.

For yet another year, the largest share of the total market segment under review was formed by revenue from mobile telephony service (89.1%, with 90.2% in the previous year). The share of revenue from fixed telephony service dropped by 1 percentage point, while the share of other voice services rose by 2.1 percentage points.

2.1. Fixed telephony service

Market players

As of 31.12.2021, the total number of undertakings authorised by CRC to provide access to fixed telephony service through primary assigned resource - geographic numbers - and access to public telephony service through the "carrier selection" service was 22, which is by three less than at the end of 2020.[12] A total of 20 undertakings were registered for their intention to provide public electronic communication services through resale of fixed telephony service through secondary assigned numbers. The undertakings listed in the CRC register with the intention of providing telephone services via public payphones at the end of 2021 were 12.

In 2021, the total number of undertakings which declared activity on providing fixed telephony service through numbers from the NNP and/or wholesale services for interconnection of public telephone networks reached 29. Of these, 24 undertakings declared activity on providing access to fixed telephony service to end-users through geographic numbers. Fifteen of them provided the service through a primary assigned resource, while nine declared activity on resale of fixed telephony service through secondary assigned numbers. Five undertakings declared that they provided only wholesale services ("transit" and "interconnection") related to the provision of fixed telephony service. In 2021, two undertakings declared activity on providing telephony service through public payphones/telephone booths, one of which was BTC.

The main providers of fixed telephony service through numbers from the NNP to end-users (retail service) were BTC, A1 Bulgaria EAD (A1) and Yettel Bulgaria EAD (Yettel).

Table 3

Market shares of undertakings providing retail fixed telephony service through NNP numbers

Undertaking	2020		2021	
	Share based on number of subscrion lines	Share based on revenue from subscribers	Share based on number of subscription lines	Share based on revenue from subscribers
BTC	59.5%	83.4%	57.6%	83.3%
A1 Bulgaria EAD	25.1%	7.3%	26.5%	6.7%
YETTEL Bulgaria EAD	13.3%	5.2%	13.7%	5.5%
All other	2.1%	4.1%	2.2%	4.6%

Source: Data submitted to CRC

In 2021, the main competitors on the retail fixed telephony service market (BTC, A1 and Yettel) accounted for nearly 98% of the market volume, measured on the basis of the number of

[12] In 2021, authorisations for the use of an individually assigned scarce resource - numbers for the provision of public electronic communications - were amended and/or suspended for three undertakings which provided access to a fixed telephony service to end-users in 2020. The authorisation of Novatel EOOD was suspended at the request of the undertaking (CRC Decision No 70/18.02.2021). The authorisation of Net Is Sat EOOD was suspended after the transfer of a scarce resource - numbers to Net 1 EOOD, starting from the entry in the Commercial Register of the incorporation of Net Is Sat EOOD into Net 1 EOOD (CRC Decision No 241/15.07.2021). By Decision No 344 of 30.09.2021, CRC authorised the transfer of part of the rights and corresponding obligations included in the authorisation of Net 1 EOOD to use a scarce resource - numbers - to BTC.

telephone lines of fixed telephony service subscribers and a little over 95% of the revenue generated from retail service subscribers.

As shown in the table above, the conversion carried out in 2021 through the incorporation of Net Is Sat EOOD into Net 1 EOOD as well as the acquisition of the capital of Net 1 EOOD by BTC did not cause any changes in the market shares of the main service providers.

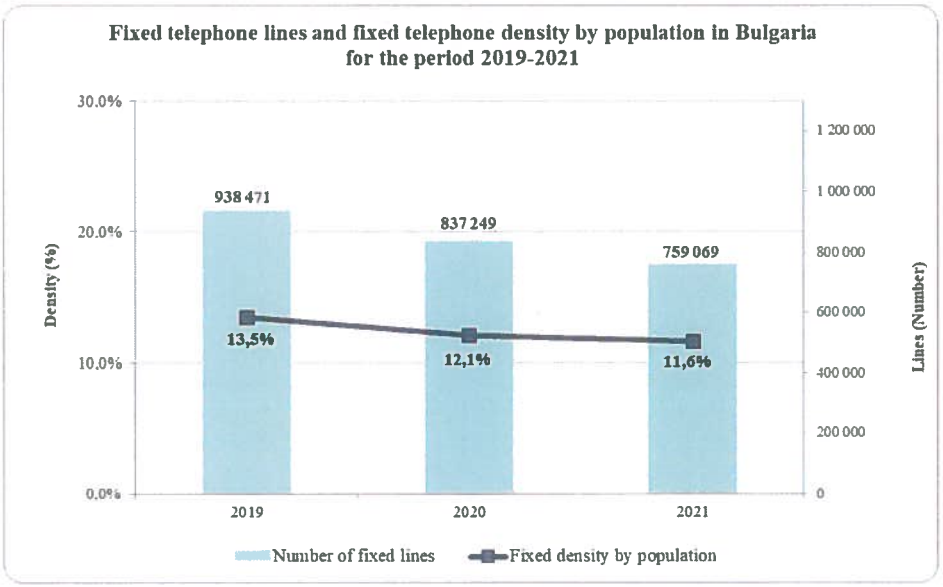
BTC's market share, calculated on the basis of fixed telephone lines, decreased by 1.9 percentage points in 2021 compared to 2020, reaching a value of 57.6%. The share of A1 increased by 1.4 percentage points over the one-year period. The smallest change - an increase of 0.4 percentage points - was observed in the market share value of Yettel. The fixed telephone lines of the subscribers of all other undertakings accounted for 2.2% of the market, measured on the basis of the number of telephone lines.

The market shares of undertakings, calculated on the basis of revenue from the provision of fixed telephony service to subscribers, also did not change significantly in 2021 versus 2020. BTC's share remained at the level of the previous year, with a reduction of 0.1 percentage points in 2021. A1 also reported a decline - down by 0.6 percentage points, and the retail revenue generated by the undertaking made up 6.7% of this market segment. An increase was recorded in Yettel's market share by 0.3 percentage points. The cumulative market share of the other market players rose by 0.5 percentage points from 4.1% in 2020 to 4.6% in 2021.

Telephone lines of fixed telephony service subscribers

In 2021, for yet another year, the downward trend in the number of fixed telephone lines was preserved. It was the result of the decreased interest of end-users in the fixed telephony service. The decline in the total number of fixed telephone lines was by 9.3% compared to 2020, which is by 1.5 percentage points less than the decrease registered in 2020 versus 2019 (10.8%). The number of BTC's lines decreased by 12.3% in 2021, with a drop of 11.7% in the previous period (2019-2020), and as for the other undertakings, the reduction in the total number of fixed telephone lines of fixed telephony service subscribers was by 5.0% in 2021 compared to 2020, with 9.4% for the previous reporting period.

Figure 7 presents information on the variation in the number of fixed telephone lines and the fixed density by population for a three-year period.



Source: Data submitted to CRC

Figure 7

As a result of the year-on-year decline in the total number of fixed telephone lines (by 19.1% for the period 2019-2021), the value of the fixed telephone density by population indicator also decreased, reaching 11.6%[13] in 2021.

At the end of 2021, the number of public payphones/telephone booths decreased by half from the end of 2020, due to the withdraw of BTC's obligation to provide public payphones and/or other points for public access to voice telephony services of certain quality. During a transitional period, the undertaking will continue to provide the service through public payphones and/or other points for public access to voice telephony services of certain quality, installed at specific places of public significance.[14]

Consumption (traffic) of fixed telephony service

The data provided by undertakings on the consumption of fixed telephony service for 2021, as in the previous year, do not suggest that the COVID-19 pandemic had a significant impact on the segment, since the overall trends of decline in the service consumption were maintained.

The total volume of the outgoing traffic (in minutes), originated by the end-users[15] for national (local and long-distance calls, calls to mobile terrestrial networks and non-geographic numbers) and international calls amounted to 446.043 million minutes in 2021. This indicator registered a decline for yet another year, down by 14.8%, with a fall of 4.8% for the period 2019-2020. The consumption of the "carrier selection" service was also symbolic in 2021, with only one company[16] declaring the provision of this service.

The share of traffic generated by calls included in the subscription plans in 2021 rose again (by 0.5 percentage points) and reached 89.6%, indicating that the model of service provision, consisting of including an increasing volume of telephone traffic in the monthly subscriptions of fixed telephony service subscribers continued to apply. As a result, only 10.4% of the total traffic generated is paid by subscribers outside of their monthly subscription.

Figure 8 displays the breakdown of the total volume of traffic generated from fixed networks in the period 2019-2021, depending on the call destinations.

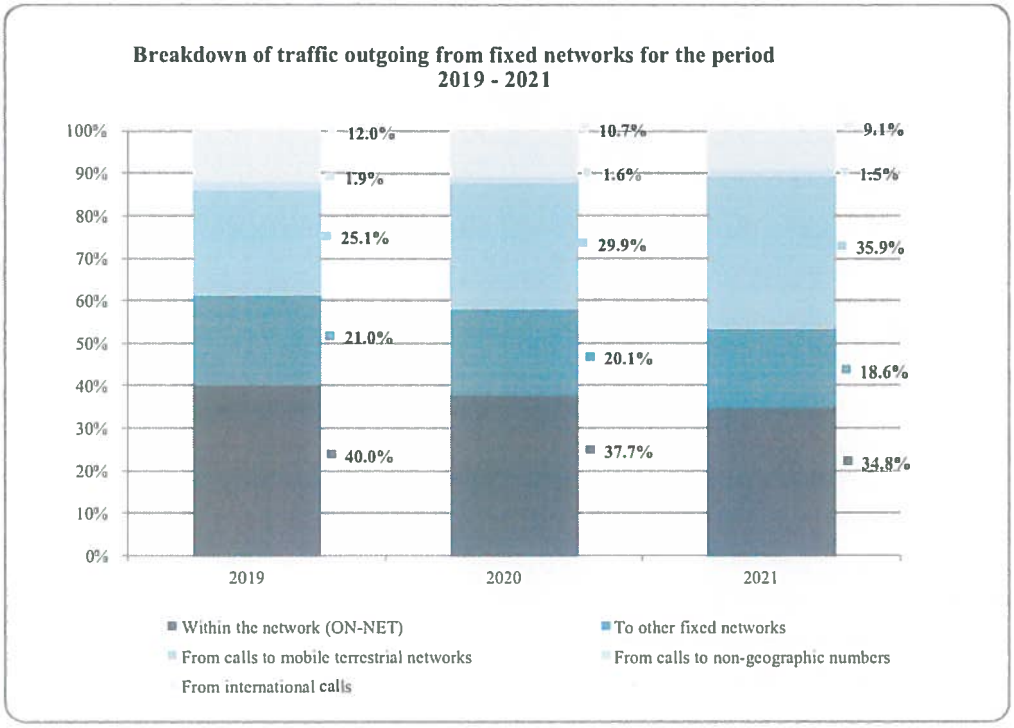
---

[13] The "fixed density by population" indicator was calculated as the ratio between the total number of active telephone lines as of 31.12.2021 and the number of population as of 07.09.2021, according to preliminary NSI data from the census of the population and housing conducted in the country. (https://nsi.bg/sites/default/files/files/pressreleases/Census2021_predvaritelna_ocenka.pdf)

[14] According to CRC Decision No 350/30.09.2021, BTC will continue to maintain public payphones and/or other points of public access voice telephony services of certain quality, installed, as of the date of this Decision, at the following locations: airports, ports, railway and bus stations serving international destinations, motorways, hospitals and police stations.

[15] Includes traffic originated by subscribers of fixed telephony services (including the "carrier selection" service), as well as traffic originated from public payphones/telephone booths.

[16] Eastern Telecommunications Company EAD



Source: Data submitted to CRC

Figure 8

In 2021, as in the previous year, an increase in the volume of traffic from calls was recorded only for calls to mobile networks - by 2.5% over a one-year period, which, accompanied by the already established steady downward trend in the traffic from the fixed telephony service, has led to a change in the segment structure, calculated based on the outgoing traffic. The share of traffic from calls to mobile networks grew by 6 percentage points and in 2021 accounted for the largest share (35.9%) of the total volume of outgoing traffic from fixed telephony service.

For the remaining types of calls, a decrease, both in absolute terms and as a share in the total volume, was observed in 2021 compared to 2020, as follows:

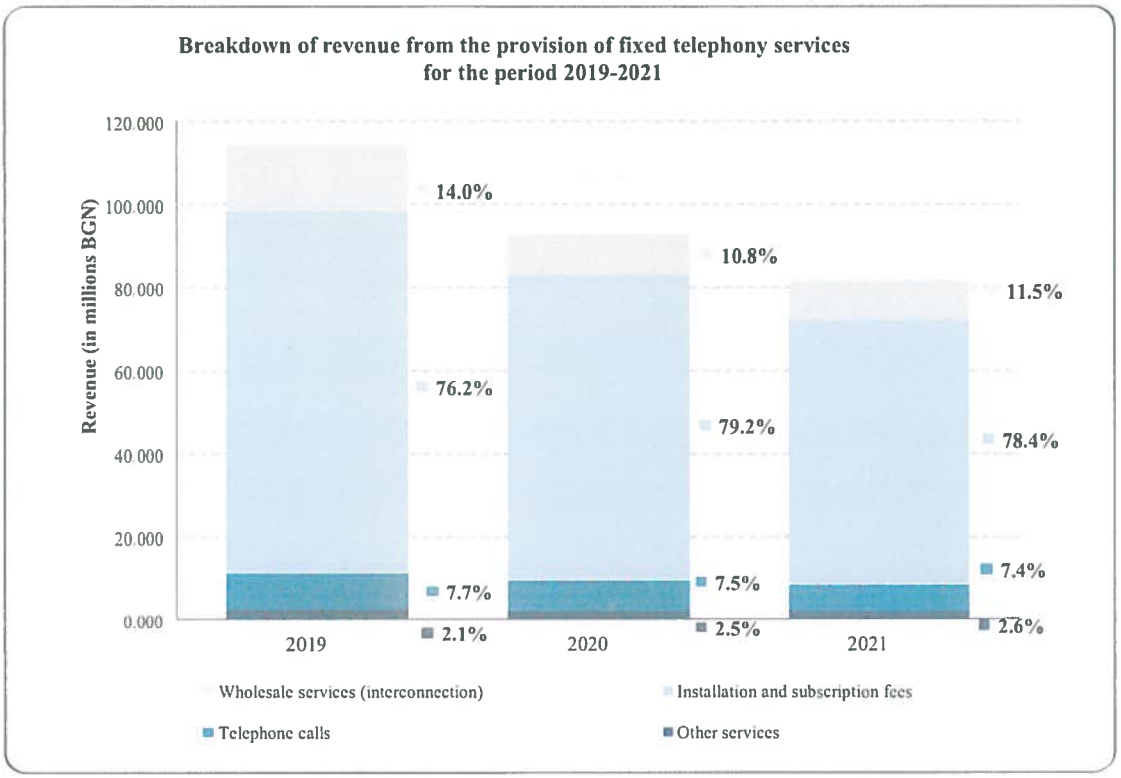
- the volume of traffic within the networks (on-net) dropped by 21.4% and the share it made up in the total volume of traffic generated was down from 37.7% to 34.8%;
- traffic from calls to other fixed networks (off-net) fell by 21.0% and its share dropped by 1.5 percentage points compared to the year before, down to 18.6%;
- calls to networks abroad accounted for 9.1% of the total retail traffic and decreased both as a relative share of the total consumption by 1.6 percentage points and in absolute terms by 27.1%.

The data show that in 2021, as in the previous year, the regulation of international call rates within the European Union (EU), adopted on 15 May 2019, did not affect the downward trend in the consumption of calls to EU/EEA[17] countries by residential subscribers. The major part (about 94%) of the total traffic generated for this type of calls comes from consumption included in the subscription plans.

[17] European Union/European Economic Area.

Revenue from fixed telephony service

In 2021, the total volume of revenue generated from the provision of fixed telephony service[18] amounted to BGN 81.588 million, registering a decline of 12.3% compared to 2020. In 2021, revenue from public payphones/telephone booths continued to drop, making up only 0.01% of the total revenue from fixed telephony service.



Source: Data submitted to CRC

Figure 9

In 2021, the revenue from installation and subscription fees from the provision of fixed voice services to end-users, including the part of a bundled service, formed the main part of the total revenue generated from the service – 78.4%, compared to 79.2% in 2020.

The main changes reported in terms of revenue generated from fixed telephony service in 2021 are as follows:

- drop in the volume of revenue generated from the provision of access to the fixed telephony service (installation and subscription fees) of 13.1% compared to the preceding year;
- the revenue generated from calls beyond the subscriptions decreased by 13.6% in 2021 compared to 2020, due to the decreased consumption of the services as well as to the high proportion of "free minutes" used, included in the price of monthly subscriptions;
- in 2021, a decrease was also registered in the revenue from wholesale services (including interconnection services - origination, termination, transit and realization of interconnection) by 6.2%.

The adoption of the delegated act on uniform European voice call termination rates for mobile and fixed networks (Delegated Regulation (EU) 2021/654) also had no impact on the fixed telephony service segment as wholesale voice call termination rates for fixed networks

[18] Including revenue from calls through the "carrier selection" service and public payphones/telephone booths.

applied from 01.07.2021, according to the Regulation, are very close to the rates applied in the first half of 2021.[19]

Summary

The fixed telephony service segment in 2021 is characterized by the following changes:

- the number of fixed telephone lines of subscribers to a fixed telephony service continues to drop year-on-year - for 2021, the decline was by 9.3% compared to the year before;
- the total consumption of the service, expressed in minutes of retail call traffic, shrinks, with growth being recorded only for calls to mobile networks for yet another year. The revenue generated by the provision of the service is also decreasing, with the main share in the volume being made up of subscription fees;
- the volume of traffic generated from calls included in subscriptions continues to increase, with subscribers paying only 10.4% of the traffic beyond their subscriptions in 2021.

2.2. Mobile telephony service

Market players

In 2021, a total of five undertakings were authorised by CRC for the use of an individually assigned scarce resource - radio frequency spectrum (in the 900 MHz, 1800 MHz and 2 GHz bands) for the implementation of electronic communications via a terrestrial network capable of providing mobile electronic communications services. These are A1, BTC, Yettel, Bulsatcom EOOD (Bulsatcom), and Ti.Com AD (Ti.Com). The last two of those undertakings were issued authorisations only for the 1800 MHz band, which expired on 15.12.2021.

The reports presented in CRC on the activities for the provision of public electronic communications in 2021 show that four of the above five undertakings provided a mobile telephony service during the year (A1, BTC, Bulsatcom and Yettel), as Bulsatcom provided the service until 15.12.2021. At the time of preparation of this annual report, CRC did not receive any annual activity report for 2021 from Ti.Com. According to the undertaking's latest report on the activities for the provision of mobile services as of 30.06.2021,[20] Ti.Com did not provide mobile telephony service by that date, but only mobile access to the Internet.

With the expiry of Bulsatcom's authorisation in mid-December 2021, as of 31.12.2021, the number of active participants on the Bulgarian mobile telephony service market was three: A1, BTC and Yettel.

Since its entry into the mobile telephony service market in 2018, Bulsatcom did not build up a serious customer base until its exit in late 2021, therefore, the redistribution of its subscribers between the remaining three active undertakings in the mobile market does not have an impact on their market positions. As of 31.12.2021, the market shares of the three undertakings, calculated on the basis of number of subscribers, were respectively: A1 - 37.3%, Yettel - 33.0% and BTC - 29.7%. (Table 4). The distribution of market shares on the basis of revenue from the provision of a retail mobile telephony service in 2021[21] was: 39.5% for Yettel, 35.1% for A1, 25.3% for BTC, and 0.002% for Bulsatcom.

---

[19] Cost-oriented call termination rates at a fixed location for individual public networks defined by CRC Decision No 550/20.10.2016.

[20] Information according to Appendix 4 to CRC Decision No 295/12.08.2021 (activity report questionnaire as of 30.06.2021 for undertakings providing public mobile services (telephone and/or data transfer services) via mobile terrestrial networks using radio spectrum (GSM, UMTS, LTE).

[21] Market shares were calculated based on revenue from the provision of retail mobile telephony service (revenue from retail service provided standalone and the part of revenue provided bundled with other electronic communication services). In the 2010-2017 Annual Reports of CRC, market shares based on revenue were

Table 4

Market shares of undertakings providing retail mobile telephony service

Undertaking	2020		2021	
	Share based on number of subscribers	Share based on revenue	Share based on number of subscribers	Share based on revenue
A1 BULGARIA EAD	38.1%	33.0%	37.3%	35.1%
YETTEL BULGARIA EAD	33.4%	41.6%	33.0%	39.5%
BTC	28.5%	25.4%	29.7%	25.3%
BULSATCOM EAD*	0.02%	0.002%	0.00%	0.002%
TI.COM AD**	0.0%	0.0%	0.0%	0.0%

*The undertaking provided mobile telephony service until 15.12.2021.
** The undertaking did not provide mobile telephony service in 2020 and in 2021.

Source: Data submitted to CRC

The data in Table 4 show that, in 2021, changes in market shares based on both the number of subscribers and the retail revenue from mobile telephony services were not significant and did not lead to rearrangement of the positions of mobile undertakings in the segment. BTC registered a small increase in the market share based on number of subscribers and a symbolic decrease in the market share based on retail revenue. A1 experienced a slight decrease in the market share based on number of subscribers and a slightly more significant increase in its market share based on revenue - to compare with, in the previous year 2020, both indicators fell since 2019. Yettel reported a drop of market shares based on both revenue and on number of subscribers. The particular values of the changes in the market shares of A1, Yettel and BTC in 2021, compared to 2020, are as follows:

- the relative share of A1, calculated on the basis of number of subscribers, dropped by 0.8 percentage points, while the one calculated on the basis of revenue rose by 2.2 percentage points;
- the relative share of Yettel, calculated on the basis of number of subscribers, was down by 0.4 percentage points, while the one calculated on the basis of revenue fell by 2.1 percentage points;
- the relative share of BTC, calculated on the basis of number of subscribers, increased by 1.2 percentage points, whilst the one calculated on the basis of revenue was down by 0.1 percentage points.

The data presented on the dynamics in the market shares of mobile undertakings in 2021 show that the health and economic crisis caused by the COVID-19 pandemic for a second consecutive year did not lead to rearrangement of the positions of Bulgarian mobile undertakings in the mobile telephony service segment in the country as compared to the previous year 2020.

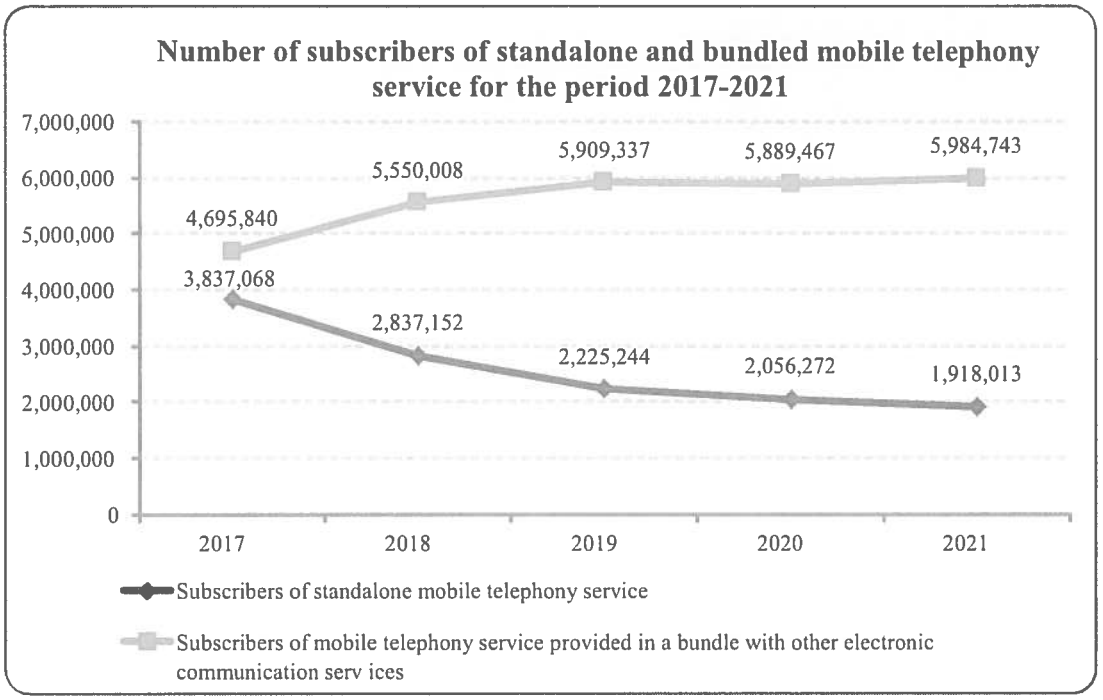
Subscribers of mobile telephony service

As of 31.12.2021, the number of mobile telephony service subscribers (number of unique SIM cards) amounted to 7,902,756. Compared to the previous year 2020, there was a reduction of 0.5% (as of 31.12.2020, the number of subscribers was 7,945,739). It should be noted that the

calculated based on revenue from the provision of wholesale mobile telephony service and revenue from retail service provided standalone, excluding the part of revenue from the provision of the service bundled with other electronic communication services.

fall in the number of subscribers in 2021 was by 1.8 percentage points lower than the one observed in 2020 (2.3%).

Data provided to CRC by undertakings show that, as of 31.12.2021, postpaid subscribers were almost by 34 thousand less than the previous year (down by 0.5%), while the number of end-users of prepaid cards decreased by 9 thousand compared to the end of 2020 (down by 0.7%). To compare with, in 2020, the registered decline of postpaid subscribers was 1.7% and in the case of prepaid cards it was 5.7%. These data show that the negative impact reported in 2020 caused by the Coronavirus pandemic on business and ordinary end-users (consolidation of end-user use of SIM cards and deactivation with the purpose of reducing the costs of telecommunication services of unused SIM cards by business subscribers) subsided in 2021. The number of subscribers using mobile telephony services in a bundle with other electronic communications services continued to rise in 2021 and reached 5,984,743 by the end of 2021 (Figure 10), which represents 75.7% of the total number of mobile telephony service subscribers in Bulgaria as of 31.12.2021. Over the last five years (2017-2021), the reported growth in the number of subscribers using the service in a bundle has been 27.5%.

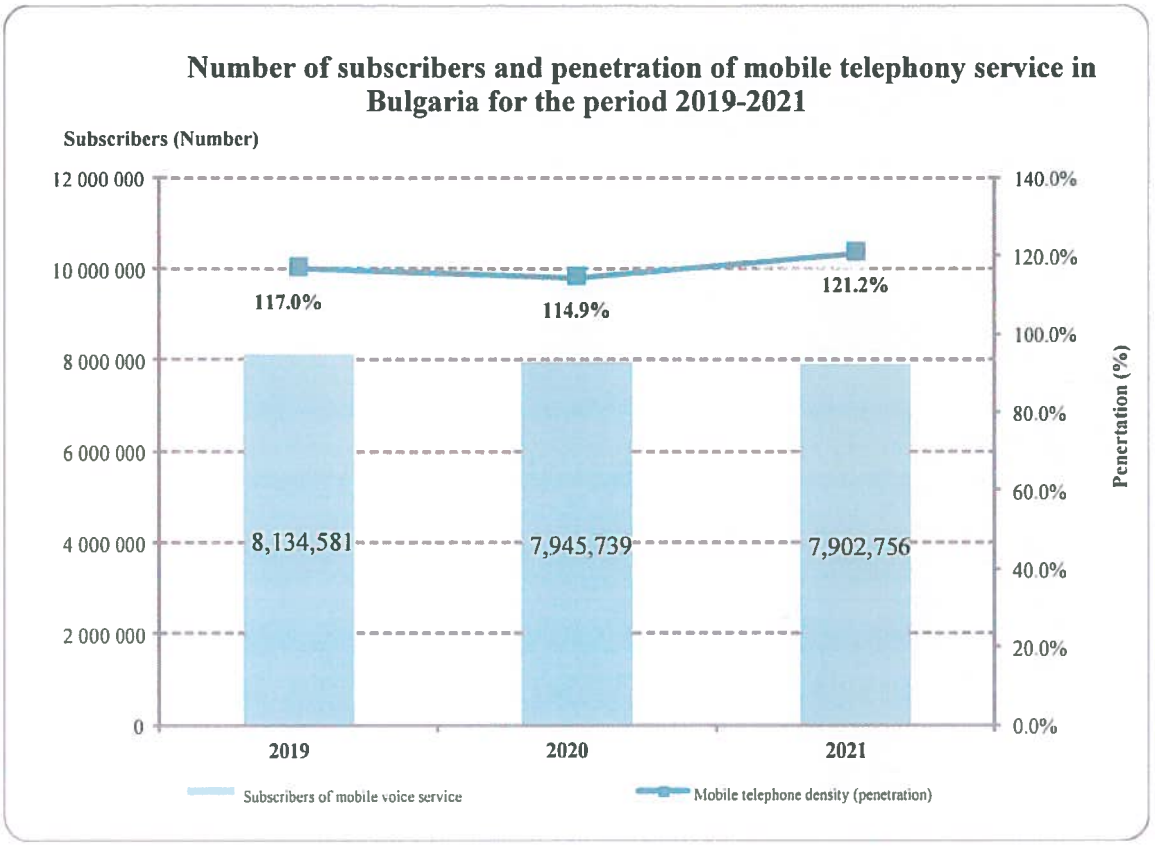


Source: Data submitted to CRC

Figure 10

The figure below presents information on the number of subscribers of mobile telephony service and service penetration ("mobile telephone density") among the population for the period 2019-2021.[22] As is evident from the data presented, the persistent downward trend in penetration of the service among the population in recent years was transformed in 2021 into a 6.3 percentage point increase (from 114.9% as of 31.12.2020, mobile telephony service penetration rose to 121.2% as of 31.12.2021).

[22] The "mobile telephone density" indicator was calculated as the ratio between the number of subscribers to mobile telephony service as of 31.12.2021 and the number of population as of 07.09.2021, according to preliminary NSI data from the census of the population and housing conducted in the country (https://nsi.bg/sites/default/files/files/pressreleases/Census2021_predvaritelna_ocenka.pdf) .



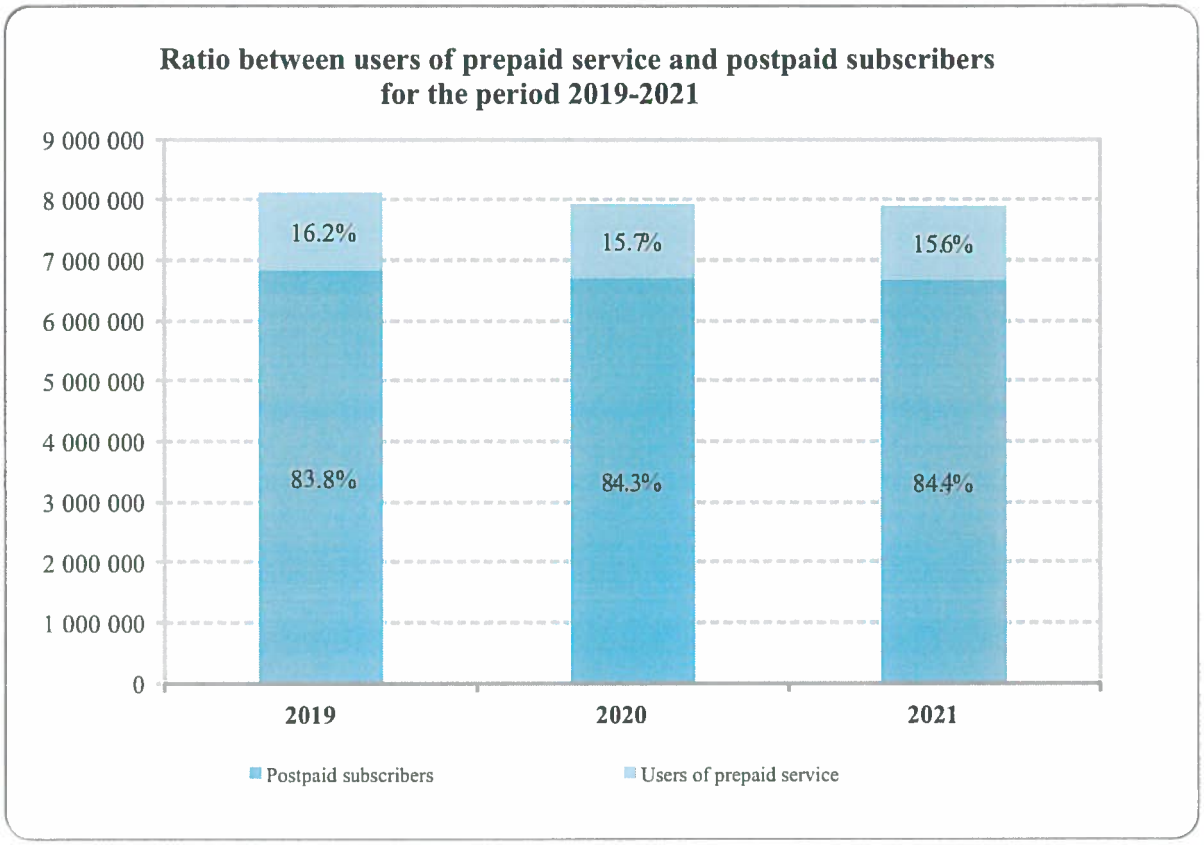
Source: Data submitted to CRC

Figure 11

The observed increase in mobile telephony service penetration in 2021 is a result, above all, of the significant decline in the NSI's data on the number of Bulgarian population. According to an preliminary estimation of the census conducted in 2021 by the NSI, as of 7 September 2021, this figure was 6,520,314, or by 5,7% less, compared to the population reported at the end of 2020[23] . Another factor, which also contributes to a mobile telephone density increase in 2021 in the country, is the relatively smaller decrease (by 0.5%) in the number of mobile telephony service subscribers compared to the one reported in 2020 (2.3%).

The following figure shows the proportion of subscribers to prepaid mobile telephony service and those who use the service on the basis of a monthly subscription contract signed with a mobile undertaking.

[23] Population by districts, municipalities, residence and sex: http://www.nsi.bg/bg/node/2972



Source: Data submitted to CRC

Figure 12

As shown in the figure above, as of 31.12.2021, the change in the proportion of subscribers to prepaid mobile telephony service and postpaid subscribers, compared to the previous year, is insignificant - by 0.1 percentage point. The share of subscribers using prepaid service is reduced to 15.6%, while 84.4% have a monthly subscription contract with a service provider.

Consumption (traffic) of mobile telephony service

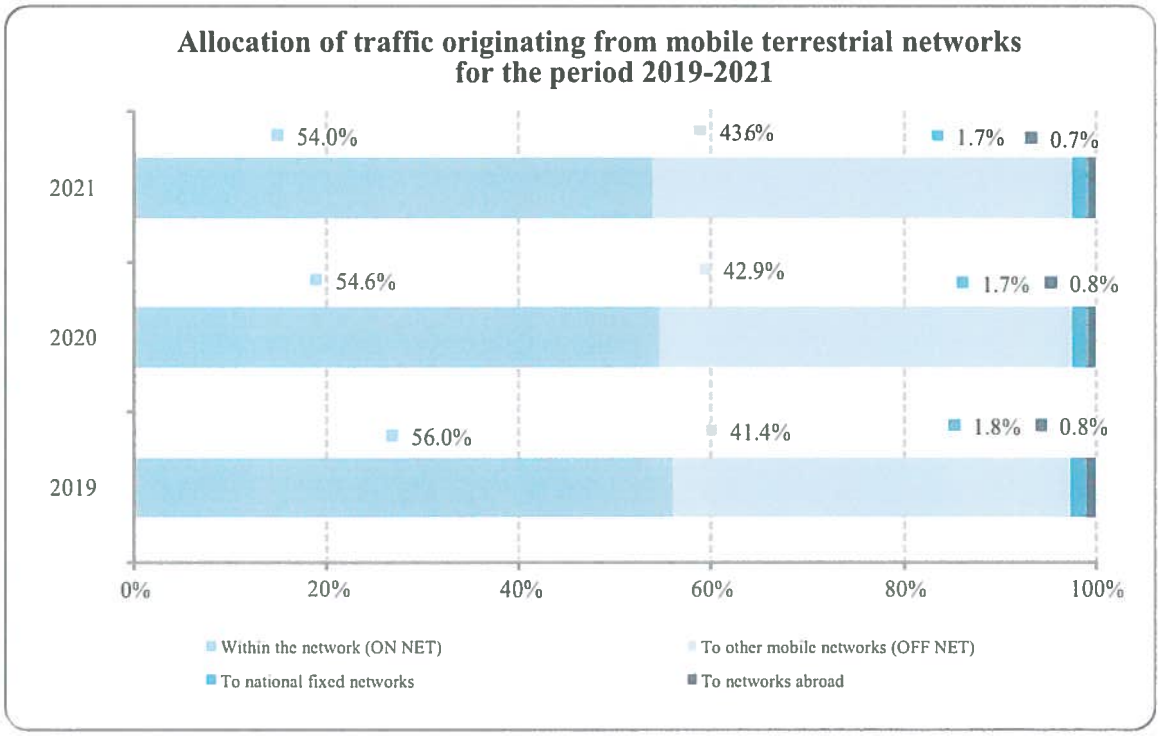
The total volume of mobile outgoing traffic in the country[24] in 2021 amounted to 22,091.57 million minutes, which represents a 0.6% increase in the consumption of mobile telephony services compared to the previous year 2020. This growth is symbolic compared to the reported record growth of 12.1% in the first year of the COVID-19 pandemic, but it shows that the "softer" measures of social distance imposed in 2021 did not lead to a decline in the service consumption and it continued to have a leading role and potential for the development of the voice telephony service segment in Bulgaria, as well as of the electronic communications services market in general. In 2021, for the second year in a row, there was an increase in the number of minutes used from mobile to fixed networks in the country (0.9%), while the increase in the number of minutes used to other mobile networks in the country was 2.4%. The number of minutes used to networks abroad dropped by 8.3% versus 2020, and there was also a decline in the on-net consumption of mobile calls - by 0.7%.

[24] Including outgoing traffic generated by mobile telephony service subscribers within a mobile network (on-net traffic), to other mobile networks in the country (off-net traffic), to fixed networks in the country and to networks abroad.

As regards international calls, it should be noted that, unlike the growth recorded in the previous two years in the consumption of international mobile telephone calls to EU/EEA networks, as a result of the regulation of the rates of international calls to networks from these countries introduced on 15 May 2019, there was a 5.6% fall in the consumption of these calls in 2021. According to information from mobile undertakings, the decline reported is the result of Britain's exit from the EU (the so-called Brexit).

The share of consumption (number of call minutes) by subscribers with prepaid SIM cards in the total consumption of mobile telephony service in 2021 continued to drop gradually, and was reduced to 3.4% (3.6% in 2020). The share of consumption by postpaid subscribers rose, reaching 96.6%. Unlike the previous year 2020 when both categories of subscribers experienced an increase in the total volume of their call minutes, in 2021, there was although a slight increase (of 0.9%) for postpaid subscribers, while a drop of 6.7% was reported for prepaid subscribers.

Following the growth of 9.4% reported in 2020 in the consumption of mobile calls within a given mobile network (on-net), in 2021, the volume of this traffic registered an insignificant decline of 0.7% since 2020. This has led to a slight decrease of 0.6 percentage points in the share which this traffic occupies in the total volume of traffic generated on mobile networks in the country. As shown in the figure below, the share of on-net traffic is decreasing for another year - from 54.6% in 2020 to 54.0% in 2021. The steady upward trend in the share of off-net traffic continued for yet another year and its share reached 43.6% in 2021. These figures show that the retail conditions and prices for calls to other mobile networks in the country offered by mobile undertakings to end-users are competitive with those offered for calls within their own network. The fact that end-users have favourable conditions for both on-net and off-net calls means that the product and pricing strategies of mobile undertakings do not lead to a restriction of competition in the mobile voice service market by "closing traffic" within their own network.



Source: Data submitted to CRC

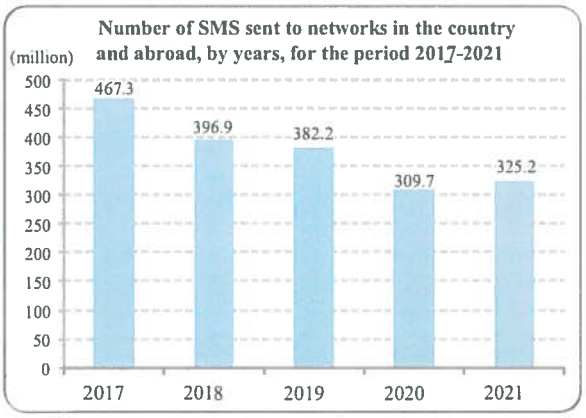
Figure 13

The figure above shows that the share of traffic to fixed networks in the country remained unchanged since the year before - 1.7% in both 2020 and 2021. The share of traffic to networks abroad (0.7% in 2021) dropped by 0.1 percentage point compared to 2020.

With regard to roaming calls, it should be noted that despite the "softer" COVID-19 measures for travelling abroad in 2021, outgoing roaming calls from subscribers of Bulgarian undertakings abroad decreased by another 3.4% compared to 2020, and the total volume of incoming calls to subscribers of Bulgarian undertakings abroad was down by 7.6%.

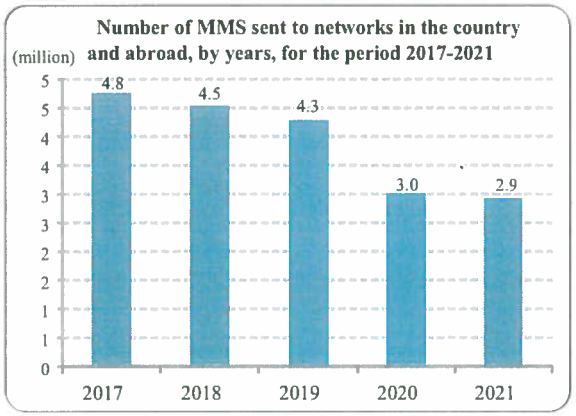
Short multimedia and text messages

In 2021, the total number of short text messages (SMS) sent by Bulgarian subscribers to networks in the country and abroad amounted to 325.2 million (Figure 14) and the total number of short multimedia messages sent (MMS) amounted to 2.9 million (Figure 15).



Source: Data submitted to CRC

Figure 14



Source: Data submitted to CRC

Figure 15

As shown in the figures above, for the first time in years short text messages registered a growth (5,0%), while MMS messages dropped for another consecutive year (3.3%). According to data provided by mobile undertakings, the increase in the volume of SMS messages sent in 2021 was the result of changes in their product portfolio and the offer of tariff plans with "free" SMS messages included in the price of the monthly subscription.

The number of SMS sent in roaming continued to decline, down by 3.2% in 2021, while the number of MMS messages reported an increase of 80.8%.

Revenue from mobile telephony service

In 2021, the total volume of revenue from the provision of mobile telephony service amounted to BGN 1,023.819 million, registering a drop for yet another year (by 1.3%), as compared to the previous year 2020. To compare with, the decline in revenue reported in 2020 was by 0.4%.

The volume of revenue from the provision of retail mobile telephony service was BGN 835.466 million, while that of revenue from wholesale services amounted to BGN 188.353 million. This data shows that, for yet another year, the decline in mobile telephony service revenue was provoked by a decrease in retail revenue: by 1.7% compared to 2020. Wholesale revenue (interconnection) increased by 0.6% for the fourth year in a row. In relation to the new, but relatively identical to the previously applicable wholesale voice call termination rates (as defined in the Delegated Act on European single voice call termination rates in mobile and fixed networks (Delegated Regulation (EU) 2021/654)), applied from 1 July 2021, it should be noted that, in 2021, there was a small decrease (by 1.1%) in the total volume of relevant wholesale

revenue.

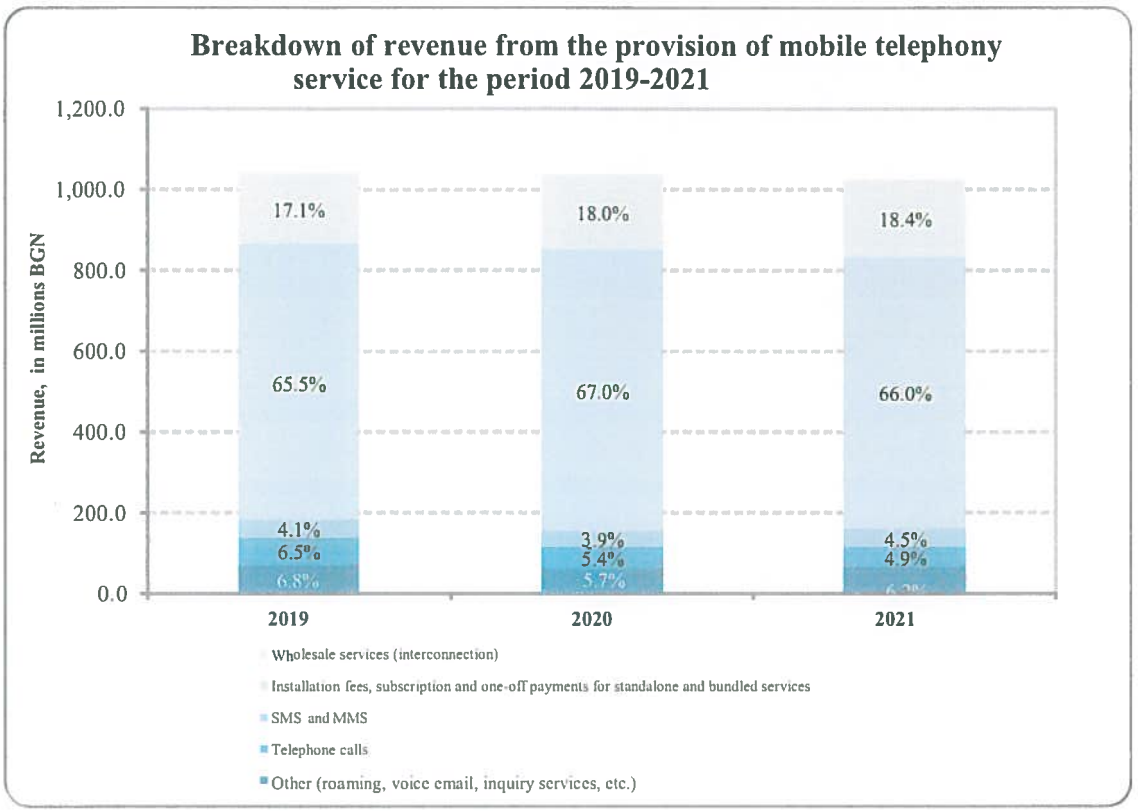
The total volume of revenue from non-traffic and traffic mobile services provided at retail level by mobile operators to business subscribers also registered a growth (by 6.1%) compared to 2020.

The data analysis shows that the decline in revenue from the provision of retail mobile telephony service in 2021 was mainly the result from a drop in the non-traffic revenue from the provision of retail mobile telephony service[25] standalone (by14.4%) as well as from the decline in the part of revenue from the provision of the service bundled with other electronic communications services (by 1.2%). The figures available to CRC indicate that the fall in non-traffic retail services from the provision of the service standalone in 2021 was provoked by a drop of 25.4% in monthly subscription revenue. As shown in Figure 10 above, the number of subscribers using a mobile telephony service standalone decreases annually at the expense of those using it in a bundle. This leads to a downward trend in the volume of revenue generated from monthly subscription by subscribers of a standalone service, with a 73.9% drop in the volume of these revenues over the last 5 years (2017 through 2021) (over the same period, the number of subscribers using the service standalone decreased by 50%).

With regard to the first recorded fall in the revenue generated by mobile telephony service provided in a bundle in 2021, it should be noted that it was provoked by two factors: 1) high share of subscribers using the double-play "mobile voice and mobile Internet access" service (93% of mobile voice bundled subscribers) and 2) the availability of an increasing volume of mobile Internet traffic in subscription plans, which results in a drop in the proportion of the mobile voice in the total price of the monthly subscription fee paid by the bundled service subscribers.

The breakdown (structure) of revenue from mobile telephony service for the period 2019-2021, by years, is presented in Figure 16. It shows that, despite the registered decline, in 2021, revenue from monthly subscription fees and installation charges of standalone and bundled provision of the mobile telephony service, which held the largest share in the segment (66.0%), continued to play a key role. The small growth of the total volume of wholesale revenue, reported in 2021, led to a slight increase in its share in the segment which reached 18.4%. The share of revenue from telephone calls (4.9%) registered a decline for yet another year - by 0.5 percentage points.

[25] Includes the following revenue from the standalone provision of a mobile telephony service: revenue from monthly subscription and installation fees, revenue from number portability, revenue from contracts concluded with applicants for short and/or non-geographic numbers (from one-off and regular/monthly payments) and other revenue from one-off payments for ancillary services (e.g. replacement of SIM card, issuance of itemised bills, change of telephone number, number by choice and other similar services).



Source: Data submitted to CRC

Figure 16

The share of revenue from SMS and MMS registered an increase in 2021 (by 0.6 percentage points). The share of revenue from other services also grew by 0.5 percentage points, mainly as a result of the growth reported in 2021 in the revenue from calls from the "700" range, included in this group of revenues.

Summary

The total volume of mobile telephony service revenue in 2021 continued to decrease, but in the second year of the COVID-19 pandemic outbreak an increase was once again observed in the consumption of telephone calls on mobile networks in the country. The number of subscribers shows a significantly smaller decrease compared to the previous year 2020, which shows that the negative impact on the indicator which was reported in the first year of the crisis subsided in 2021.

The total revenue from the provision of a retail mobile telephony service was negatively affected by the growth in the number of subscribers using the service in a bundle with mobile Internet access, as it accounts for an increasing share of the total monthly subscription price paid by the subscribers for a bundled service.

The total revenue from the provision of a wholesale mobile telephony service increased for the fourth year in a row, and it is relatively slightly affected by the new (applied from 1 July to 31 December 2021), but relatively similar wholesale voice call termination rates previously applied in Bulgaria (under Delegated Regulation (EU) 2021/654).

Despite the "softer" anti-epidemic measures and the possibility of travelling abroad under certain conditions (possession of a vaccination certificate or a negative COVID-19 test), in 2021,

consumption and revenue from roaming mobile calls once again registered a fall, albeit at a significantly lower level.

3. Leased lines services

The 2021 data submitted by the undertakings providing the leased lines service, including international leased lines, interrupted the downward trend observed over the last more than ten years in this market segment. The total revenue from the provision of the service in 2021 amounted to BGN 24.757 million, registering an increase of 29.2% compared to revenue generated the year before.

Summarised information on the number of undertakings that provided leased lines services, including international leased lines, and on the volume of revenue generated from them is presented in Table 5 below.

Table 5

Number of undertakings, number of lines and revenue by type of leased lines provided in 2021

Service	Number of undertakings providing the service in 2021	Number of leased lines as of 31.12.2021	Revenue in 2021 (in millions BGN, excl. VAT)
1. Wholesale leased lines	**22**	**2,813**	**20.723**
1.1. National leased lines	20	2,368	14.219
1.2. International leased lines	8	445	6.504
2. Retail leased lines	**12**	**1,734**	**4.034**
Total	**26**	///	**24.757**

Source: Data submitted to CRC

Market players

According to information submitted to CRC, 26 undertakings (out of 115 that have notified CRC of their intention to provide the leased lines service, entered in the public register as of 31.12.2021) were active in the market segment. Eight undertakings provided the service both in the retail and in the wholesale market, and also eight undertakings provided the wholesale international leased lines service.

Tables 6 and 7 present the market shares of the major undertakings providing retail/wholesale leased lines in 2021.

Table 6

Market shares of undertakings providing retail leased lines

Undertaking	2020		2021	
	Share based on number of retail lines	Share based on retail revenue	Share based on number of retail lines	Share based on retail revenue
BTC	77,6%	62,4%	77,0%	60,5%
A1 BULGARIA EAD	11,1%	19,4%	11,5%	21,9%
SOFIA COMMUNICATIONS EAD	4,1%	6,6%	3,4%	4,9%
All other	7,2%	11,7%	8,1%	12,7%

Source: Data submitted to CRC

In 2021, as opposed to 2020, the total market share (91.9%) based on number of retail lines of the three major undertakings dropped by 0.9 percentage points, with the most significant decrease registered in the share of Sofia Communications EAD[26] – by 0.7 percentage points. Based on retail revenue, the decline reported in the share of the three undertakings was higher - by 1 percentage point. As a result, the remaining players increased their share proportionally, both by revenue and by number of lines.

Table 7

Market shares of undertakings providing wholesale leased lines

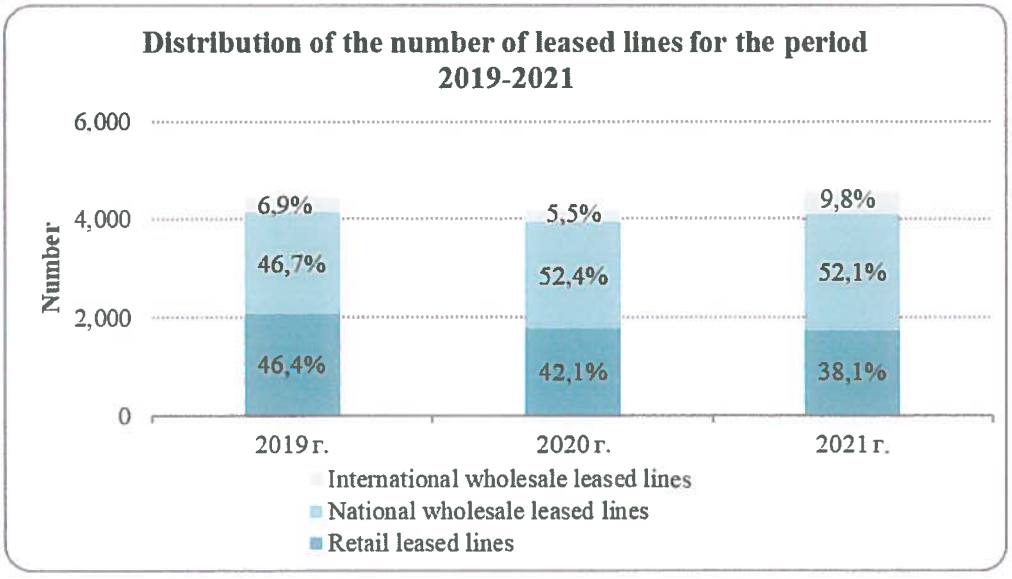
Undertaking	2020		2021	
	Share based on number of wholesale lines	Share based on wholesale revenue	Share based on number of wholesale lines	Share based on wholesale revenue
NOVATEL EOOD	30.1%	43.0%	25.6%	29.5%
NETERA EOOD	1.5%	3.1%	21.2%	29.2%
SOFIA COMMUNICATIONS EAD	22.4%	6.2%	15.2%	4.2%
All other	46.0%	47.6%	38.0%	37.1%

Source: Data submitted to CRC

In 2021, as opposed to 2020, the total market share (62%) based on number of wholesale lines of the three major undertakings rose by 8 percentage points. This is mainly due to the migration of data transfer services to leased lines. Based on wholesale revenue, the increase reported in the share of the three undertakings was by 10.5 percentage points.

Number of wholesale and retail leased lines

The number of retail leased lines provided continued to decrease in 2021, and the decline registered year-on-year was by 1.6%. The number of wholesale leased lines registered a growth of 16.0%.



Source: Data submitted to CRC

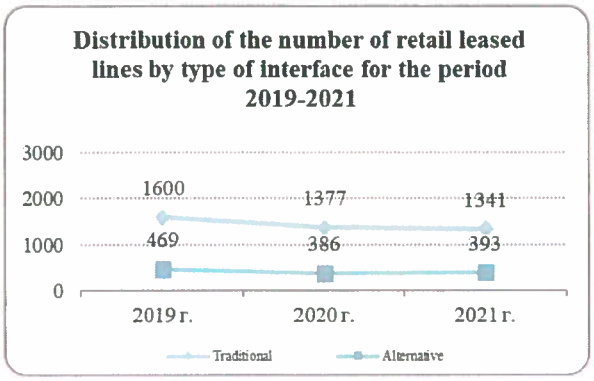
Figure 17

The breakdown of leased lines is displayed in Figure 17. The decrease in the share of

[26] Cetin Bulgaria EAD is the sole owner of the capital of Sofia Communications EAD as of 15.07.2021.

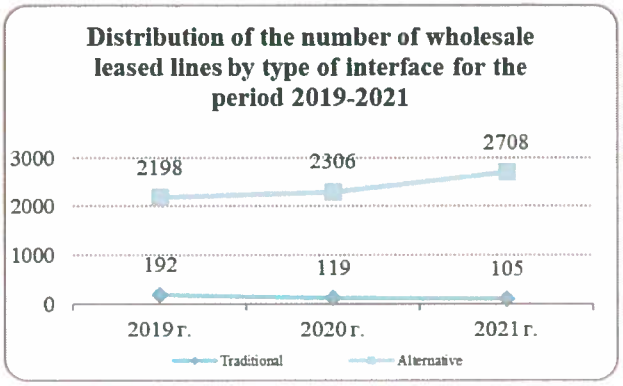
retail leased lines compared to the previous year was by 4 percentage points. In 2021, there was an increase of 5.7 percentage points in the share of national wholesale leased lines, while the share of international ones rose by 4.3 percentage points.

Figures 18 and 19 present the distribution of the number of retail and wholesale leased lines provided for the period 2019 – 2021 by type of interface.



Source: Data submitted to CRC

Figure 18



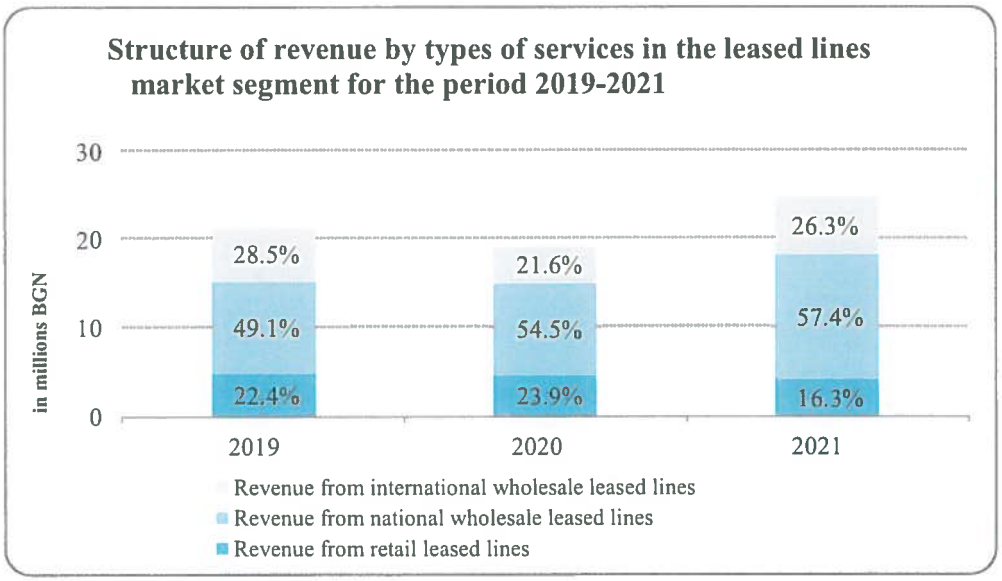
Source: Data submitted to CRC

Figure 19

The total decline in retail leased lines made up 1.6% in 2021, with traditional lines decreasing by 2.6%, while alternative lines were up by 1.8%. The reported growth (16.0%) in the number of wholesale leased lines was the result of the 17.4% increase in the number of alternative wholesale lines. The number of traditional wholesale leased lines continued to decrease (by 11.8%) at a slowing drop rate compared to the previous period (the decrease in 2020 versus 2019 was by 38.0%).

Revenue from leased lines

Figure 20 presents the structure of revenue generated from the provision of leased lines services (wholesale and retail) for the period 2019-2021.



Source: Data submitted to CRC

Figure 20

In 2021, the significant increase in revenue from international wholesale leased lines (by 57.1% compared to the 2020 figures) as well as revenue from national wholesale leased lines (by 36.2% compared to the 2020 figures) affected the ratio between revenues by types of services in the total segment volume. As a result, the share of national wholesale leased lines increased by 3 percentage points, while the share of international lines grew by 4.7 percentage points. Compared to 2020, in 2021, the share of retail leased lines dropped by 7.6 percentage points.

Summary

The following trends were observed in the leased lines services segment in 2021:

- entry of three new undertakings providing the leased lines service;
- reduction in retail revenue, but increase in wholesale revenue;
- decline in the number of retail leased lines and increase in the wholesale leased lines;
- increase in the number of alternative leased lines at the expense of traditional ones.

4. Data transfer and Internet access

In 2021, the total volume of revenue generated from services included in the data transfer and Internet access segment amounted to BGN 1,451.381 million, registering an increase of 21.3% compared to the previous year 2020.[27]

Table 8 presents summarised information about the number of undertakings which provided services in this market segment in 2021 as well as about the number of their subscribers/users and the revenue generated from them.

Table 8

Number of undertakings, subscribers/users and revenue by type of Internet access and data transfer services provided in 2021

Service	Number of undertakings providing the service in 2021	Number of subscribers/users as of 31.12.2021		Revenue (in millions BGN, excl. VAT	
		Total [1]	incl. bundled services subscribers	Total [2]	incl. revenue from bundled services
1. Retail Internet access and data transfer services	657	///	///	1,228.630	675.921
1.1. Internet access[3] including	650	8,994,431	6,294,956	1,171.511	675.921
1.1.1. fixed	650	2,251,986	729,117	329.572	68.680
1.1.2. mobile [4]	4	6,794,109	5,617,503	841.939	607.241
1.2. Data transfer services	53		///	56.575	///
1.3. Other services (hosting, e-mail, etc.)	17	2 484	///	0.543	///
2. Wholesale services	141	///	///	222.751	///
2.1. Provision of capacity for Internet connectivity (Peering and Transit)	97	750	///	27.471	///
2.2. Data transfer services	28	314	///	9.816	///
2.3. Wholesale provision of Internet access via next generation access networks (NGA)	51	266	///	4.230	///
2.4. Other wholesale services	14	22	///	181.234	///
Total	699	///	///	1,451.381	///

[1] Including subscribers of bundled services.

[27] The data for 2020 have been updated. Revenue from the segment in 2020 amounted to BGN 1,196.457 million

[2] Including revenue from bundled services.

[3] The data on the total number of subscribers and revenue from Internet access services have been obtained on the basis of data received in CRC from 89.8% of the registered undertakings.

[4] Including mobile access via data cards or modems and bundled services with mobile access to the Internet (including subscribers to data transfer bundles bought in addition to voice plans via 3G, 4G and 5G UMTS/HSPA+/LTE+/NR (5G) mobile networks).

Source: Data submitted to CRC

Market players

The number of undertakings actually providing Internet access and data transfer services in 2021 was 699,[28] by 3 undertakings less compared to 2020.[29] The number of undertakings providing retail services was 657, down by 10 undertakings since the year before,[30] while the number of undertakings providing wholesale services increased by 11 undertakings over the one-year period.

The major providers of fixed Internet access to end-users (retail service) in 2021, as well as in the year before, were BTC, A1 and Bulsatcom.

Table 9

Market shares of undertakings providing retail fixed Internet access

Undertaking	2020		2021	
	Share based on number of fixed access subscribers[1]	Share based on revenue from fixed access [2]	Share based on number of fixed access subscribers	Share based on revenue from fixed access [2]
BTC	27.2%	21.6%	31.4%	24.6%
A1 BULGARIA EAD	26.0%	15.8%	26.9%	18.7%
BULSATCOM EAD	8.1%	9.1%	7.6%	8.0%
All other	38.6%	53.6%	34.2%	48.6%

[1] Including subscribers of bundled services.

[2] Including revenue from bundled services

Source: Data submitted to CRC

In contrast to previous years, as shown in Table 9, in 2021, BTC registered a significant increase in its market share on the basis of number of subscribers - by 4.2 percentage points (by comparison, the growth in 2020 was by 0.2 and in 2019 - by 0.1 percentage points). A1 also maintains the trend of increasing its market share and registered a 0.9 percentage point increase compared to 2020. Bulsatcom continued the negative trend in its market share based on number of subscribers reported from the previous years, registering a decline of 0.6 percentage points. With regard to the market share of undertakings based on revenue from retail fixed Internet access, including the share of revenue from the provision of fixed Internet access bundled with other electronic communications services, BTC and A1 increased their market share by 3.0 and 2.9 percentage points, respectively. The third undertaking, Bulsatcom, once again registered a fall in the share of revenue from fixed access of 1 percentage point compared to 2020. The most

[28] Including undertakings that notified CRC for suspension of their activity in 2021 and declared revenue during the year.

[29] The data for 2020 have been updated.

[30] The data for 2020 have been updated.

significant changes in the shares based on subscribers and revenue were observed for undertakings classified as "all other" (all of these, which are outside the top three of the undertakings with the highest market share), which registered a significant drop by 4.5 and 4.9 percentage points, respectively. This noticeable change in the market share on a subscriber basis and on the basis of revenue from fixed Internet access at retail level was mainly driven by mergers and acquisitions carried out in 2021 by BTC (Net 1 EOOD[31], Comnet Sofia EAD[32], Digital Cable Television EOOD[33] and Net Is Sat EOOD[34]) which affected BTC's market share.

In 2021, mobile Internet access was provided by all five mobile undertakings - A1, BTC, Bulsatcom, Yettel and Ti.Com.[35] Table 10 presents their shares in the provision of mobile Internet in 2020 and 2021.

Table 10

Market shares of undertakings providing retail mobile Internet access

Undertaking	2020		2021	
	Share based on number of mobile access subscribers[1]	Share based on revenue from mobile access[2]	Share based on number of mobile access subscribers[1]	Share based on revenue from mobile access[2]
BTC	34.2%	34.7%	35.0%	32.2%
A1 BULGARIA	33.8%	35.6%	33.4%	37.0%
YETTEL	31.8%	29.6%	31.6%	30.8%
BULSATCOM*	0.02%	0.02%	0.00%	0.01%
TI.COM**	0.03%	0.06%	0.00%	0.00%

[1] Including subscribers of a standalone service via data cards or modems and subscribers of bundled services including a certain volume of data traffic at maximum speed and/or volume of data traffic per month.

[2] Including revenue from a standalone service via data card or modem, traffic revenue and the proportion of revenue from the provision of mobile Internet in a bundle with other electronic communications services.

*The service was provided until 15.12.2021 due to the expiry of Authorisation No 01759/15.12.2011.

**The undertaking did not submit an annual activity report for 2021 pursuant to Decision No 415/09.12.2021 and its Authorisation No 01757/15.12.2011 has expired.

Source: Data submitted to CRC

As is evident from the data presented on the table, there was no shift in the positions of undertakings providing retail mobile Internet access in 2021. Among the three largest undertakings in the mobile Internet access market, a slight increase in the market share based on subscribers was only observed in BTC - by 0.8 percentage points. This slight increase comes at the expense of the share of A1 and Yettel, which registered a decrease of 0.4 and 0.3 percentage points, respectively. There is no shift in positions and market shares calculated on the basis of

[31] The acquisition is considered to be in effect as of 28.05.2021. The undertaking has transferred its data transfer and Internet access activities (except for the MAN wholesale access) to BTC. It was not deleted from the CRC public register.

[32] The acquisition is considered to be in effect as of 11.05.2021. The undertaking ceased operations on 17.09.2021 and was incorporated into BTC. It was deleted from the CRC public register.

[33] The acquisition is considered to be in effect as of 11.05.2021. The company ceased operations on 21.07.2021 and was incorporated into BTC. It was deleted from the CRC public register.

[34] The undertaking ceased operations on 23.08.2021. It was deleted from the CRC public register.

[35] The undertaking did not submit an annual activity report for 2021 pursuant to Decision No 415/09.12.2021 and its Authorisation No 01757/15.12.2011 has expired. However, it should be borne in mind that the undertaking has been active during the year as it declared mobile subscribers in the broadband Internet access questionnaire as of 01.07.2021 in accordance with Decision No 234/01.07.2021

revenue – it should be noted that A1 and Yettel reversed the negative results of the previous year and their market shares increased by 1.4 and 1.2 percentage points, respectively. In contrast to 2020, BTC's revenue fell by 2.5 percentage points. A drop of 0.01 percentage points compared to the previous year was also observed in Bulsatcom's market share. Although Ti.Com did not provide an annual activity report for 2021, the undeclared annual revenues from the provision of the service will not lead to substantial changes in the structure of the market shares of undertakings.

Subscribers of Internet access services

As of 31.12.2021, the total number of retail Internet services subscribers (fixed and mobile Internet access) was 8.994 million, registering an increase of as much as 4.2% after the slow growth rate of only 1.7% recorded in the previous year, moving closer to the growth rates of the pre-pandemic 2019 (compared to 5.4% growth in 2019 versus 2018). The growth trend in the number of bundled service subscribers (with fixed and/or mobile Internet access included) was also maintained in 2021. In contrast to the previous year (a growth rate of only 0.6% in 2020), there was some recovery of growth rates, with an increase of 2.8% in absolute terms over the last year, reaching up to 6.295 million subscribers to bundled services, and it should be noted that this growth remains far from the growth recorded in the pre-pandemic 2019, namely 5.5%. The slowdown in the growth rate of bundled service subscribers registered in the last two reporting periods is reflected in their share based on the total number of subscribers[36] and in 2021 they already accounted for 70%, which is a decrease of 0.9 percentage points compared to the previous year.

The total number of subscribers of fixed Internet access (including services provided in a bundle) preserved its steady growth rate. Over the past year, the number of subscribers grew by 6.5%, reaching 2.252 million, as this increase was due both to the rise in the number of subscribers to fixed access provided standalone (by 7.9%) and to the growth in the number of subscribers to fixed access provided in a bundle (by 3.5%). The share of fixed access subscribers in the total number of subscribers of Internet access registered a growth of 0.5 percentage points year-on-year,[37] and already made up 25%.

In 2021, the number of subscribers using mobile Internet access services[38] slightly restored their growth rate (by comparison, the growth was only 0.7% in 2020 compared to 2019), with a registered growth rate of 3.2%, reaching 6.794 million. The situation with subscribers to mobile Internet access in a bundle is similar - at the end of 2021, their number reached 5.617 million, up by 2.5% since 2020 (compared to only 0.1% in 2020 versus 2019). For the second year in a row, there has been a growth in the number of subscribers using the service standalone (via data cards and/or modem). The registered growth rate was 7.2% compared to 2020 (3.5% increase in 2020 compared to 2019), with the number of these subscribers reaching 1.177 million at the end of 2021. The number of LTE[39] mobile Internet access subscribers registered a growth of 8.3% compared to the previous year, reaching 4.724 million as of 31.12.2021. The share of LTE subscribers in the total number of mobile subscribers already reached 69.5%, rising by 3.2 percentage points.

---

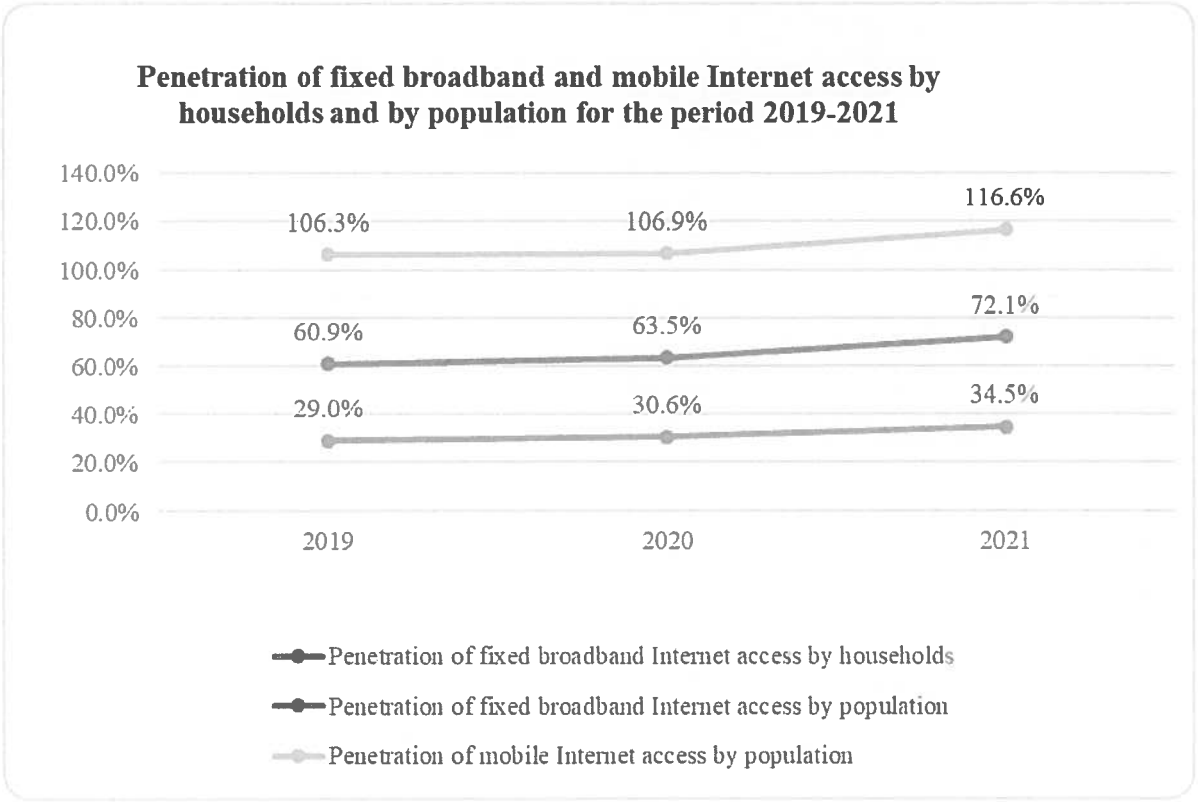
[36]To avoid duplication, subscribers of bundled services with both fixed and mobile Internet access are excluded from the total number of Internet access subscribers.

[37]The data for 2020 have been updated.

[38]Standalone service via data cards or modems and bundled services with mobile Internet access included via 3G, 4G and 5G UMTS/HSPA+/LTE+/NR (5G) mobile networks (including data transfer packages, purchased in addition to voice plans).

[39] Including subscribers to 5G NR networks.

Figure 21 presents penetration of fixed broadband Internet access by population[40] and by households[41] as well as of mobile access[42] by population for the period 2019-2021.



Source: Data submitted to CRC

Figure 21

The indicators of "fixed broadband penetration by households", "fixed broadband penetration by population" and "mobile Internet access penetration by population" have grown strongly since the previous year, by 8.6, 4.0 and 9.8 percentage points, respectively. The main reason for this sensitive growth is due to the significant decline in the NSI's population and household figures, according to the preliminary assessment of the 2021 census conducted by NSI. Another factor contributing to the growth of these indicators is the rising rate of development of fixed and mobile broadband access.

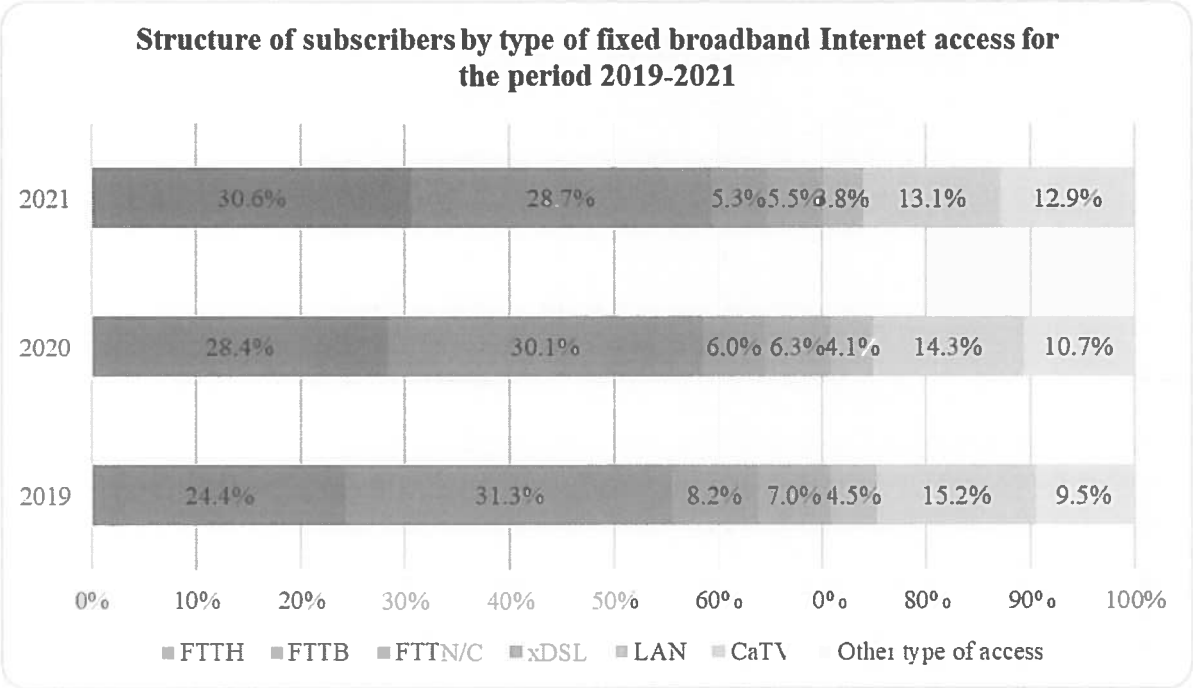
The breakdown of subscribers by type of fixed Internet access for the period 2019-2021 is shown in Figure 22.

---

[40]This indicator was calculated as the ratio between the number of subscribers of fixed access as of 31.12.2021 and the number of population as of 07.09.2021 according to NSI data (preliminary assessment of the 2021 census conducted by NSI:
https://www.nsi.bg/sites/default/files/files/pressreleases/Census2021_predvaritelna_ocenka.pdf).

[41]This indicator was calculated as the ratio between the number of residential subscribers of fixed access as of 31.12.2021 and the number of households as of 07.09.2021 according to NSI data (preliminary assessment of the 2021 census conducted by NSI:
https://www.nsi.bg/sites/default/files/files/pressreleases/Census2021_predvaritelna_ocenka.pdf).

[42] These include: subscribers of bundled services with mobile Internet access included (including subscribers of data transfer bundles purchased in addition to voice plans), subscribers of standalone services via data cards or modems, as well as subscribers of mobile Internet access services provided without an individual subscription. This indicator was calculated as the ratio between the number of subscribers of mobile access as of 31.12.2021 and the number of population as of 07.09.2021, according to NSI data (preliminary assessment of the 2021 census conducted by NSI:
https://www.nsi.bg/sites/default/files/files/pressreleases/Census2021_predvaritelna_ocenka.pdf).



Source: Data submitted to CRC

Figure 22

At the end of 2021, the majority of subscribers of fixed Internet access in Bulgaria mainly used access via fibre-optical networks (FTTH, FTTB and FTTN/C) – 64.7%. The growth recorded versus 2020[43] was by 0.2 percentage points, as the number of subscribers using fibre-optical networks rose by 6.8% in absolute terms.

The only change in the structure of subscribers by type of fixed broadband access to the Internet concerns the leadership position where FTTH access, with its 30.6% share, replaced from the top FTTB (28.7% share) for the first year.

The next place, with a 13.1% share, is held by CATV access subscribers (based on networks for transmission and/or distribution of radio and TV programmes and DOCSIS standard). By the end of 2021, almost all subscribers of CATV access (98.4%) used DOCSIS 3.0 protocol, whereby the maximum speed to the subscriber can reach up to 200 Mbps. To compare with, at the end of 2019, the subscribers using DOCSIS 3.0 were 95% of the CATV access subscribers, with an increase of 3.4 percentage points for the period.

The downward trend in the subscribers of xDSL access, provided only by BTC, continued in 2021 as well. Compared to the end of the previous year, the number of subscribers of that type of access dropped by 7.5% in absolute terms, thus registering a 12.5% decline for the period 2019-2021. Migration of BTC subscribers to optical access was preserved as well, registering an increase of 36% in the number of BTC subscribers using fibre-optical networks over a one-year period, which is by 28.7 percentage points more compared to the growth registered over the previous one-year period. For the period 2019-2021, the growth was 46% in absolute value. The main reason for this significant growth lies in the acquisitions and mergers carried out by BTC in 2021.[44] Another factor contributing to this trend is the ongoing migration of subscribers from xDSL to fiber access. At the end of 2021, the share of BTC subscribers using Internet access via xDSL technology decreased from 23% as of 31.12.2020 to 17% in the total

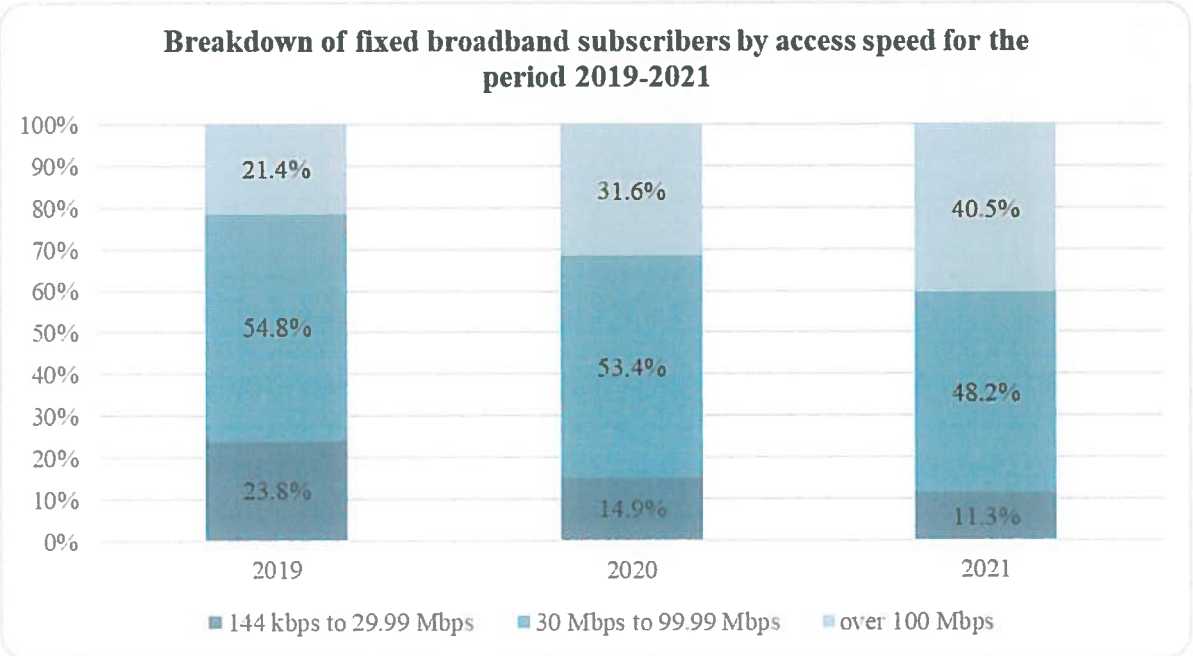
[43]The data for 2020 have been updated.

[44] Information about the undertakings acquired by BTC in 2021 is mentioned above in the section relating to market players.

number of subscribers of this undertaking, while the share of subscribers using VDSL[45] dropped by 1.6 percentage points since 2020 to 8.3% in the total number of the undertaking's subscribers.

In 2021, the share of LAN access subscribers continued to decline, reaching 3.8% of the total number of fixed broadband subscribers, with a registered decline of 0.4 percentage points. The share of subscribers to other types of access[46] in 2021 reached 12.9%, and compared to 2019, the subscribers to this access recorded the most significant increase - by 59.1% in absolute value. This growth is mainly due to the increase in the number of subscribers using fixed access via a mobile network, which accounted for 85.1% of the total number of subscribers to other types of access and rose by 62% in absolute value.

At the end of 2021, the subscribers of fixed broadband access using high-speed access via NGA networks[47] reached 92.7% of the total number of subscribers of fixed broadband Internet access, while their share was up by 1.6 percentage points compared to the end of 2020. As a result of this upward development, the speed of offered Internet services also increased. The figure below presents the breakdown of the number of subscribers of fixed broadband Internet access according to the international download speed[48] for the three-year period 2019-2021.



Source: Data submitted to CRC

Figure 23

The number of subscribers using Internet access with a minimum speed of 30 Mbps continued to increase in 2021, which is the result of the growing number of subscribers using fibre connectivity and DOCSIS 3.0 cable access protocol. At the end of 2021, 88.7% of subscribers used a minimum speed of 30 Mbps, registering an increase of 3.6 percentage points

[45] VDSL subscribers are included in the total number of subscribers using xDSL technology to access the Internet.
[46] Including RLAN access, fixed access via mobile networks, access via satellite networks and access via leased lines and dedicated access.
[47] Including optical (FTTB, FTTH, and FTTx bitstream access), hybrid fibre-optical (FTTN/C with a minimum speed of 30 Mbps), cable networks under the DOCSIS 3.0 standard, LAN and RLAN access with a minimum speed of 30 Mbps, VDSL access, satellite access with a minimum speed of 30 Mbps, access via leased lines and dedicated access with a minimum speed of 30 Mbps as well as fixed access via mobile networks with a minimum speed of 30 Mbps.
[48] The data for 2020 have been updated.

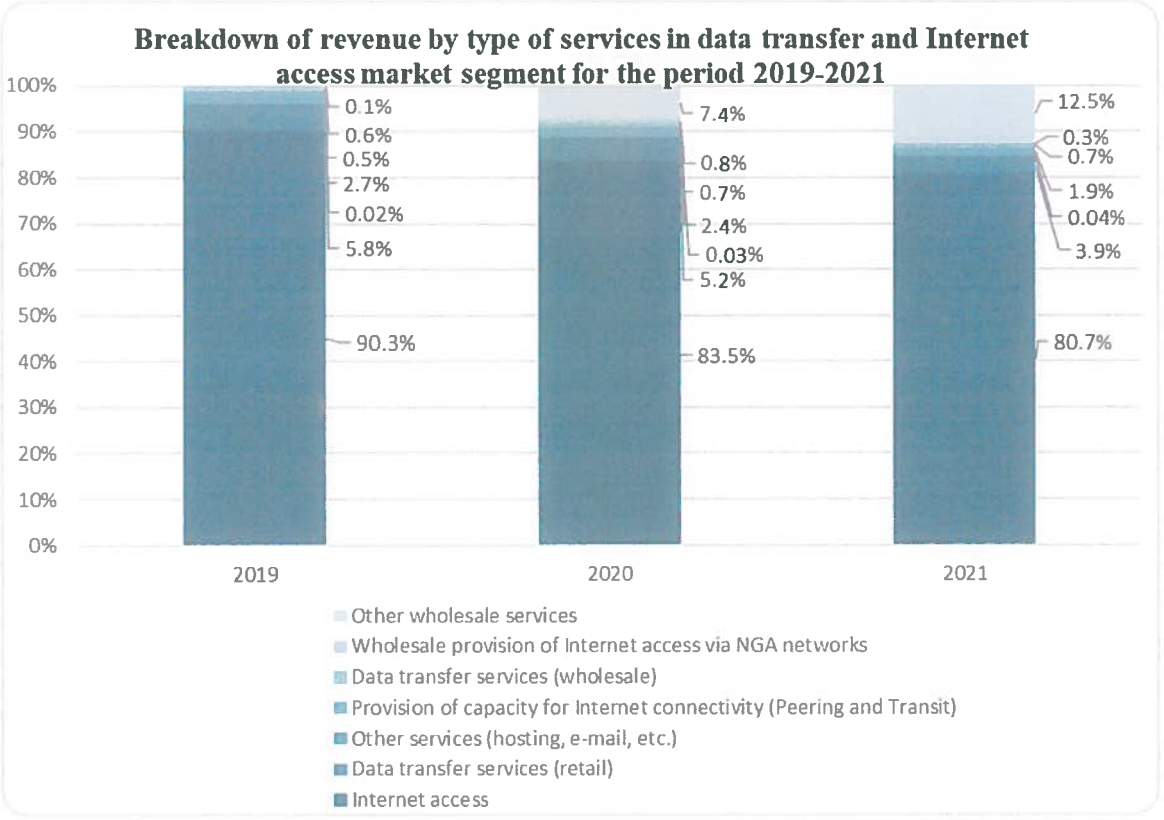
compared to 2020. Although the relative share of subscribers to fixed broadband access who used high-speed broadband access with international download speed from 30 Mbps to 99.99 Mbps decreased by 6.6 percentage points, it remained the highest in the structure of subscribers distributed by speed intervals. The highest growth was observed in the share of users of ultra-high-speed access (minimum 100 Mbps), which rose by 19.1 percentage points over the three-year period under review, also registering a growth by 8.8 percentage points compared to 2020.

The number of broadband access subscribers using speed of minimum 100 Mbps also grew in absolute value. Compared to 2020, 36.1% more subscribers used ultra-high-speed access (minimum 100 Mbps). Over the one-year period, a decline of 3.9% in absolute terms was observed in the number of subscribers using speed from 30 to 99.99 Mbps, while subscribers using speed up to 29.99 Mbps decreased by as much as 19.4%.

Revenue from data transfer and Internet access

In 2021, compared to 2020,[49] revenue[50] from the data transfer and Internet access segment reached BGN 1,451.381 million. The registered increase of 21.3% compared to the 2020 data was mainly due to the increased revenue from wholesale services which reported a growth by 66.1%. The total amount of revenue from retail services was BGN 1,228.630 million, 95.4% of which was revenue from Internet access services (BGN 1,171.511 million).

Figure 24 presents the breakdown of revenue generated for the period 2019-2021.



Source: Data submitted to CRC

Figure 24

[49]The data for 2020 have been updated.

[50] Including revenue from standalone services for retail fixed and mobile Internet access, retail data transfer services and wholesale services (capacity for Internet connectivity, wholesale access services, wholesale provision of Internet access via next generation access networks (NGA), wholesale data transfer services and revenue from Internet access (fixed and mobile) provided bundled with other electronic communication services.

In 2021, there was no substantial change in the overall structure of revenue in the segment. The highest relative share (80.7%), although at a decreasing rate owing to the increase of revenue from wholesale services, continued to be held by revenue from retail Internet access services which registered a growth of 17.2% in absolute value compared to 2020. Traditionally, the total revenue from the provision of mobile Internet access continued to register an increase, with the rate of change rising compared to the 2020 figures, registering an increase of 22.3%. A growth of 6.1% was observed in revenue from retail fixed Internet access, but at a decreasing rate of 1 percentage point compared to the 2020 figures. In bundled services with mobile Internet access[51] included, there was a 28.7% increase compared to 2020, and for the period 2019 - 2021, these revenues increased by 58.5%. In revenue from bundled services with fixed internet access[52] included, the growth rate was 4.4% over the one-year period and 6.4% since 2019.

Summary

The trends observed in the data transfer and Internet access segment in recent years were to a great extent preserved in the past year 2021. The following was reported compared to 2020:

- increase in the total number of subscribers of fixed and mobile Internet access which is due to the growth in the number of subscribers with standalone fixed Internet access, as well as the number of subscribers using bundled services with mobile Internet access included;
- continued increase in the share of 4G and 5G network subscribers in the total number of mobile Internet subscribers both due to the wide coverage of LTE networks at a national level and to the increased rate of construction and deployment of 5G networks;
- increase in the share of subscribers using fixed high-speed and ultra-high-speed; access within the total number of subscribers using fixed Internet access, due to the continuing migration to NGA networks;
- growth in the total volume of revenue in the segment due to the increased revenue from retail Internet access services and the significant increase of revenue from wholesale services.

5. Transmission and/or distribution of radio and TV programmes services

In 2021, the volume of the "transmission and/or distribution of radio and TV programmes services" market segment reached BGN 453.187 million, registering a growth of 6% since 2020.[53]

Summarised information on the number of undertakings that provided transmission and/or distribution of radio and/or TV programmes services, the number of their subscribers/users, and on the volume of revenue generated from them, along with the structure of the segment, is presented in Table 11 and in Figure 24 below:

[51] The part of the revenue relating to mobile access to the Internet included in the bundle.
[52] The part of revenue relating to fixed Internet access included in the bundle.
[53]The data for 2020 have been updated.

Table 11

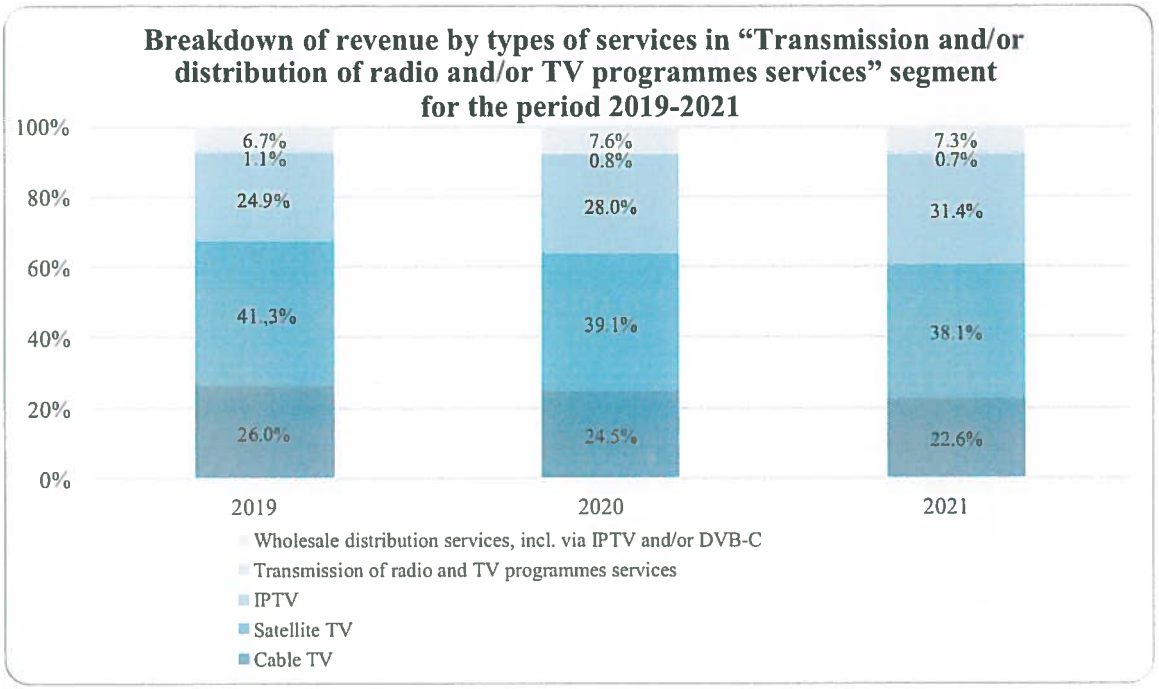
Number of undertakings, number of subscribers/users and revenue by type of transmission and/or distribution of radio and TV programmes services in the segment provided in 2021

Service	Number of undertakings providing the service in 2021	Number of subscribers/users as of 31.12.2021		Revenue (in millions BGN, excl, VAT)	
		Total [1]	incl. bundled services subscribers	Total [2]	incl. from bundled services[3]
1. Retail distribution of radio and TV programmes[4]	**246**	**2,072,889**	**703,975**	**417.132**	**146.321**
1.1. Cable TV	209	517,466	309,025	102.325	66.413
1.2. Satellite TV	5	870,302	107,617	172.662	20.332
1.3. IPTV	59	685,121	287,333	142.145	59.576
2. Terrestrial broadcasting of radio and TV programmes	**60**	///	///	///	///
3. Provision of transmission/distribution of radio and TV programmes	**11**	///	///	**36.055**	///
3.1. Transmission of radio and TV programmes services	4	///	///	3.026	///
3.2. Distribution of radio and TV programmes services, incl. wholesale service (via IPTV and/or DVB-C)	8	///	///	33.029	///
Общо ///		///	///	**453.187**	///

[1] Including subscribers of bundled services.
[2] Including revenue from bundled services.
[3] Revenue from bundled services by TV platforms was measured on the basis of the distribution of bundled services subscribers by platforms.
[4] Data on the total number of subscribers and the revenue from the retail distribution of radio and TV programmes are valid as of 27.04.2022 on the basis of information received from 90.6% of registered undertakings.

Source: Data submitted to CRC

According to the data submitted by undertakings, there was a growth in revenue from three services registered in 2021 – IPTV (by 18.7%), satellite TV (by 3.3%) and wholesale transmission of radio and TV programmes services (by 2.3%) over the one-year period under review. Revenue for the other services in the segment fell compared to 2020. A drop was observed in the amount of revenue from cable television - by 2.5% compared to 2020. For another consecutive year, a drop from the previous year was recorded in revenue from wholesale transmission of radio and TV programmes services - by 7.8%. This is once again due to the registered decline in revenue from wholesale satellite transmission (a little over 9%) , which occupies a significant share in the total revenue from wholesale transmission of radio and TV programmes services.



Source: Data submitted to CRC

Figure 25

In 2021, the largest share of the total volume of the segment (92%) continued to be occupied by revenue from the provision of retail radio and TV programmes services (Figure 25): cable television, satellite television and IPTV. For yet another year, revenue from satellite television held the highest share in the total segment volume, as this share dropped by 1 percentage point in relative value for a one-year period to arrive at 38.1%, followed by the share of revenue from IPTV which in 2021 continued its upward development. Only the share of revenue from the provision of IP television registered a growth compared to the year before by 3.4 percentage points, reaching 31.4% of the total segment volume and approaching the share of revenue from satellite TV. The share of revenue from cable television decreased by 2 percentage points compared to 2020 and covered 22.6% of the total volume of the segment in 2021. The smallest share was held by revenue from wholesale services - 7.3% from distribution of radio and TV programmes services, including wholesale service via IPTV and/or DVB-C, and 0.7% from wholesale transmission of radio and TV programmes services, respectively.

5.1. Retail distribution of radio and TV programmes

Market players

The number of undertakings providing services related to retail distribution of radio and TV programmes services grew by 1.7% to arrive at 246[54] in 2021 (Table 11), as the downward trend reported in the last several years was discontinued.

As of 31.12.2021, the total number of undertakings actually providing cable television was 209 (down by 4 compared to 2020). Television operators offering cable TV started to increasingly offer to their subscribers IPTV as well, with the number of undertakings offering cable TV and IPTV simultaneously being up by 11 year-on-year to reach 24 undertakings, 25% of which are among the largest 10 undertakings.

[54] Including undertakings that notified CRC for suspension of their activity in 2021 and declared revenue during the year.

The undertakings providing satellite TV in Bulgaria as of 31.12.2021 increased by 1 compared to the previous year, with the traditional providers of satellite TV - Bulsatcom, BTC and A1 - being joined by Neosat EAD and Polaris Media EOOD.

As of 31.12.2021, 59 undertakings actually provided the IPTV service, with their number up by 14 compared to the previous year. Another two undertakings declared their intention to start offering the service in 2022.

The table below presents the relative shares of the first three undertakings, calculated based on the number of subscribers and the revenue from the provision of retail television services, including the part of revenue from bundled services with television included, for the period 2020– 2021.

Table 12

Market shares of undertakings providing retail pay TV for the period 2020-2021

Undertaking	2020		2021	
	Share based on subscribers	Share based on revenue	Share based on subscribers	Share based on revenue
BULSATCOM EAD	34.0%	35.8%	31.3%	34.2%
BTC	25.5%	21.0%	30.2%	24.3%
A1 BULGARIA EAD	25.7%	28.8%	25.3%	28.5%
All other	14.9%	14.4%	13.2%	12.9%

Source: Data submitted to CRC

In 2021, BTC acquired several regional TV providers such as Digital Cable Television EOOD[55] and Net 1 EOOD[56] resulting in redistribution of the market shares of market segment participants.

Bulsatcom continued to rank first in terms of both the number of subscribers and the revenue generated by the service provided at retail level in 2021. The company's share dropped by 2.7 percentage points on the basis of number of subscribers and by 1.6 percentage points on the basis of revenue, accounting for 31.3% of the total number of subscribers to pay TV and 34.2% of the revenue from the service in 2021.

As a result of this consolidation on the market in 2021, BTC moved A1 from the second position by number of subscribers, with the company's share up by 4.7 percentage points compared to the individual share of BTC in 2020 and by 2.7 percentage points compared to its aggregate share (including the individual market shares of the undertakings acquired in 2021). The share based on revenue also increased significantly from the previous year, with a registered increase of 3.3 percentage points compared to the individual share of BTC in 2020 and by 1.8 percentage points compared to its aggregate share. In relative terms, the number of BTC subscribers is only 1.1 points away from the largest undertaking's share. In the event that the development trend of the two undertakings continues in 2022, a new redistribution of the shares can be expected whereby the incumbent undertaking may occupy the first position according to this indicator.

A1 is the third largest company of this market segment based on the number of pay TV subscribers. In 2021, the share of the undertaking both on a subscriber basis and on the basis of

[55] The acquisition is considered to be in effect as of 11.05.2021. The company ceased operations on 21.07.2021 and was incorporated into BTC. It was deleted from the CRC public register.

[56] The acquisition is considered to be in effect as of 28.05.2021. The company transferred its operations on distribution of radio and TV programmes to BTC. It was not deleted from the CRC public register.

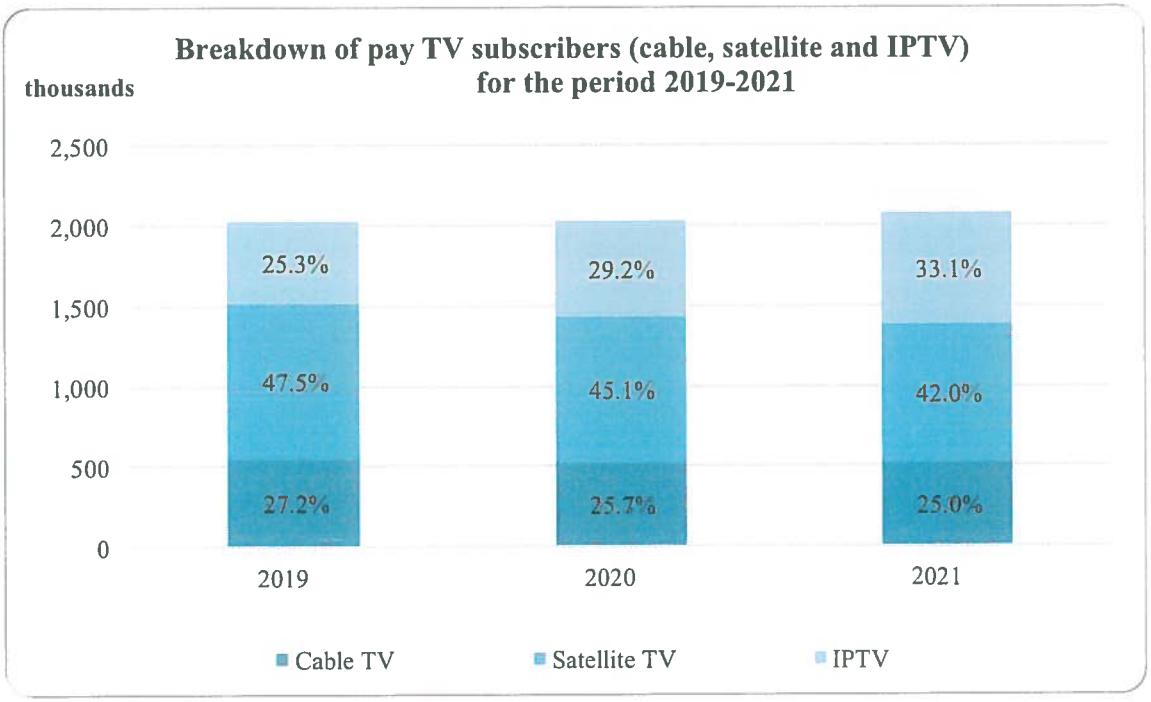
revenue from service provision was reduced insignificantly by 0.4 and 0.3 percentage points, covering 25.3% of the pay TV subscribers and 28.5% of the revenue generated.

The observed increase in the share of BTC based on number of subscribers and on revenue affects positively the aggregate market share of the first three undertakings, with a growth of 1.7 percentage points based on subscribers and 1,5 percentage points based on revenue at the expense of the share of all other players in the market segment.

Subscribers of retail distribution of radio and TV programmes services

As of 31.12.2021, the number of pay TV subscribers at retail level increased by 2.3% compared to the end of the previous year and reached 2.07 million subscribers.[57]

The figure below presents the shares of subscribers by platforms in the total number of pay TV subscribers for the period 2019–2021.



Source: Data submitted to CRC

Figure 26

In 2021, a growth in the number of subscribers and in their relative share in the total number of pay TV subscribers was again recorded only for IPTV. The number of IPTV subscribers continued to grow compared to the previous reporting period – by 15.9%, as its share rose significantly once again – by 3.9 percentage points, reaching 33.1% as of 31.12.2021. The reasons leading to a growth of this indicator during the one-year period under review are the presence of 14 new undertakings in the IPTV sector that declared subscribers by the end of 2021, as well as the registered increase in the number of subscribers of almost 80% of all other undertakings providing IPTV.

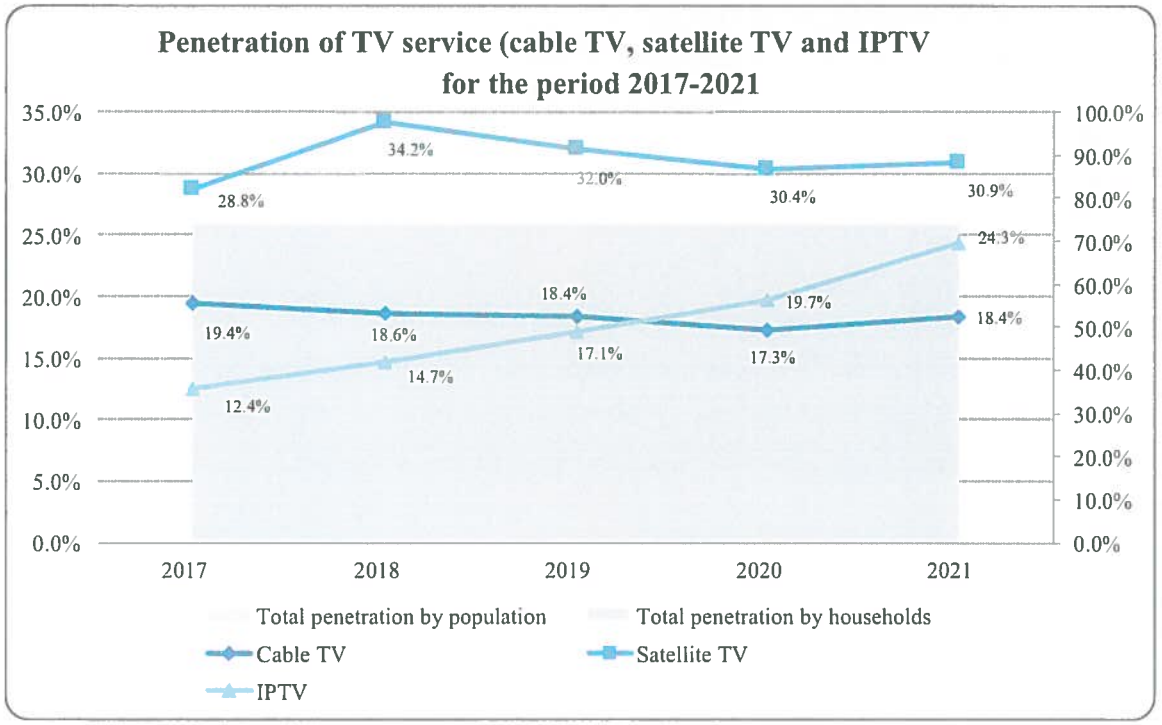
The increase in the share of IPTV subscribers in 2021 was mainly at the expense of a fall in the share of satellite TV subscribers, down by 3.1 percentage points over the one-year period, with the indicator's value returning to its 2011 levels. Nevertheless, as of 31.12.2021, satellite TV subscribers continued to occupy the largest share, covering 42% of the total number of pay

[57] Including subscribers of bundled services who amounted to 703,975 as of 31.12.2021.

TV subscribers in the country (Figure 25). In absolute terms, the number of subscribers of satellite television fell by 4.8% compared to 31.12.2020.

The downward trend in the number of cable TV subscribers was preserved, with an insignificant drop of less than 1% in the current reporting period, while their share in the total number of pay TV subscribers decreased by 0.8 percentage points to 25%.

A formal census of the country's population took place in 2021, with preliminary data on the number of inhabitants and the number of households available at the time of preparing the CRC's Annual Report for 2021. According to an assessment developed by the National Statistical Institute (NSI), the country's population at the census date was 6,520,314. 2,813,847 households have been counted[58]. As a result, for the period considered, the penetration[59] of pay TV among households in Bulgaria grew significantly compared to the previous reporting periods. As of 31.12.2021, there was a growth of 6.3 percentage points, with the value of this indicator reaching 73.7%. Unlike the previous one-year period, the penetration of cable and satellite TV registered a growth of 1.1 and 0.5 percentage points, respectively, despite the reported decline in the number of subscribers since 2020. IPTV penetration continued to grow, reaching 24.3% at the end of 2021 - an increase of 4.7 percentage points compared to the previous year (Figure 27). There was also an increase in the penetration of pay TV among the Bulgarian population,[60] reaching 31.8% in 2021 - up by 2.5 percentage point compared to 2020.



Source: Data submitted to CRC

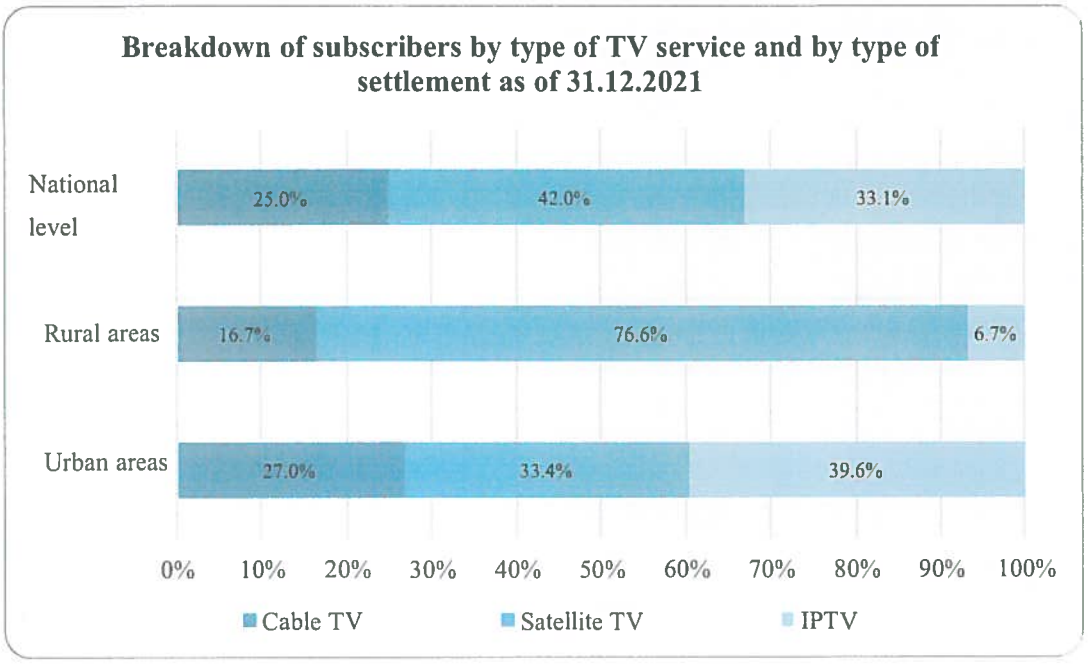
Figure 27

[58] https://www.nsi.bg/sites/default/files/files/pressreleases/Census2021_predvaritelna_ocenka.pdf

[59] This indicator was calculated as the ratio between the number of pay TV subscribers as of 31.12.2021 and the number of households according to the census carried out by NSI in 2021 (2,813,847 households according to the preliminary data available at the time of preparing the CRC's Annual Report for 2021).

[60] This indicator was calculated as the ratio between the total number of pay TV subscribers as of 31.12.2021 and the number of population according to the census carried out by NSI in 2021 - 6,520,314 according to the preliminary data available at the time of preparing the CRC's Annual Report for 2021.

Figure 28 displays the breakdown of subscribers of pay TV according to the settlement where they used this service as of 31.12.2021.



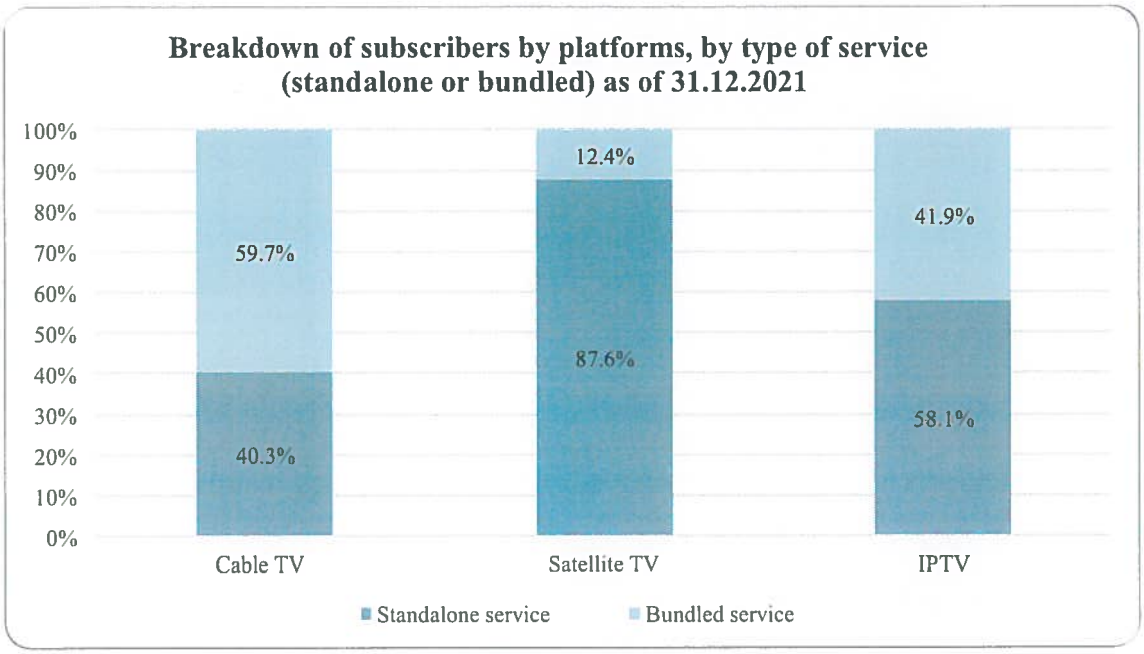
Source: Data submitted to CRC

Figure 28

For yet another year, the share of satellite TV subscribers in rural areas was several times as much as the shares of the remaining two platforms. However, for the third year this share is decreasing, with the drop recorded being the highest in relation to the decrease over the previous two one-year periods - by 3.3 percentage points, at the expense of the share of the subscribers of the other two platforms. As a result of the launch of IPTV in 851 new rural areas and the reported increase in the subscribers of this platform in over 1,300 rural areas compared to 2020, the number of IPTV subscribers in rural areas increased by nearly 50% by the end of 2021, and this was also reflected in its share which grew up to 6.7% over the period considered. The number of cable television subscribers in rural areas also grew - by a little over 1%, with the share it occupies in the total number of pay TV subscribers outside the cities growing by 0.9 percentage points to reach 16.7% as of 31.12.2021.

In cities, IPTV subscribers held the largest share, with an increase in relative terms of 3.7 percentage points compared to their share at the end of 2020, reaching almost 40% of the total number of pay TV subscribers in cities. The share of subscribers of the other two platforms continued their downward trend in 2021, with the share of cable TV subscribers down by 1.4 percentage points to 27%, while that of satellite TV subscribers dropped by 2.4 percentage points to 33.4%, in line with the general decline observed at national level (Figure 28).

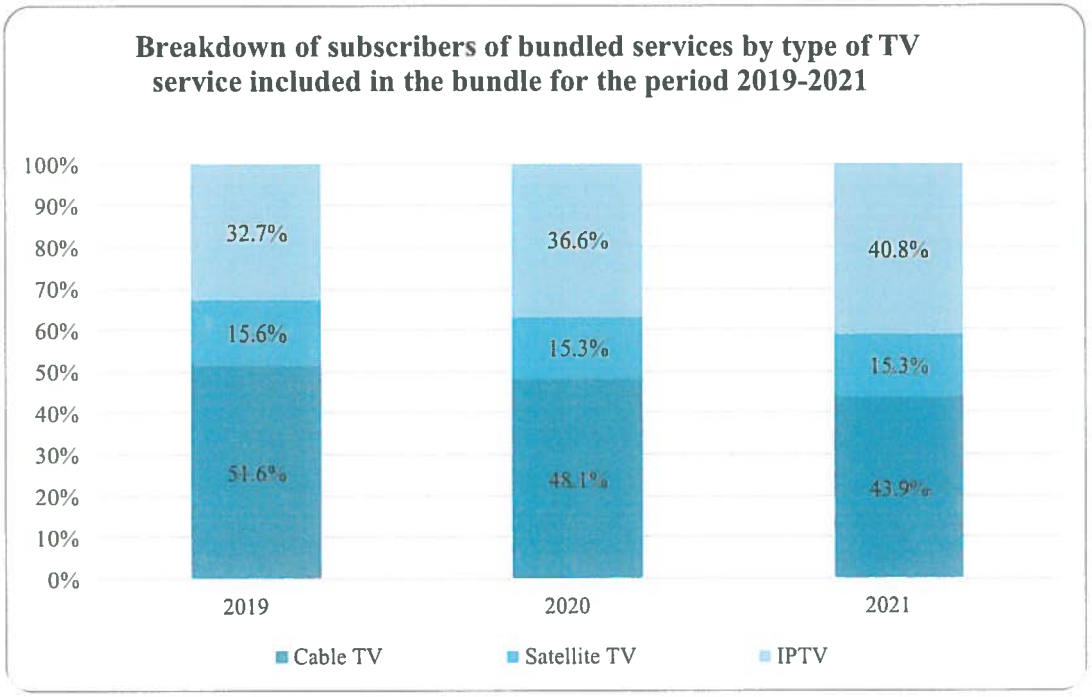
The number of subscribers of bundled services with television included continued to increase in 2021 compared to the year before - by 3.3%, while the share it covered from the total number of pay TV subscribers remained unchanged - 34%. The figure below shows the share of subscribers of bundled services with television included in the total number of subscribers distributed by platforms, as of 31.12.2021.



Source: Data submitted to CRC

Figure 29

For the one-year period under review, a substantial change in the structure of subscribers by type of service used was observed only in the proportion of cable TV subscribers. Compared to the end of 2020, the share of cable TV subscribers using the service in a bundle decreased by 3.2 percentage points to 59.7%. For the same period, the relative shares of bundled services subscribers, with satellite and IPTV included, grew by 1 percentage point in the share of satellite TV and dropped by 0.3 percentage points in the share of IPTV subscribers, to reach 12.4% and 41.9%, respectively, of the total number of subscribers of the respective platform (Figure 29).



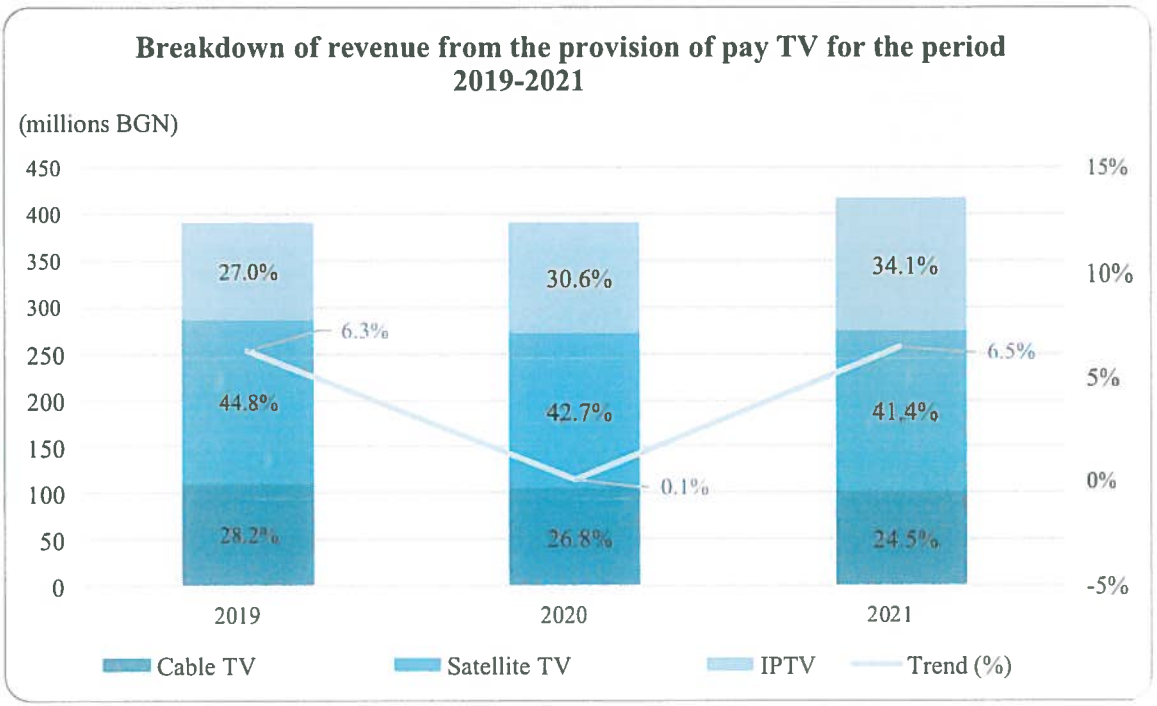
Source: Data submitted to CRC

Figure 30

As of the end of 2021, subscribers to bundled services with cable TV included accounted for 43.9% of the total number of subscribers to bundled services with television included, with a decline over the one-year period of 4.2 percentage points at the expense of the share of subscribers to an IPTV bundle. As of 31.12.2021, compared to the preceding year, a growth was registered both in the number of bundled services subscribers with IPTV included – by 3%, and its share in the total number of bundled services subscribers with television included which grew by 4.2 percentage points to 40.8% year-on-year (Figure 30). The share of subscribers to bundled services with satellite TV included remained unchanged - 15.3%.

Revenue from retail distribution of radio and TV programmes services

The volume of total revenue, including revenue from bundled services with pay TV included, increased substantially compared to 2020 and amounted to BGN 417.132 million in 2021, up by 6.5% (Figure 31). The figure below presents the breakdown of revenue from the provision of pay TV, by platforms, in the total volume of the retail segment.



Note: *The presented data on revenue from cable television, satellite television and IPTV include revenue from bundled services with television included, calculated based on the breakdown of bundled services subscribers with television included, by platforms for each undertaking.*

Source: Data submitted to CRC

Figure 31

Both satellite and IPTV revenue increased in 2021 compared to the previous year, up by 3.3% and 18.7% respectively for the one-year period under consideration. The share of IPTV revenue in the total volume of the retail segment also increased, by 3.5 percentage points, to 34.1%. Despite the reported increase in absolute terms in satellite TV revenue, its share in the total volume of the retail market segment fell by 1.3 percentage points to 41.4%, and the gap between it and the share of the IPTV revenue continued to decrease and is already a little over 7 percentage points. A decline was observed both in absolute and relative terms in respect of revenue from the provision of cable TV. Over the one-year period, the revenue generated from cable TV was by 2.2% less, and its share in the total volume of the market segment dropped by 2.5 percentage points to 24.5%.

The share of revenue from the provision of bundled services with television[61] included rose by 1.3 percentage points as compared to the year before, covering 35.1% of the total volume of the retail segment. In terms of revenue generated from a standalone service, a growth was observed in revenue from satellite television and IPTV. Over the past year, this growth rate was 2% to BGN 152.3 million from the provision of satellite television and 16% to BGN 82.6 million from the provision of standalone IPTV, respectively. The revenue from standalone cable TV again reported a significant drop of over 8% since the previous year to BGN 35.9 million.

5.2. Wholesale transmission and/or distribution of radio and TV programmes and IPTV

In 2021, the total number of undertakings providing wholesale transmission and/or distribution of radio and television programmes services, including via IPTV and/or DVB-C, was 11 - down by 1 versus 2020.

Detailed information on the number of undertakings which in 2021 provided wholesale transmission and/or distribution of radio and television programmes services, the number of users of these services and the volume of revenue generated from them, as well as on the structure of the above services' market, is displayed in Table 13 and in Figure 31 below:

Table 13

Number of undertakings, number of subscribers/users and revenue from the provision of wholesale transmission and/or distribution of radio and TV programmes services in 2021

Types of wholesale transmission and distribution of radio and TV programmes services	Number of undertakings providing the service in 2021	Number of users of the service as of 31.12.2021	Revenue from the service in 2021 (in millions BGN, excl. VAT)
1.1. Transmission of radio and TV programmes services, incl.:	**4**	///	**3.026**
1.1.1. Terrestrial radio-relay transmission	1	///	
1.1.2. Satellite transmission	2	///	
1.1.3. Other type of transmission	2	///	
1.2. Distribution of radio and TV programmes services, incl. wholesale IPTV service provided to other undertakings, incl.:	**5**	///	**30.289**
1.2.1. Terrestrial broadcasting	5	44	23.015
1.2.2. Satellite broadcasting	2	///	
1.3. Wholesale TV service (via IPTV and/or DVB-C) provided to other undertakings for resale purposes	3	48	**2.740**
Total	**11**	///	**36.055**

Source: Data submitted to CRC

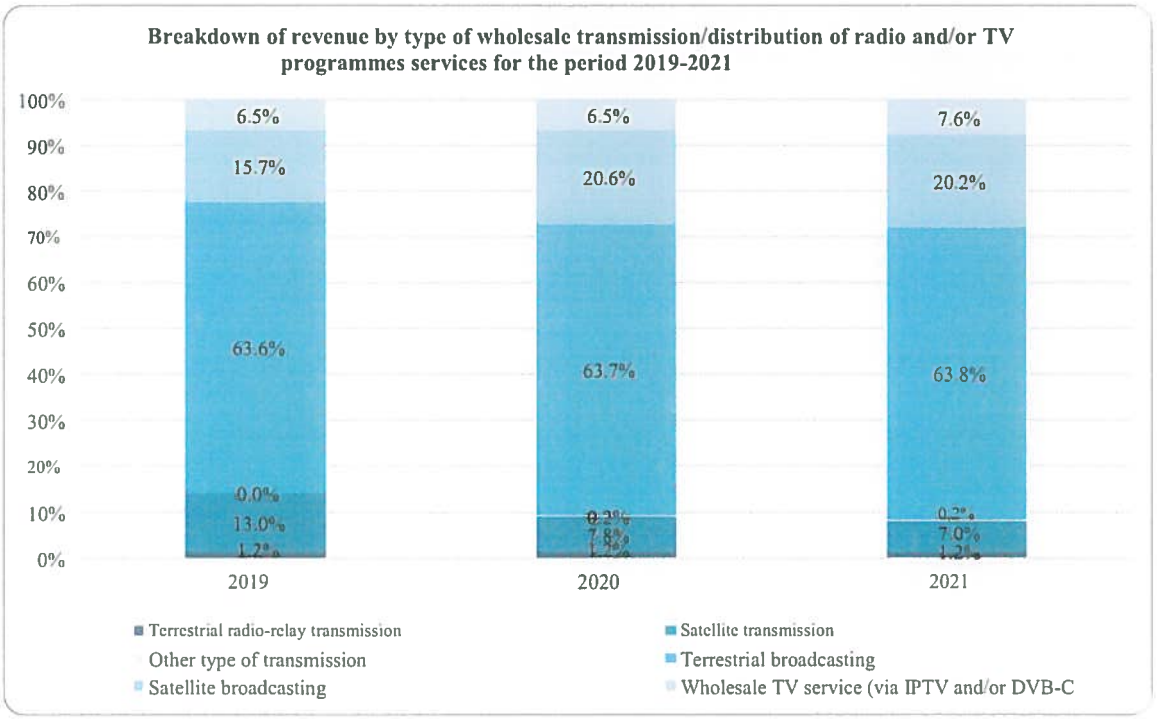
In 2021, the number of undertakings providing transmission of radio and TV programmes services remained unchanged compared to those that were active in 2020. Undertakings providing distribution of radio and TV programmes services fell by one to 5, and wholesale TV services via IPTV and/or DVB-C in 2021 were provided by three undertakings.

Revenue from the provision of the wholesale transmission and distribution of radio and TV programmes services amounted to BGN 36.055 million, registering an increase of 1.3% compared to the previous year. This decline is the result of a positive change reported in the revenue from distribution of radio and/or TV programmes services – by 1%, and the revenue

[61] The part of revenue relating to television services included in the bundle.

from wholesale TV services provided via IPTV and/or DVB-C – by 18.4% compared to the previous year. A decline was recorded only for the first main category of wholesale TV services - transmission of radio and TV programmes services. During the year, 7.8% less revenue was generated, resulting from a decline in satellite transmission revenue - by 9.2%, which could not be compensated by the growth in the revenue from other type of transmission – by 1.4%, due to the low relative share occupied by this service (only 2.4%) in the volume of revenue from the provision of wholesale transmission of radio and TV programmes services. Revenue from terrestrial radio relay transmission remained unchanged compared to 2020.

The figure below presents the structure of revenue generated by types of services for transmission/distribution of wholesale radio and TV programmes services for the period 2019-2021.



Source: Data submitted to CRC

Figure 32

The data in Figure 32 show that in 2021 the largest share in the revenue from the provision of wholesale transmission and distribution of radio and TV programmes services was again held by terrestrial broadcasting – 63.8%, registering an insignificant increase of 0.1 percentage point compared to the year before and 0.3 percentage points since 2019. The other wholesale services did not register significant changes in their shares compared to the previous reporting period. The most significant change compared to 2019 was recorded in the share of revenue from satellite transmission, which decreased by 6 percentage points to 7%. Over the same period, significant growth was observed in the share of satellite broadcasting provision - by 4.5 percentage points, reaching 20.2% of the total wholesale segment.

5.3. Terrestrial broadcasting of radio programmes – VHF broadcasting

At the end of 2021, the number of undertakings holding a registration in CRC for the provision of terrestrial broadcasting services for radio programmes remained unchanged from 2020 - 60, with 57 of them actually providing the service in 2021. As of 31.12.2021, undertakings with national coverage remained two - Bulgarian National Radio and Darik Radio

AD.

Summary

In 2021, the following changes were observed in the "transmission and/or distribution of radio and TV programmes services" segment versus 2020:

- Increase in the total volume of revenue from the segment, as a result of the reported increase in revenue from retail provision of satellite television, IPTV and wholesale distribution of radio and TV programmes;
- Growth in the number of retail subscribers and in the penetration of the TV service among the households and population;
- Growth in the consumption of bundled services with retail television included;
- Growth in revenue from wholesale transmission and/or distribution of radio and TV programmes services.

6. Prospects for development of the Bulgarian electronic communications market

The past year 2021 was another challenging year for the participants in the Bulgarian electronic communications market due to the volatile and turbulent environment created by the ongoing COVID-19 crisis. Undertakings and electronic communications service providers have been able to overcome the global pandemic by not only keeping their upward trend, but also building on what was achieved in 2020.

Participants in the electronic communications market continued to deploy next generation access networks (NGA networks), meeting the consumers' demand for higher Internet access and data transmission speeds, connection quality and security as well as information protection. In view of the ever-expanding possibilities for the provision of high-quality communication and Internet services offered by undertakings, users will have increasing flexibility in the choice and consumption of services.

The development of the electronic communications market in Bulgaria and worldwide in 2022 will be largely influenced by both the overall management of the coronavirus infection and the complete removal of restrictions and the development of the 5G networks. On 6 April 2021, CRC held a tender for the issuance of authorisations for the use of radio frequency spectrum in the 3.6 GHz band with national coverage for a period of 20 years and so the electronic communications sector entered an absolutely new era, the effect of which will be felt more strongly in the present year 2022. The deployment of the 5G networks is expected to boost the development of digital services and also to contribute to a more competitive market of broadband Internet access. The introduction of fixed wireless Internet via NR (5G) and the productivity it owns will allow mobile operators to establish even more intense competitive pressure on fixed broadband Internet access providers. In 2021, several transactions were carried out on the acquisition and merger of leading regional undertakings in the electronic communications market in Bulgaria, which was reflected in the redistribution of the shares of the main players in some of the market segments. The effects of these transactions are expected to continue in 2022.

The trends observed in 2021, which are expected to continue in the following year as well, are as follows:

- No drastic changes in the development of the mobile telephony service in Bulgaria are expected next year. As the coronavirus infection subsides and the mobile Internet becomes more widespread among the population in Bulgaria, the growth in service consumption is expected to slow down, and the rising inflation rates in the country and the price increase announced by mobile operators at the end of 2021 will lead to an increase in the revenue from the provision of the retail service in the following year;

- For the fixed telephony service, the downward trend in consumption expressed in a drop in the number of telephone lines, traffic and revenue is expected to continue next year. For calls from fixed-line subscribers to mobile voice service subscribers, the consumption is expected to remain at its 2021 level;
- The accelerated pace of 5G networks construction and deployment will continue next year, with 5G competition increasing in parallel with the wider deployment and with the variety of business opportunities and services to be offered through these networks. Mobile operators will offer more and more business customer oriented services;
- The number of subscribers using fixed high-speed and ultra-high-speed access, due to the ongoing migration to NGA networks, will continue to grow;
- IPTV will continue its upward development, with more and more undertakings expanding their portfolio of TV content services based on Internet access with the appropriate quality of service guarantees. Following the market consolidation processes observed, redistribution of the shares of the retail market segment participants is expected, which may have an impact on the evolution of the segment and the competition dynamics;
- Increase in the bundled services subscribers and revenue, and preservation of the preference for bundled services made up of two electronic communication services (double-play bundles) and especially for bundles with mobile service (mobile voice and/or mobile Internet included) at the expense of triple-play and quadruple-play bundles;
- Wholesale leased lines will continue to increase their share at the expense of retail leased lines. Traditional wholesale leased lines are less attractive to market participants and, as a result, alternative leased lines will occupy an increasing share of the market.

7. Provision of the universal service

7.1. Degree of satisfaction from the universal service provision

As of 31.12.2021, there was a 1% decline in the coverage provided by the undertaking obligated to provide the universal service[62] (Bulgarian Telecommunications Company EAD (BTC)), measured by number of territorial units compared to the previous year. The above coverage includes settlements and settlement formations (resorts, etc.), which are included in the Unified Classification of Administrative-Territorial and Territorial Units[63].

In 2021, the telephone density by households[64] registered a decline of 1.8 percentage points since the year before, as a result of the steady downward trend in the number of residential subscribers of BTC.

7.2. Analysis of the universal service provision

In line with the LASLEC, implementing the European Electronic Communications Code, adopted in 2021, the concept of universal service has been developed in order to reflect the technological progress, market developments and consumer demand.

Over the last decade, traditional voice telephony services have been replaced by Internet-based services that consumers use from different connected devices (smartphones, tablets, phablets, etc.). Access to the global network provides wide range of digital services that are

[62] Pursuant to § 7 of the Law on Electronic Communications.

[63] https://www.ekatte.com/;

[64] The "density by households" indicator is measured by dividing the total number of residential lines by the number of households in the country (based on data from the last official census carried out by NSI in 2011, since the official data from the 2021 census are expected to be available at the end of 2022).

increasingly demanding towards networks and devices through which these services are provided. Taking into account this change in consumption patterns and demand for services by consumers, the scope of universal service has been amended in the current regulatory framework and includes:

1. provision of voice communications services at a fixed location to a public electronic communications network, irrespective of the technology used, and

2. ensuring adequate broadband internet access at a fixed location, enabling at least the following services to be supported:

(a) e-mail

(b) search engines for any kind of information;

(c) basic on-line training and education tools;

(d) on-line newspapers or news;

(e) purchase or order of goods or services on-line;

(f) job search and job search tools;

(g) networking communities for professional purposes;

(h) Internet banking;

(i) use of electronic administrative services;

(k) social media and real-time communication via text messages;

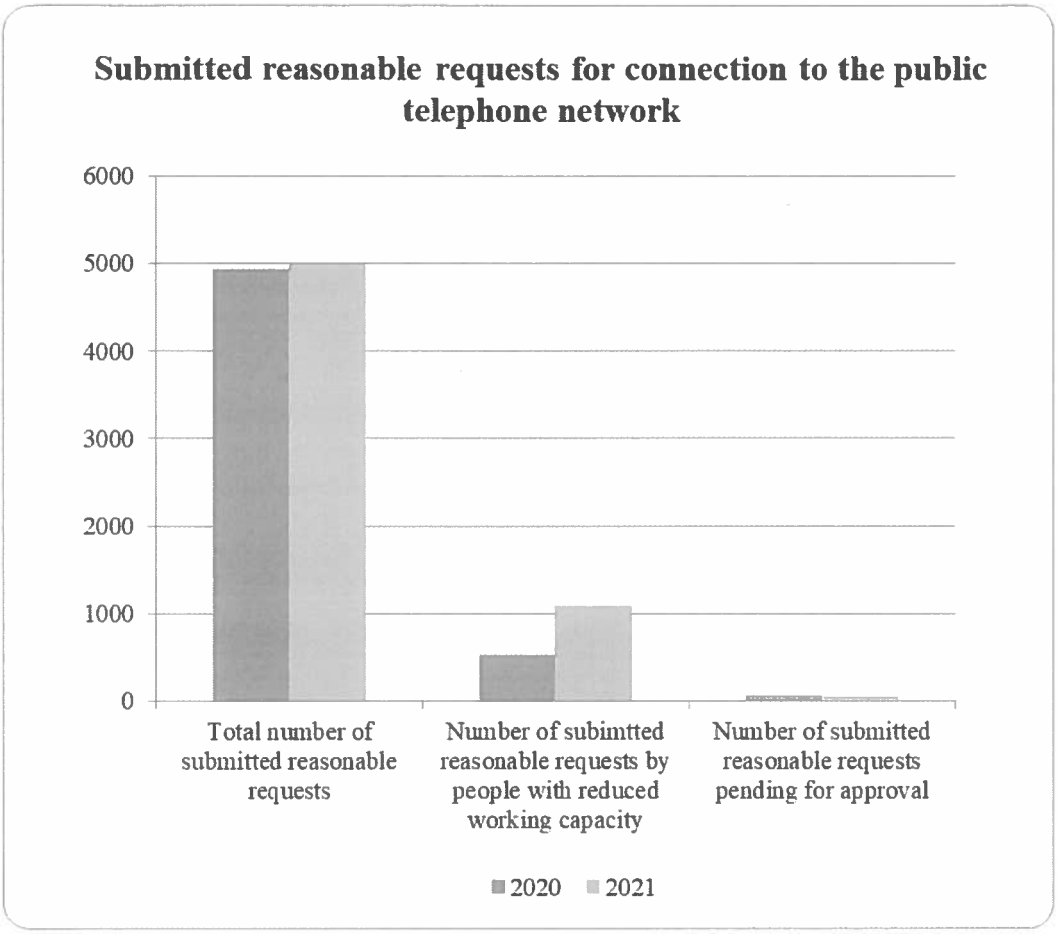
(l) voice and video calls.

3. provision of services other than those referred to in points 1 and 2 for which universal service obligations are in force.

With reference to the above change in the scope of the universal service and with a view to ensuring stability and support of the gradual transition in compliance with § 356 of the Transitional and Final Provisions of the LASLEC, CRC prepared an analysis in order to establish the need of these services, taking into account the national conditions on the basis of which it reviewed the obligations for provision of public payphones (PPs) and/or other public access points to voice telephony services of certain quality, provision of a directory and telephone inquiry services imposed as an obligation for the provision of the universal service. The analysis covers the development of the electronic communications market over a 10-year period; trends in the consumption of public payphones, a directory and telephone inquiry services; consumer attitudes and patterns with regard to the use of public payphones, a directory and telephone inquiry services. The findings of the analysis are presented in points 7.2.2 and 7.2.3.

7.2.1. Access to and provision of the universal service

As is evident from Figure 33 below, at the end of 2021, the total number of submitted reasonable requests for connection increased by 1.3% compared to the previous year. In contrast to previous periods, there was an increase of more than 100% in 2021 compared to 2020 in the number of requests for connection submitted by people with disabilities.



Source: Data submitted to CRC

Figure 33

In 2021, despite the slight increase in the total number of applications submitted, the number of requests waiting approval was by 30.9% lower than in the previous year. The share of rejected requests for connection in the total number of submitted requests was 18%, as the main part of this share - 77% - was the result of a ceased interest by the customers.

BTC performs its obligation to ensure free-of-charge calls to emergency numbers, as the traffic generated to them in 2021 continued to follow a downward trend by 36%, and the number of calls to emergency numbers was down by nearly 9%.

7.2.2. Access to public payphones

As a result of the performed, in compliance with §356 of the Transitional and Final Provisions of the LASLEC, analysis of the existing obligations for the provision of public payphones and/or other public access points to voice telephony services of certain quality, provision of a telephone directory and telephone inquiry services imposed as an obligation for the provision of the universal service, CRC pointed out the following conclusions:

- A sustained downward trend in fixed telephone lines and in the fixed telephone density indicator, with less than one third of households in the country having a fixed telephone line at the end of 2020. A prerequisite for the decreasing interest is the wide penetration of mobile phones enabling consumers to access voice services regardless of their location;
- A growth in the consumption of mobile services provided in a bundle with other electronic communications services, as mobile voice and mobile Internet access will

continue to be the most preferred type of bundled services. This is due both to the affordability of smartphones and to the increasing importance of access to the global network for all citizens of the country in order to participate fully in the social and economic life of the country.

- The wide affordability of mobile telephone services and the offered subscription plans with included minutes for calls to national networks is a significant factor that determines the rapidly declining interest in using public payphones (PPs) to make voice calls, given the possibilities of making voice calls regardless of your location.
- As a result of the rapid entry of new technologies, consumer interest in using PPs is rapidly decreasing. During the period 2010-2020, there was a dramatic decline in the minutes of telephone calls generated by PPs. The average daily consumption per one public payphone decreased to 15 seconds in 2020. The average daily consumption per one payphone from calls generated to emergency numbers was 22 seconds in 2020.

In accordance with the conclusions from the analysis performed and taking into account the national circumstances, by Decision No 350/30.09.2021, CRC adopted the results from the public discussion held on the draft decision to withdraw the obligation for the provision of public payphones and/or other public access points to voice telephony services of certain quality, imposed as an obligation for the provision of the universal service as part of the services within the scope of the universal service.

Taking into account the changed market situation, both from the perspective of the incumbent and in terms of ensuring access to telephone services for consumers, Decision No 350/30.09.2021 provides for a 2-year transitional period for the provision of PPs obligation . During the transitional period, the obligation to provide PPs is limited to the main points of entry to the country and places with increased traffic of users, and at the places mentioned in point 2.5 of the BTC license, namely:

- airports, ports, railway and bus stations serving international destinations;
- motorways;
- hospitals and police stations.

In accordance with the obligation, BTC-owned PPs, which are available at the above-mentioned locations include quality features to provide facilities for hearing impaired and sight impaired users. Part of them are accessible for users in wheelchairs by being installed in suitable locations. There is no change in the quality parameter of the public payphones provided compared to 2020, as it continued to constitute 90% and was in compliance with the target values of service quality parameters set out by CRC Decision No 345/31.03.2011.

Free-of-charge calls to the national emergency numbers and to the single European emergency number 112 can be made from all public payphones.

7.2.3. Ensuring telephone directory and provision of enquiry services

In compliance with the LEC and with relation to the provisions of Article 6 of Ordinance No 5,[65] the undertaking obliged to provide the universal service must issue at least one telephone directory in printed and/or electronic form. In 2020, CRC approved BTC's proposal for the release of a public telephone directory for 2021 in an electronic form. The telephone directory is available at the undertaking's official website.[66] There were no sales of telephony directory in printed form.

---

[65] Ordinance No 5 of 13.12.2007 on the terms and procedure for release of telephone directories, including working with database, their transfer and use, and for provision of telephone enquiry services.

[66] http://www.vivacom.bg/online/cgi-bin/wpd.cgi?temp=home.html&ls=0;

In compliance with its obligation to provide information on the numbers included in the general telephone directory, BTC provided end-users with a 24-hour telephone enquiry service in the past year through number 11 800.

BTC performs its obligation to ensure free-of-charge calls to emergency numbers, as the traffic generated to them in 2021 continued to follow a downward trend by 36%, and the number of calls to emergency numbers was down by nearly 9% compared to 2020.

In addition, as regards the provision of a telephone directory and telephone inquiry services, the findings of the 2021 analysis carried out in fulfilment of §356 of the Transitional and Final Provisions of the LASLEC indicate:

- Lack of interest in the telephone directory due to users being able to exercise their right not to include their data in the directory in order to protect personal data. In practice, this significantly reduces the information contained in the directory, which in turn also narrows the range of users of this information. The directory no longer constitutes a service of public importance as a result of the dynamic technological developments and the rapid entry of Internet access through which users are able to access up-to-date information in real time;
- Lack of interest in the inquiry services despite their provision on-line (in electronic form), either in directory form or by consulting an operator in short periods of time. For the period 2010-2020, the volume of calls to number 11800 for inquiry services, which are an alternative to the directory in electronic form, has shrunk more than 33 times.

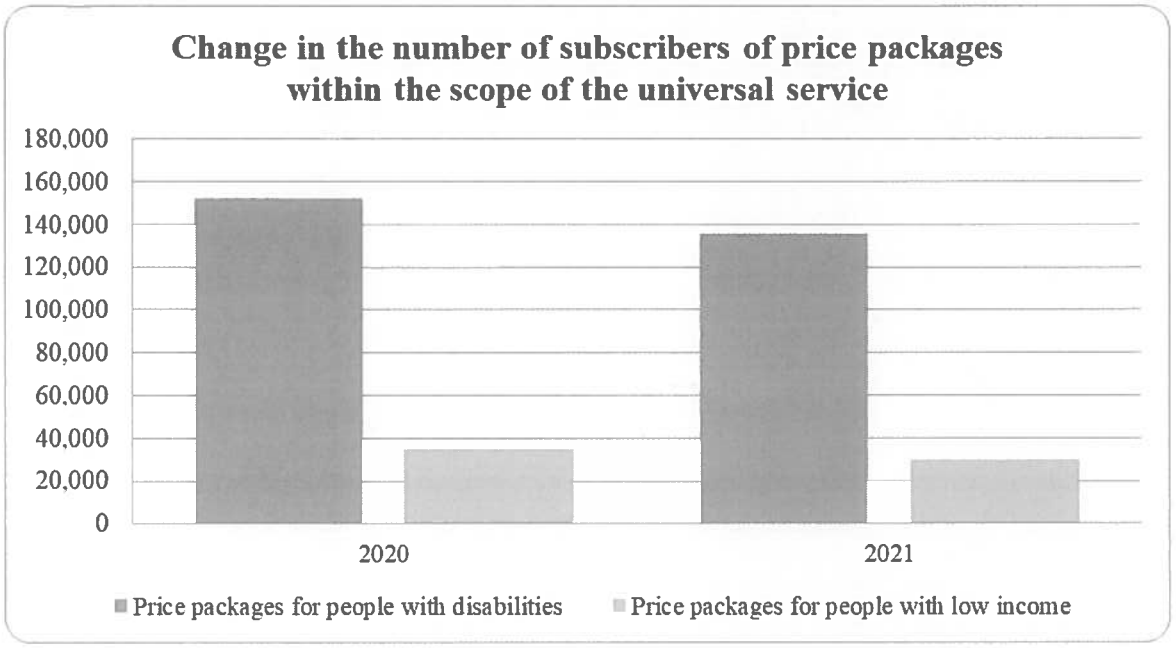
In accordance with the conclusions from the analysis performed and taking into account the national conditions, by Decision No 350/30.09.2021, CRC withdraws the obligations for the provision of a telephone directory and telephone inquiry services, imposed as obligations for the provision of the universal service as part of services within the scope of the universal service.

7.2.4. Affordability of tariffs of the universal service

In 2021, in fulfilment of its obligation to provide price packages within the scope of the universal service at affordable[67] prices, BTC continued to offer, without any change either in prices or in conditions, price packages intended for users: with low income ("Limited" plan, as named by BTC); with over 90% impaired work capacity or capacity for social adaptation ("Handicap 160" plan, as named by BTC); with over 50% impaired work capacity or capacity for social adaptation ("Handicap 300" plan, as named by BTC); people with special social needs admitted to social or health institutions ("Social and health institutions" plan, as named by BTC).

As of 31.12.2021, the subscribers of price packages within the scope of the universal service decreased by 12% compared to those in 2020. The chart below displays the trend in the number of subscribers of price packages within the scope of the universal service for 2020 and 2021.

[67] Stipulated in the Methodology for determining prices and price packages for the universal service adopted with Ordinance No 254 of 23.10.2008 of the Council of Ministers, prom. SG, no. 94 of 31.10.2008.



Source: Estimates based on data submitted to CRC

Figure 34

The number of subscribers of price packages for people with low income and price packages for people with disabilities decreased in 2021 compared to the previous year by 16% and 11%, respectively, which confirmed the long-term downward trend in the use of price packages within the scope of the universal service. The data presented in Figure 34 do not include the number of subscribers using price packages for people with special social needs, because it amounted to only 0.003% of the total number of subscribers of price packages within the scope of the universal service.

7.3. Quality of the universal service provision

The Quality of Service parameters of the universal service provision are stipulated in Ordinance No 6, as the target values of the parameters were adopted by Decision No 345/31.03.2011 of CRC and are publicly available at the Commission's official website.[68]

According to the data submitted by BTC,[69] in 2021, the undertaking reported fulfilment of all target values.

7.4. Compensation of net costs accrued due to the universal service provision

In 2021, BTC did not submit to CRC a request for compensation of the unfair burden from the universal service provision within the statutory deadline - 30.06.2021. Thus, during the last year, the amount of net costs was not calculated and it was not established whether these expenditures represent an unfair burden for the incumbent.

In relation to the provisions of Article 203 (2) of the LEC, an annual meeting of the Fund was held, during which the report of the Fund's Management Board for compensation of the universal service for 2020 and a proposal for amendment of the Fund's activity rules were considered.

Respectively, by Protocol Decision No 1 of 30.03.2021, the Fund's Management Board adopted, for information purposes, a report on the activity of the Universal Service Compensation Fund for 2020. In the absence of a request from the incumbent, no examination

[68] http://www.crc.bg/section.php?id=904&lang=bg

[69] Through the CRC's electronic system of on-line questionnaires

procedure was initiated. In this respect, the Fund's Management Board did not come up with a decision on the amount of compensation due, did not set the percentage of gross revenue and the amount of the contribution of the undertakings to the Fund and, therefore, no funds were received in the Fund.

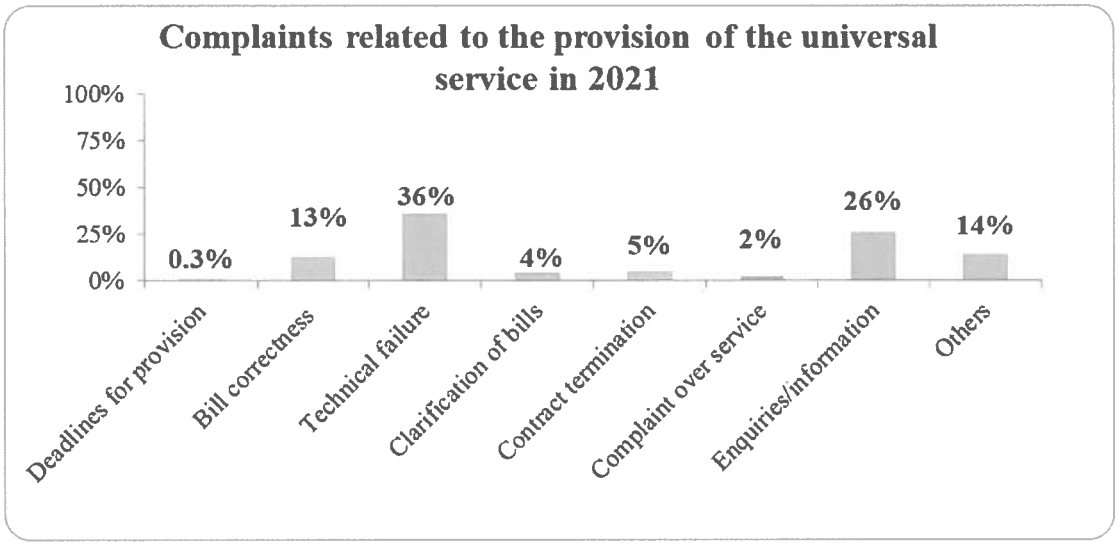
In addition, by Decision No 1 of 30.03.2021, an amendment to the rules of activity of the Universal Service Compensation Fund was adopted in order to bring it into compliance with the existing regulatory framework.

7.5. Complaints and complaint resolution

According to the General Conditions governing the relations between BTC and the end-users, the undertaking gives options to the users to individually track and control their costs through: the provision of itemised bills free of charge,[70] selective limitation of outgoing calls free of charge, and deferred payment when connecting to public telephone networks.

In 2021, the number of complaints filed with BTC regarding the provision of the universal service was by 28% less than in 2020. Most often, the complaints disputed technical

failures and enquiries/information concerning clarification of monthly bills. The causes for filing complaints are illustrated in Figure 35.



Source: Data submitted to CRC

Figure 35

The number of complaints concerning breach of contract clauses, violation of the time limits for the provision of the service, disputes concerning the correctness of bills, termination of contract, complaints from service and inquiry/information was reduced by an average of 50% for the categories indicated. There was a minimal increase in complaints about technical failure and other reasons for complaint. There is no substantial change in the percentage breakdown of complaints submitted in relation to the provision of universal service for the previous year.

In 2021, the percentage of unsatisfied complaints amounted to 67% of the total number of complaints filed, registering a decrease of 2 percentage points compared to 2020.

7.6. Prospects for development of the universal service

Following the amendment of the concept of universal service, an analysis is to be conducted for the availability at a fixed location of a service for adequate broadband Internet

[70] The content of the itemised bill is defined in Article 260 (3) of the LEC.

access and voice communications services and whether it can be ensured under normal commercial conditions. In case that a lack of these services is identified under normal commercial conditions in the territory of the whole country or in different parts of it, the Commission will take action to ensure the universal service in accordance with the LEC provisions.

The figures on the state of the universal service in 2021 confirm the continuing downward trend in the interest in this service, including in price packages with preferential conditions for vulnerable social groups.[71]

In case of assignment an obligation to provide the universal service in accordance with the amended concept, consumers' interest is expected to remain at least at the current levels due to the inclusion of an adequate broadband Internet access service.

II. LEGAL AND REGULATORY FRAMEWORK

1. EU regulatory framework for electronic communications

With Directive (EU) 2018/1972 of the European Parliament and the Council of 11 December 2018 establishing the European Electronic Communications Code (EECC), a revision of the applicable EU regulatory framework was performed. Pursuant to Article 124 (1) of Directive (EU) 2018/1972, the EU Member States had to adopt and publish, by 21 December 2020, the laws, regulations and administrative provisions necessary to comply with this Directive, and they shall apply those measures from 21 December 2020.

Regulation (EU) 2018/1971 of the European Parliament and of the Council of 11 December 2018 establishing the Body of European Regulators for Electronic Communications (BEREC) and the Agency for Support for BEREC (BEREC Office), amending Regulation (EU) 2015/2120 and repealing Regulation (EC) No 1211/2009, settles the coordination between the national regulatory authorities within the framework of the common body and regulates intra-EU international calls.

The European Commission also published a Proposal for a Regulation of the European Parliament and of the Council concerning the respect for private life and the protection of personal data in electronic communications and repealing Directive 2002/58/EC. The last Directive is not part of the legal framework of the EECC and will be the subject of a separate regulation. The final text of the regulation has not been adopted yet.

2. Legal and regulatory framework in Bulgaria

In 2021, the 44th National Assembly adopted the Law on Amendment and Supplement of the Law on Electronic Communications (the LASLEC) (SG, no. 20 of 9 March 2021) which is in effect as of 13 March 2021. The amendment of the law introduced Directive (EU) 2018/1972 to fulfil the commitments of the Republic of Bulgaria as an EU Member State to bring the Bulgarian legislation into line with that act.

The amendments and supplements to the LEC follow the provisions of Directive (EU) 2018/1972 and relate to the following more substantial changes:

- The conditions that may contain the general requirements and authorisations for the use of radio frequency spectrum, numbering resources and position on the geostationary orbit have been refined;
- The criteria to be taken into account in determining the regime of use of radio frequency spectrum and in limiting the number of authorisations to be issued have

[71]Price packages for people with impaired work capacity or capacity for social adaptation; people admitted to social and health care facilities; or people with low income

been further developed, with the possibility to define the conditions for shared use of radio frequency spectrum;

- In order to ensure faster access to the radio frequency spectrum and to reduce the administrative burden, a possibility of using the radio frequency spectrum on the basis of registration has been foreseen;
- New rules relating to the authorisation of the use of radio frequency spectrum have been introduced, such as a period of time of no less than 15 years, with the possibility of extending at least up to 20 years for the use of harmonised radio frequency spectrum for wireless broadband services;
- Conditions have been envisaged for the authorisation of alternative use of harmonised radio frequency spectrum;
- Procedures have been introduced for cooperation with competent authorities of other EU Member States in the case of cross-border coordination of radio frequency spectrum;
- The scope of universal service has been expanded while allowing some of the ancillary services that are part of the universal service to be abolished;
- The provisions on consumer rights have been amended by introducing new requirements on pre-contractual and contractual information, transparency, quality of service, duration and renewal of the contract, security and access to emergency numbers, facilitating processes for the provision of number portability and switching of providers of Internet access services, better protection when using bundled services, etc.;
- The rules on the protection and processing of personal data of end-users when concluding an electronic communications service contract have been refined.

3. Important regulatory decisions of CRC in 2021

The total number of CRC decisions adopted in 2021 was 424, the majority of which

are in implementation of CRC's powers according to the LEC. Among those decisions, the acts that play a more significant role in ensuring a foreseeable and competitive environment in the sector are as follows:

- By Decision No 94 of 10.03.2021, CRC announced the end of the sealed-bid tender for the issuance of authorisations for the use of individually assigned scarce resource - radio frequency spectrum in the 3.6 GHz band for electronic communications through terrestrial network capable of providing electronic communications services (TDD mode of operation) with a national coverage as announced by the Communications Regulation Commission (CRC) Decision No 36 of 28 January 2021, because the number of applications submitted was equal to the number of authorisations that are subject to the decision;
- By Decision No 171 of 11.05.2021, CRC issued to A1 BULGARIA EAD Authorisation No 02448/11.05.2021 for the use of individually assigned scarce resource - radio frequency spectrum in the 3.6 GHz band for a terrestrial network capable of providing electronic communications services with national coverage for a period of 20 (twenty) years, from 11.05.2021 to 11.05.2041;
- By Decision No 172 of 11.05.2021, CRC issued to BULGARIAN TELECOMMUNICATIONS COMPANY EAD Authorisation No 02449/11.05.2021 for the use of individually assigned scarce resource - radio frequency spectrum in the

3.6 GHz band for a terrestrial network capable of providing electronic communications services with national coverage for a period of 20 (twenty) years, from 11.05.2021 to 11.05.2041;

- By Decision No 173 of 11.05.2021, CRC issued to YETTEL BULGARIA EAD Authorisation No 02450/11.05.2021 for the use of individually assigned scarce resource - radio frequency spectrum in the 3.6 GHz band for a terrestrial network capable of providing electronic communications services with national coverage for a period of 20 (twenty) years, from 11.05.2021 to 11.05.2041;
- By Decision No 251 of 22.07.2021, CRC adopted Ordinance No 1 of 22.07.2010 regarding the rules for use, allocation and the procedures of primary and secondary assignment for use, reservation and withdrawal of numbering resources(SG, no. 64 of 3 August 2021);
- By Decision No 329 of 16.09.2021, CRC adopted the Rules for use of radio frequency spectrum for production purposes after authorisation (SG, no. 85 of 12 October 2021);
- By Decision No. 333 of 23.09.2021, CRC adopted the Rules for interaction with the undertakings concerned when filing applications for, international coordination and registration in international electronic communications organisations of the positions on the geostationary orbit with the relevant radio frequency spectrum and of the radio frequency spectrum used by the non-geostationary satellite system, and the procedure of payment of fees defined by an international act (SG, no. 85 of 12 October 2021);
- By Decision No 347 of 30.09.2021, CRC adopted the Rules for use of radio frequency spectrum for electronic communications networks by satellite radio services after authorisation (SG, no. 91 of 2 November 2021);
- By Decision No 348 of 30.09.2021, CRC adopted the Rules for free use of the radio frequency spectrum (SG, no. 92 of 5 November 2021);
- By Decision No. 350 of 30.09.2021, CRC CRC withdrew the obligations for the provision of public payphones and/or other points of public access to voice telephony services of certain quality, provision of a directory and telephone inquiry services imposed as obligations for the provision of the universal service as part of the services within the scope of the universal service, or the obligations of BULGARIAN TELECOMMUNICATIONS COMPANY EAD in this part. This Decision also introduced a transitional period related to the undertaking's obligation to provide public payphones and/or other points of public access to voice telephony services of certain quality, installed as of the date of this Decision at certain locations of social importance;
- By Decision No 362 of 14.10.2021, CRC adopted the Rules for use of radio frequency spectrum after registration (SG, no. 92 of 5 November 2021);
- By Decision No 373 of 21.10.2021, CRC adopted the Rules on the conditions and procedure for the transfer of authorisations for the use of a scarce resource, the transfer of part of the rights and obligations under authorisations for the use of a scarce resource and the lease of radio frequency spectrum (SG, no. 92 of 5 November 2021);
- By Decision No 384 of 28.10.2021, CRC adopted the Rules for use of radio frequency spectrum for terrestrial networks capable of providing electronic communications services after authorisation (SG, no. 95 of 16 November 2021);

- By Decision No 387 of 04.11.2021, CRC adopted the Rules for use of radio frequency spectrum for electronic communications networks from mobile radio service after authorisation (SG, no. 98 of 23 November 2021);
- By Decision No 391 of 11.11.2021, CRC adopted the Functional Specifications for portability of nationally significant numbers from the National Numbering Plan (SG, no. 101 of 3 December 2021);
- By Decision No 396/18.11.2021, CRC adopted Joint instructions from the Commission and the Commission for Personal Data Protection on the conditions, methodology and time limits for providing information on the existence of unpaid end-user obligations toward undertakings providing public electronic communications services (SG, no. 109 of 21 December 2021);
- By Decision No 406 of 02.12.2021, CRC adopted General Requirements in the provision of public electronic communications (SG, no. 108 of 17 December 2021);
- By Decision No 414 of 09.12.2021, CRC adopted the Rules for terms and conditions of the provision and use of functions of network "calling line identification", "connected line identification" and "tone dialing" (SG, no. 108 of 17 December 2021);
- By Decision No 418 of 16.12.2021, CRC adopted draft Rules for use of radio spectrum for radio equipment by amateur radio service, for transmission to the Ministry of Economy and Industry, with a view to its notification to the European Commission;
- By Decision No. 420/16.12.2021, CRC amended and supplemented the Methodology for the terms and procedure of relevant markets definition, analysis and assessment, and criteria for designating undertakings with significant market power (SG, no. 2 of 7 January 2022);
- By Decision No 421/16.12.2021, CRC adopted the CRC Guidelines under Art. 160 (4) of the LEC concerning the procedures applicable to access and interconnection.

4. Provision of electronic communications

4.1. Authorisations for the use of individually assigned scarce resource

The authorisations for the use of individually assigned scarce resource issued during the year are presented in Table 14.

Table 14

Authorisations for 2021 under the Law on Electronic Communications				
Electronic communications network	Amendments/Supplements (number)	Authorisations issued (number)	Terminated/Revoked/ Expired (number)	Transfers (incl. partial)/Lease (number)
Electronic communications networks for terrestrial digital broadcasting of television signals with national and local coverage	2	-	-	-
Electronic communications networks for terrestrial analogue broadcasting of radio signals with national and local coverage	21	1	1	3
Terrestrial networks in frequency band 1800 GHz	1	-	-	-
Terrestrial networks in frequency band 2 GHz	3	-	-	-
Terrestrial networks in frequency band 2.6 GHz	-	3	-	-
Terrestrial networks in frequency band 3.6 GHz	-	3	-	-
Electronic communications networks from mobile radio service - PMR/ PAMR	48*	15*	20	34
Electronic communications networks from the aeronautical mobile radio service	2	1	2	1
Electronic communications networks from the fixed satellite radio service	12	3	-	-
Electronic communications networks from the fixed radio service of the "point-to-point" type	31**	2	3	-
Authorisation for the use of individually assigned scarce resource – numbers for provision of public electronic communications	9	-	1	2
Electronic communications networks for fixed wireless access (FWA)	-	-	-	1
Temporary authorisations	2	16 *	-	-
TOTAL:	131	44	27	41

** The total number of provided radio frequencies for these authorisations was 135;*

*** Amendments and supplements to the technical data of a total of 2,380 radio links, including provided radio frequency spectrum for new 948 links.*

4.2. Notifications on the provision of public electronic communications

The notification on the provision of public electronic communications has been brought into compliance with the template established by BEREC, the LEC and the Code. In application

of the Code, all data of the undertakings that have notified CRC on the provision of electronic communications services were transferred to the single database of undertakings established in accordance with Regulation (EU) 2018/1971.

The activities related to the notifications submitted in 2021 for the provision of public electronic communications are presented in Table 15.

Table 15

Type of activity	2021 (number)
Processed notifications for provision of public electronic communications	78
Processed notifications for termination of the provision of public electronic communications	44
Issued certificates for entry in the Register	14
Undertakings entered in the Register	46
Undertakings deleted from the Register	37

4.3. Provision of electronic communications through radio equipment from the amateur radio service

The authorisations, certificates and licenses for radio amateur capacity issued during the year are presented in Table 16.

Table 16

Type of document	2021 (number)
Authorisations for radio amateur capacity	245
HAREC certificates	18
CEPT licenses	27
Allocated call signs	315*

**75 of the allocated call signs are temporary.*

In past year, 9 amateur radio licence exams were held with 234 examined persons in the cities of Sofia, Varna and Gabrovo

4.4. Interconnection and access

In 2021, CRC prepared and published Guidelines and Procedures under Article 160 (4) of the LEC[72] concerning access and interconnection (the Guidelines). The provisions of art. 160 (4) of the LEC introduced Article 61(1) of the EECC, under which NRAs are required to provide guidance and make public the procedures applicable to access and interconnection to ensure that small and medium-sized enterprises and operators with limited geographical coverage can benefit from the obligations imposed. The Guidelines provide information on access and interconnection concerning:

- *applicable documents;*
- *specific obligations;*
- *call termination rates;*

[72] Guidelines and procedures under Article 160 (4) LEC

- *procedure applicable to access and interconnection;*
- *contents of contracts;*
- *disputes.*

CRC considered one request for binding instructions under Article 54 of the LEC and mediated on two requests for agreement in relation to Article 55 of the LEC relating to amendments to the General conditions for voice calls termination in a mobile network of an operator, providing interconnection. The amendments include new clauses concerning the manipulation of A-numbers and artificially generated traffic. Sanctions for termination of calls with manipulated identification of the caller line were introduced and set in the additional agreements to the interconnection contracts. By Decision No 122 of 25 March 2021,[73] the Commission partially accepted the requests for binding instructions. As a result of the CRC's intervention, additional agreements were signed in the framework of the two assistance procedures, with the conditions corresponding to the binding instructions given by the Commission.

In 2021, CRC received a request for mediation under Article 54 of the LEC concerning the refusal to carry out and perform a test resulting from a regulatory administrative act (Rules for terms and conditions of the provision and use of functions of network "calling line identification", "connected line identification" and "tone dialing"). In the course of this mediation, CRC was informed of the successful conduct of the test and the procedure was finalised.

At the end of the year, the Commission received a request to impose an obligation to provide access to and use of specific network elements and associated facilities on the grounds of Article 160a of the LEC to any undertaking providing electronic communications networks and/or services which owns network and associated facilities in the territories mentioned in the request (including dark fibres). In 2022, information will be collected and analysed in connection with the request received.

Delegated Regulation (EU) 2021/654 supplementing Directive (EU) 2018/1972 of the European Parliament and of the Council by setting a single maximum Union-wide mobile voice termination rate and a single maximum Union-wide fixed voice termination rate entered into force in 2021 (Delegated Regulation).[74] In this respect, CRC checked the information on the websites of undertakings that are addressees of Decision No 265 of 23 July 2020 and Decision No 266 of 23 July 2020. The results showed that all the undertakings have amended their voice call termination rates in accordance with the provisions of the Delegated Regulation.

III. ACTIVITIES UNDER THE LAW ON ELECTRONIC COMMUNICATIONS AND THE LAW ON ELECTRONIC DOCUMENT AND ELECTRONIC TRUST SERVICES AND THE LAW ON ELECTRONIC COMMUNICATIONS NETWORKS AND PHYSICAL INFRASTRUCTURE

1. Activities in implementation of the CRC's priorities

1.1. Effective management of scarce resources

1.1.1. Radio frequency spectrum

Radio frequency spectrum is an extremely valuable scarce resource with great importance for ensuring the sustainable development of the Bulgarian economy and society as a whole. Bulgaria, as well as Europe, face COVID-19, which is a social and economic challenge of unprecedented scale. The provision of radio frequency spectrum and connectivity are among the cornerstones of economic recovery in this respect. Radio frequency spectrum is a key factor in achieving the objectives of the Digital Decade 2030 and a key asset for achieving universal

[73] CRC Decision No 122

[74] Delegated Regulation (EU) 2021/654

broadband coverage and digital transformation. The use of wireless networks facilitates people's everyday lives by providing society with access to information, connectivity in the sphere of energy, healthcare, transport, industry, home management, city management, etc.

In 2021, the Law on Amendment and Supplement to the Law on Electronic Communications (the LASLEC) was promulgated, transposing the provisions of the EECC in Bulgaria.

In pursuit of the LEC's main objectives of creating the necessary conditions for the development of connectivity and access to high capacity wireless networks, promoting the effective, efficient and coordinated use of radio frequency spectrum, CRC manages the radio frequency spectrum for civil needs in accordance with the European radio frequency spectrum policy and taking into account the national interests and specificities. CRC seeks to ensure timely availability and conditions for the use of radio frequency spectrum for the deployment of new wireless systems and technologies, including 5G networks, high capacity networks in high frequency bands, intelligent transport systems, innovative satellite networks, digital broadcasting of television and radio programmes, programme making and special events (PMSE) networks, short-range radio equipment to support the development of a sustainable internal market.

In 2021, in performing the activities related to the radio frequency spectrum management, CRC took into account the Regulatory policy for radio frequency management for civil needs, the Updated electronic communications policy, the Updated state policy for radio spectrum planning and allocation in the Republic of Bulgaria.

A draft Regulatory policy for radio frequency management was prepared during the year, setting out the main objectives, mechanisms and approaches for the management of radio spectrum for civil needs for the period 2022-2024, the implementation of which will contribute to the development of wireless networks and ensure harmonised and coordinated use of radio spectrum.

CRC ended the public consultations on the intention announced by Decision No 409/03.12.2020 to limit the of number of authorisations for use of spectrum in the 2.6 GHz band for a terrestrial network capable of providing electronic communications services with national coverage provided and adopted the results from them (Decision No 22 of 21.01.2021). As a result, by its Decisions No 84, 85 and 86 of 25.02.2021, CRC issued authorisations to A1 BULGARIA EAD (A1), YETTEL BULGARIA EAD (YETTEL) and BULGARIAN TELECOMMUNICATIONS COMPANY EAD (BTC) for the use of radio spectrum in the 2.6 GHz band. Each of the three undertakings was assigned a radio spectrum of 3x2x20 MHz (a total of 120 MHz). This has enabled undertakings to increase the capacity of their networks in densely populated areas to serve the growing data traffic, where the consumption of services is higher.

In 2021, CRC carried out a number of activities related to ensuring the conditions of use of the bands determined in the Radio Spectrum Policy Group's (RSPG) opinion[75] as initial for the introduction of 5G networks - the 700 MHz, 3.6 GHz and 26 GHz bands - for the introduction of 5G in Europe.

By Decision No 35 of 28.01.2021, CRC adopted the results from the public consultations on the announced intention to limit the number of authorisations for use of spectrum in the 3.6 GHz band for a terrestrial network capable of providing electronic communications services with national coverage and announced a tender for the issuance of authorisations. In this respect, on 6 April 2021, CRC run a sealed-bid tender to issue three authorisations for the use of the 3.6 GHz spectrum with national coverage for a period of twenty years. As a result of the tender, by Decisions 171, 172, 173 of 11 May 2021, 3.6 GHz spectrum usage authorisations were issued to the three mobile operators participating in the tender, A1, Yettel and BTC, as each of them was assigned a spectrum of 100 MHz. This ensured real conditions for the introduction of 5G

[75] Strategic roadmap towards 5G for Europe - Opinion on spectrum related aspects for next-generation wireless systems (5G)

networks in Bulgaria and high-speed services for consumers, which is a prerequisite for achieving the objectives of the Digital Decade, universal mobile broadband coverage and digital transformation.

By Decision No 93 of 04.03.2021, CRC adopted the results of the public consultations held on the prospects and conditions for use of the free resource in the 26 GHz band. In the context of the consultations, undertakings only expressed a general interest in obtaining spectrum in the 26 GHz band. In order to overcome the fragmentation of spectrum in the band, discussion were held with representatives of the Ministry of Defense to move and optimise their network as well as with mobile undertakings, with a view to ensuring large continuous 5G blocks.

For the 700 MHz band, an analysis and public consultation activities were carried out over the past year. As a result, in light of the significant investments made by undertakings to obtain spectrum in the 2.6 and 3.6 GHz bands, the public consultation on the assignment of resources in the 700 MHz band is scheduled to take place in 2022 with a view to spectrum assignment in 2023.

The adoption of the Rules for the use of radio frequency spectrum after registration has allowed for easier access to a frequency resource for undertakings (registration regime) in the 57-66 GHz, 71-76 GHz paired with the 81-86 GHz and 92-95 GHz bands which, until the adoption of the rules, were subject to authorisation. The networks in these bands provide high speeds and data transmission quality.

In order to ensure the conditions for the introduction of 5G networks and the promotion of investment in infrastructure, and in fulfilment of the amendments and supplements of the Law on Spatial Planning and the LASLEC, in 2021, CRC adopted the results of the public discussion of a draft Ordinance on the content, conditions and procedure of keeping, maintaining and use of the register of transceiver stations on terrestrial networks, the activities under Article 151, Para 1, p. 16 of the Law on Spatial Planning and small-area wireless access points, which will be finally adopted in 2022.

Activities were carried out related to the setting up of a register of the granted rights for the use of the radio frequency spectrum based on registration and a register of transceiver stations on terrestrial networks capable of providing electronic communications services, activities under Article 151, Para 1, point 16 LSP and small-area wirelessaccess points. The introduction of the Register under the LSP will ease the conditions and encourage investment in the construction and deployment of 5G networks in Bulgaria.

In 2021, CRC took actions to gradually modify the authorisations issued in connection with the entry into force of the amendment and supplement to the Tariff on fees collected by CRC under LEC (prom., SG, no. 30 of 31.03.2020, effective as of 1 January 2021) and the LASLEC. In this respect, 36 authorisations for networks of mobile, land mobile, fixed and satellite radio services and 17 authorisations for broadcasting networks were amended, including 3 authorisations for national networks (BNR, Darik and BTC).

By Decision No 308 of 26.08.2021, CRC adopted a position and opened a public consultation procedure on the prospects for the use of the free resource in the 174–230 MHz band. In this respect, concrete questions were raised concerning the prospects of using the free resource in this band. By Decision No 404 of 02.12.2021, CRC adopted the results of the public consultation held during which a willingness to use a resource in the 174-230 MHz band was declared. At the beginning of 2022, pursuant to Article 89 (1) LEC, CRC took action to announce the intention to hold a competition for the use of radio spectrum.

On the basis of an analysis of the decisions adopted at the World Radiocommunication Conference which took place in 2019 (WRC-19), proposals and opinions have been prepared in relation to the amendment of the National plan for radio frequency spectrum allocation and State policy for radio spectrum slanning and allocation.

Allocation, planning, assignment and effective use of the frequency spectrum

In 2021, CRC examined and analysed the need of updating the regulations related to the radio frequency spectrum management, both with regard to the harmonised conditions for use of the frequency spectrum and to the need of their bringing into compliance with the LASLEC.

In this respect, CRC developed and adopted the regulations on the frequency resource management specified in section "II. LEGAL AND REGULATORY FRAMEWORK, p. 3. "Important regulatory decisions of CRC in 2021" of this report of the Commission.

The rules applicable to the use of radio spectrum by the relevant radio services include the provisions on technical requirements for the operation of electronic communications networks by different radio services and updated conditions relating to the use of radio spectrum.

In fulfilment of Bulgaria's obligations under Directive 2014/53,[76] seven draft rules were notified to the EC under the procedure under Directive (EU) 2015/1535.[77] Pursuant to Article 5 of Directive (EU) 2015/1535, Member States are required to notify any draft technical regulation,[78] which is the rules by nature.

In 2021, CRC also adopted draft Rules for use of radio spectrum for radio equipment by amateur radio services (public consultation was ended by Decision No 418 of 16.12.2021), which was also notified to the European Commission.

With the adoption of those acts, the regulatory framework for spectrum use has been brought into line with the LASLEC and the provisions of the new decisions of the Electronic Communications Committee (ECC) on harmonised use of radio spectrum have been implemented in the Bulgarian legislation, as well as the provisions of the following EC Decisions:

- Commission Implementing Decision (EU) 2020/1426 of 7 October 2020 on the harmonised use of radio spectrum in the 5875-5935 MHz frequency band for safety-related applications of intelligent transport systems (ITS) and repealing Decision 2008/671/EC (OJ L 328/19 of 9 October 2020).
- Commission Implementing Decision (EU) 2020/667 of 6 May 2020 amending Decision 2012/688/EU as regards an update of the technical conditions applicable to the 1920-1980 MHz and 2110-2170 MHz frequency band.

By transposing the provisions of these EC Decisions, the technical conditions for harmonised use of radio spectrum in range 2 GHz have been updated for terrestrial networks capable of providing electronic communications services and in the 5875-5935 MHz frequency band for intelligent transport systems.

In line with the amendments and additions to the above regulations in the frequency information system of the European Communications Office - EFIS (ECO Frequency Information System), the data on the use of the frequency resource in the Republic of Bulgaria were updated.

In relation to the activities relating to implementation of the Decisions adopted at WRC-19, CRC was actively involved in the interdepartmental working group. Proposals were prepared to amend the National plan for radio frequency spectrum allocation in relation to the

---

[76]Directive 2014/53/EU of the European Parliament and the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC

[77] Directive (EU) 2015/1535 of the European Parliament and of the Council of 9 September 2015 laying down a procedure for the provision of information in the field of technical regulations and of rules on information society services (codifying and repealing Directive 98/34/EC)

[78] Technical Regulation means both the essential characteristics of the product and their conditions of use, where such conditions may significantly affect the composition or nature of the product or its sale, or rules for services including provisions concerning service providers, services and recipients of services, including the relevant administrative provisions, the observance of which is mandatory, in law or in fact, in the case of marketing, the provision of services, the establishment of a service operator or use in a member state or in a large part of it. Technical Regulation is a more general concept covering the concept of radio interface.

implementation of WRC-19 decisions and to harmonise spectrum allocation with the European spectrum allocation table.

Mobile radio service

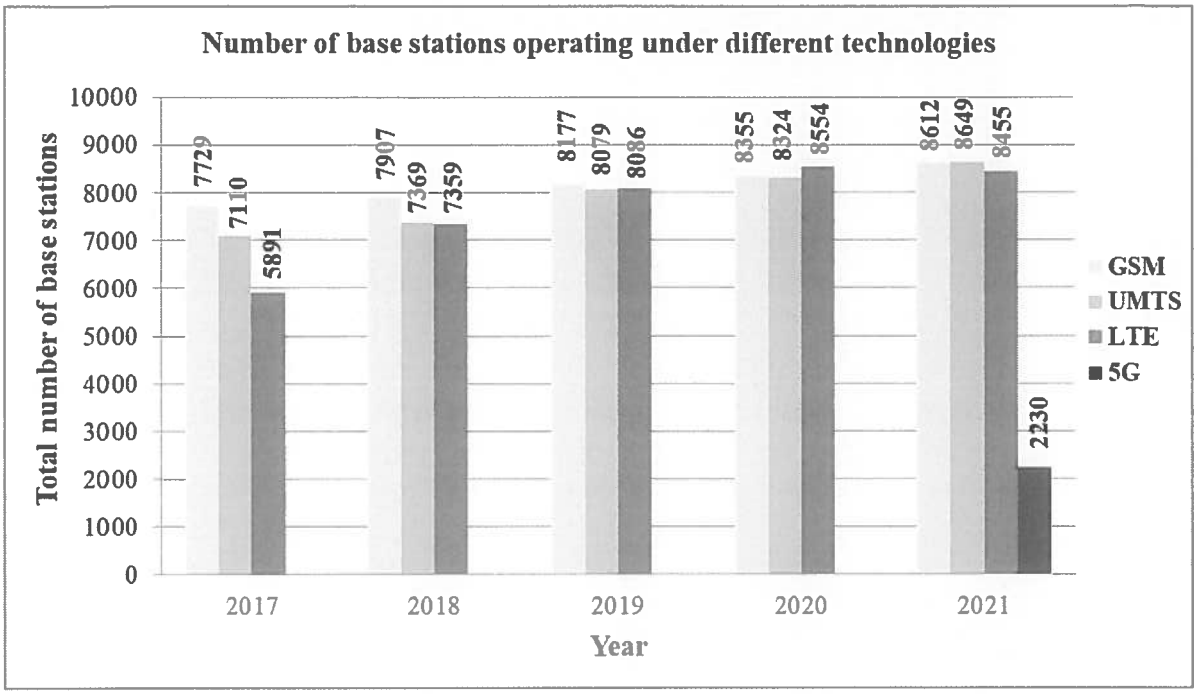
The possibility of applying a flexible approach to the creation and configuration of networks from mobile radio services, such as PMR/PAMR networks, is the reason for their use both for large groups of consumers, mainly in the public sector (energy, transport, healthcare, environmental protection, municipal voluntary organisations, etc.), and for small and medium-sized consumer groups, mainly in the private sector (taxi, construction and security services, service providers, etc.). Depending on users' objectives, hierarchical structured networks with local, regional or national coverage can be set up.

The demand for PMR/PAMR networks in recent years has remained relatively constant. Following an analysis of the radio frequency spectrum provided for use and a national coordination and agreement of radio frequencies and frequency bands with all state authorities, departments and agencies concerned, 131 radio frequency channels (121 simplex and 10 duplex) were provided to undertakings, of which 48 radio frequencies were for the construction of 32 new radio networks for the provision of electronic communications for private needs through an electronic communications network from the mobile radio service. The total number of deployed networks amounted to 1,771.

With the introduction of the 5G mobile technology, we are witnessing a dynamic change in mobile networks, which will benefit both consumers and the business and industry. 5G networks will provide infrastructure to connect millions of smart devices that will be able to automatically exchange information. This is expected to lead to the introduction on the market of various personalised applications, smart cities, smart homes, autonomous cars, connected industry, etc. A major component in the development of 5G is the use of a large amount of spectrum, respectively wider bands to support higher speeds, higher traffic volumes and the provision of better quality services.

In 2021, CRC issued authorisations to the three mobile undertakings to use radio frequency spectrum in the 3.6 GHz band, which was identified as one of the initial 5G deployment bands in Europe. All three operators have launched their 5G networks and are introducing 5G base stations, among other technologies, as shown by the chart presented on Figure 36. The evolution of mobile networks will undoubtedly continue and 5G will play a key role in our lives, ensuring higher speeds, reliability and connectivity. 5G is likely to be the fastest-growing mobile technology and is expected to reach around 75% coverage[79] of the world's population in 2027.

[79] Ericsson Mobility Report, November 2021



Source: CRC

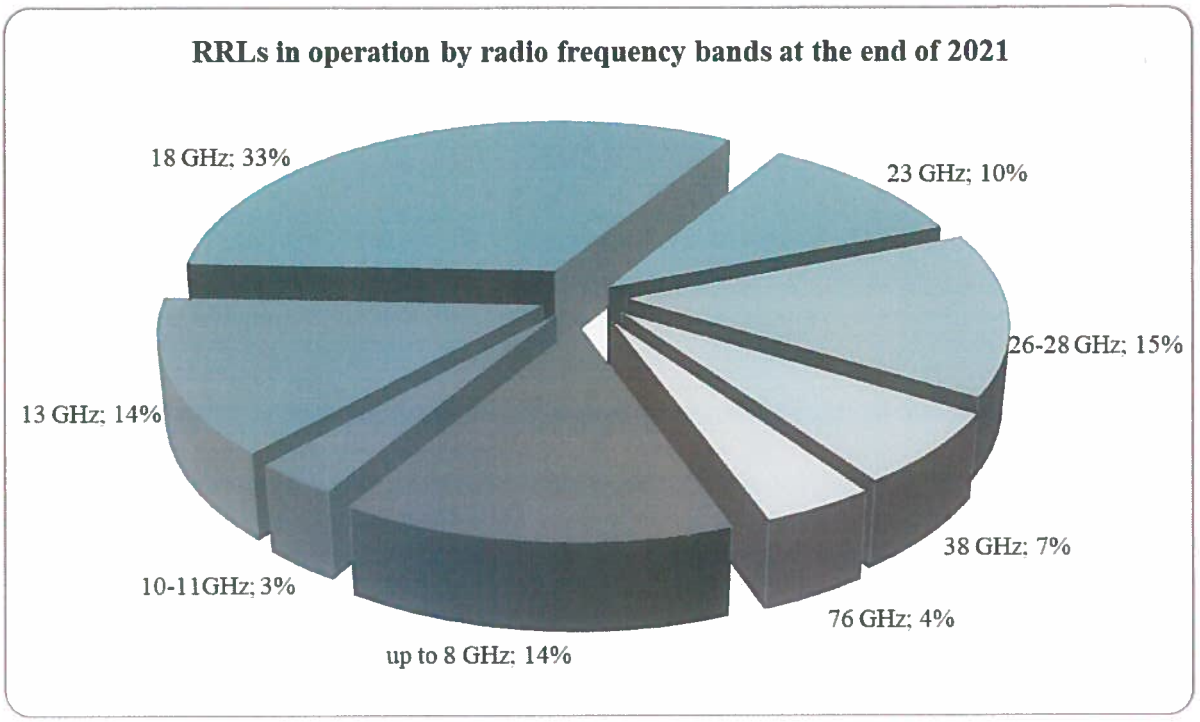
Figure 36

Fixed radio service

In 2021, one authorisation was issued and 37 amendments and supplements were made to authorisations for the use of individually assigned scarce resource – frequency spectrum - for the provision of electronic communications via electronic communications network of the point-to-point type concerning the technical data of a total of 2,360 one-way radio relay links (RRLs). With them, radio frequency spectrum was allocated to new 948 links, their total number reaching 18,198 versus 17,841 for 2020. The trend for deployment of high-tech digital systems using XPIC/CCDP technologies continued, as the number of RRLs using these systems reached 10,460 at the end of 2021 (an increase of 1% compared to 2020 – 10,514 items). The amendments of the authorisations reflect the increased need of undertakings to use higher transmission capacity, which in turn increases the frequency band used in different directions.

A growth in the use of high-frequency bands, compared to the total number of RRLs, was once again registered. In band 18 GHz, their number reached 5,996, preserving the 32% share in the total number of RRLs at the end of 2021. The development of high-density communications networks using the super-high-frequency bands continued. At the end of the year, RRLs in bands 28 GHz, for which there are authorisations issued for the use of the frequency spectrum, totalled 3,844. In 2021, the use of coupled radio frequency bands 71-76 GHz and 81-86 GHz for high-capacity RRLs continued, as their number reached 758 at the end of the year, which is an increase of 55.5 % compared to 2020.

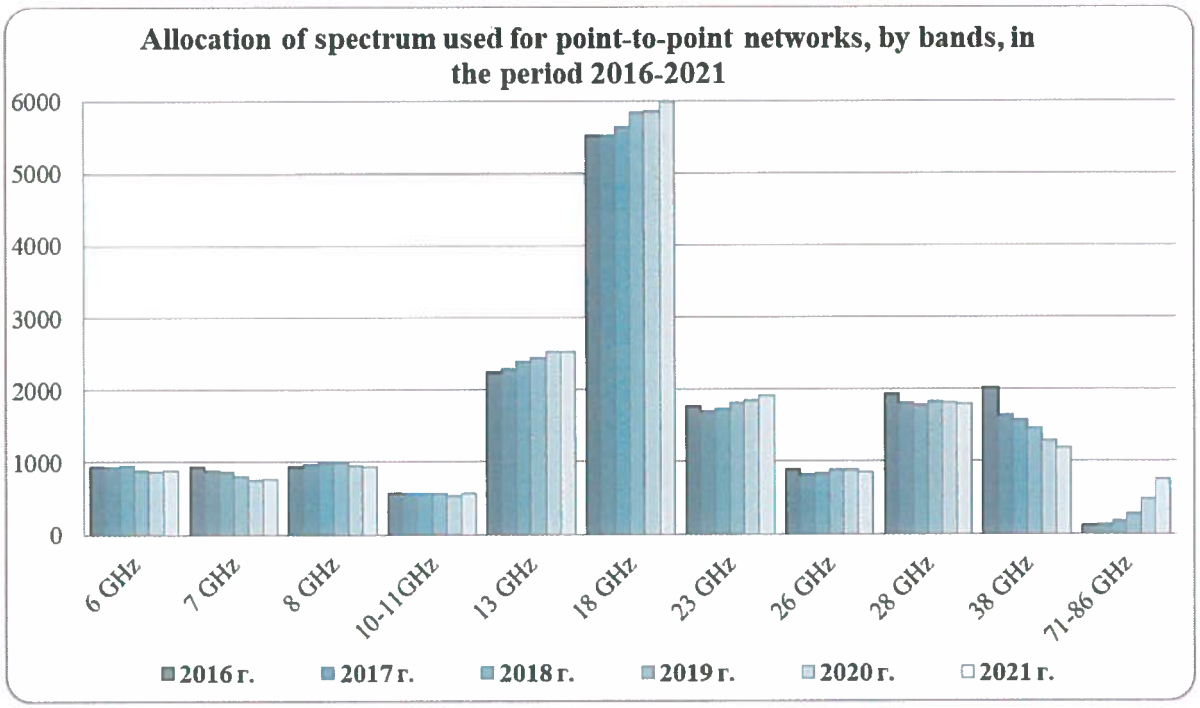
Figure 37 presents information on the percentage breakdown of active RRLs by radio frequency bands assigned with authorisations for the use of individually assigned scarce resource – frequency spectrum - for the provision of electronic communications via electronic communications network of the point-to-point type, at the end of 2021.



Source: CRC

Figure 37

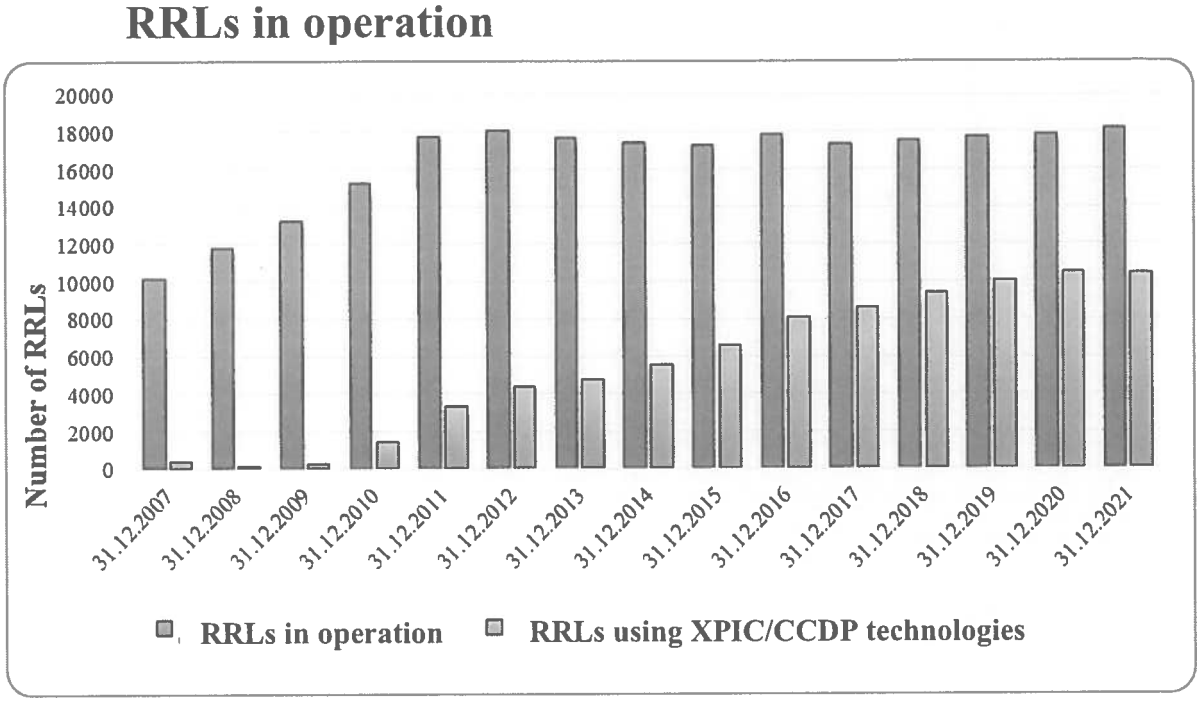
Figure 38 presents the allocation of spectrum used for point-to-point networks, by bands, in the period 2016-2021.



Source: CRC

Figure 38

Figure 39 displays the active RRLs by years, compared with the part of them which uses XPIC/CCDP technologies.



Source: CRC

Figure 39

As 5G networks develop and deploy, the challenges for transmission networks and respective transmission capacities are increasing. Therefore, in 2021, the number of RRLs using new technical solutions for higher transmission speeds increased, such as:

- band channel aggregation (BCA) or super dual band (SDB) – use of two frequency bands in one direction;
- channel aggregation (CA) – use of two adjacent channels in one direction.

Also, in 2021, RRLs with a bandwidth of 3.5 MHz and 7 MHz migrated to the 14 MHz, 28 MHz, 56 MHz and wider bands. The number of RRLs with a bandwidth of 3.5 MHz and 7 MHz in 2017 was 3,962, in 2018 it was 2,798, in 2019 - 2,030, in 2020 - 1,742, reaching 1,519 at the end of 2021, of which 10 one-way RRLs with a bandwidth of 3.5 MHz.

The LASLEC has introduced a new regime for granting rights of use for radio spectrum, a more relaxed registration regime than the authorisation one (issue of an authorisation), thereby reducing the regulatory burden. In order to bring the regulatory framework into line with the LASLEC, including with respect to this regime, CRC adopted rules for the use of radio spectrum after registration and rules for the use of radio spectrum for electronic communications networks from a fixed radio service after authorisation.

The adopted rules regulating the registration regime determined the conditions for the use of the spectrum and launched the procedure for development of an Information system ensuring the granting of individual rights to use radio frequency spectrum on the basis of registration. This will allow the application for and assignment of radio spectrum to take place entirely electronically.

Satellite radio services

In 2021, the activity related to regulation of satellite radio services continued to be focused on the coordination of the positions using geostationary orbit from fixed – satellite (FSS) and broadcasting – satellite (BSS) radio service. The high intensity of the coordination process was preserved. The goal of this process is to avoid potential interference to the Bulgarian planned systems on position 1.2°W (BSS) and 56.02°E (FSS). A request was submitted to the International Telecommunications Union (ITU) to register the BALKANSAT AP30B system, located at position 56.02°F (FSS) in the Main International Frequency Register (MIFR).

In the past year, an international coordination procedure was launched in ITU for the fourth Bulgarian satellite on non-geostationary low Earth orbit (NGSO) SHAREDSAT_2141 The application for an advance international coordination (API) was published by the ITU Radiocommunication Bureau in August 2021. The Bulgarian satellites on the non-geostationary low Earth orbit SPARTAN and QMR-KWT, working in the range assigned for amateur satellite radio service, were published by the ITU Radiocommunication Bureau in the API/B section of BRIFIC 2940.

The coordination activities continued through analyses of the biweekly circulars (BR International Frequency Information Circular - BRIFIC) issued by the Radiocommunication Bureau of the International Telecommunication Union. As a result of the analyses of all biweekly circulars for 2021, the relevant objections were sent in view of performing the regulatory functions of CRC in terms of the efficient use and effective management of the frequency spectrum.

In addition, an analysis was also made of the proposals received from other administrations to conclude agreements with a view to the successful coordination of the Bulgarian satellite systems.

Broadcasting

In 2021, following a request from the Council of Electronic Media(CEM) for the provision of free frequency resources for the city of Ruse concerning an open procedure to hold a competition, technical analysis and frequency planning were performed for the assignment of frequency resources and the relevant technical parameters (admissible powers, points of broadcasting as well as other technical information). In application of the LEC provisions, information was provided to CEM on the lack of free frequency resources needed for analogue terrestrial broadcasting in the territory of the city of Ruse.

In 2021, a total of 17 technical characteristics of electronic communications networks for terrestrial analogue broadcasting of radio signals in the VHF band (frequency band 87.5-108.0 MHz) were examined and analysed, of which 5 were of undertakings authorised to use individually assigned scarce resource – radio frequency spectrum for the provision of electronic communications through electronic communications network for terrestrial analogue broadcasting with national coverage, and 12 were of undertakings authorised to use individually assigned scarce resource – radio frequency spectrum for the provision of electronic communications through electronic communications network for terrestrial analogue broadcasting with local coverage.

Three temporary authorisations for short-term events (autocinema sound production in 29 settlements) were issued for the use of spectrum from the VHF band.

In relation to the authorisation issued for the use of individually assigned scarce resource – radio frequency spectrum for the provision of electronic communications via electronic communications network for digital terrestrial television broadcasting with national coverage to BULGARIAN TELECOMMUNICATIONS COMPANY EAD, a total of 3 technical characteristics were examined and analysed.

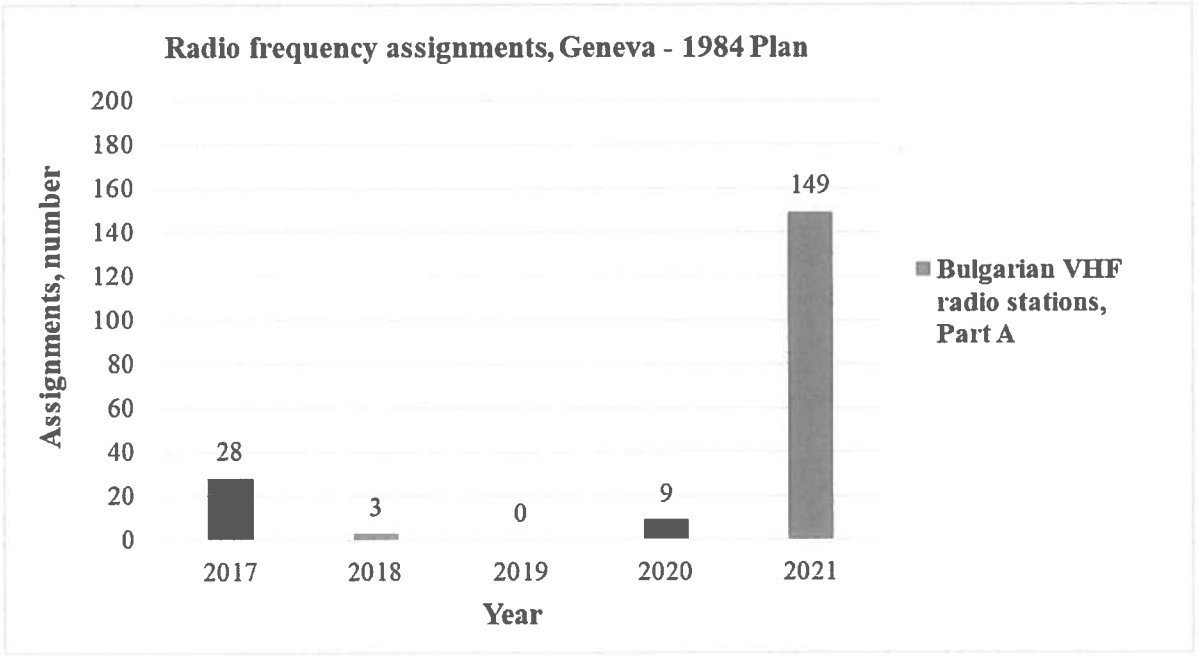
In 2021, CRC received 1 application for the issue of a temporary authorisation to use individually assigned scarce resource – radio frequency spectrum for the provision of electronic

communications through electronic communications network for digital terrestrial broadcasting on the territory of the city of Sofia, and 1 application for the issue of a permanent authorisation to use individually assigned scarce resource – radio frequency spectrum for the provision of electronic communications through electronic communications network for digital terrestrial broadcasting on the territory of the city of Sofia. In this respect, three technical characteristics of the electronic communications network for digital terrestrial broadcasting of radio signals were examined and analysed.

National and international coordination

In 2021, in the Advisory Council for National Coordination and Agreement to CRC, 1,412 radio frequencies and frequency bands were coordinated and agreed. National coordination and agreement with all state authorities, departments and agencies concerned is carried out with the goal to ensure the aeronautical and maritime safety, the protection of national security, and the efficient use of the radio frequency spectrum.

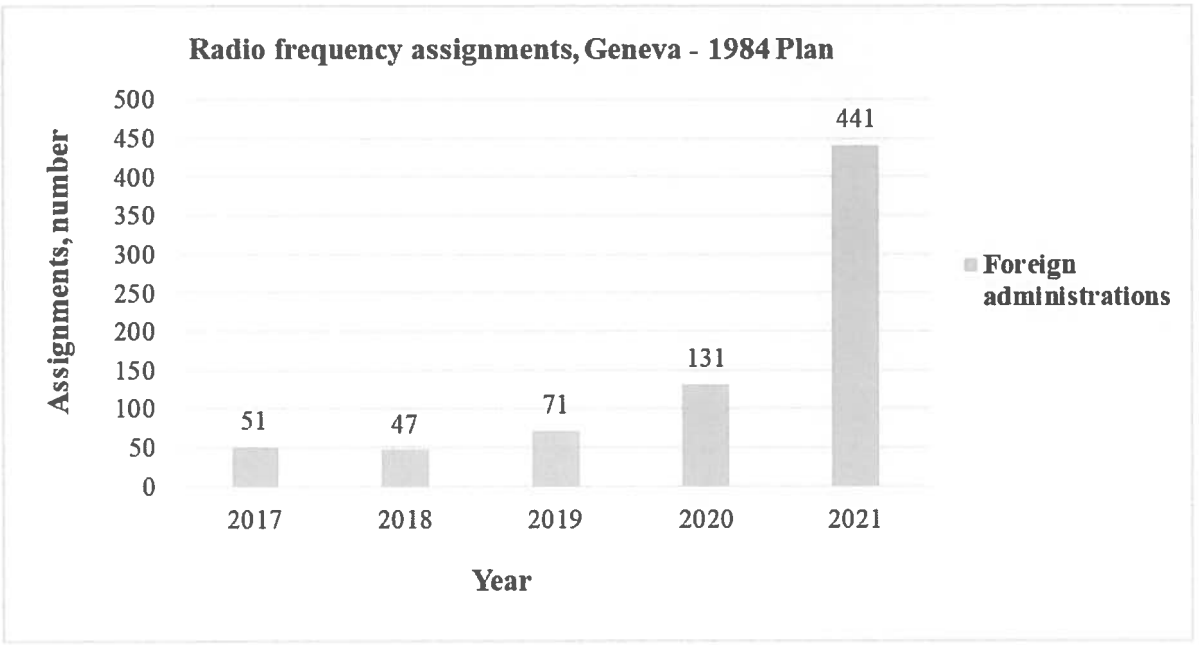
With regard to the international coordination of terrestrial networks, the Radiocommunications Bureau received applications for the adding of 164 radio frequency assignments to Bulgarian VHF radio stations in accordance with the Regional Agreement relating the use of the87.5-108.0 MHz frequency band for VHF (FM) sound broadcasting, Geneva, 1984 (Geneva – 1984). Figure 40 shows the number of Bulgarian assignments entered in Part A of the Geneva-1984 Plan over the last five years.



Source: CRC

Figure 40

Following the processing and analysis of publications in the BRIFIC biweekly circulars for the terrestrial radio services over the past year, 441 radio frequency assignments to foreign administrations with their respective technical parameters were coordinated under the terms of the Regional Agreement on the use of the 87.5-108.0 MHz frequency band for VHF (FM) radio broadcasting, Geneva, 1984. On the chart on Figure 41 one can track the intensity of international coordination of radio frequency assignments to foreign administrations over the last five years.



Source: CRC

Figure 41

In accordance with the conditions of the Regional Agreement relating to the introduction of the digital terrestrial radio and TV broadcasting service in the frequency bands 174-230 MHz and 470-862 MHz (Geneva - 2006), 15 frequency zones and assignments to foreign administrations were analysed and coordinated to amend the digital plan GE06D in accordance with the technical parameters.

In accordance with the procedures under Article 12 of the ITU Radio Regulations, 170 (87 in season A and 83 in season B) frequency assignments for terrestrial analogue and digital broadcasting of radio signals within the short-wave bands were coordinated.

Radio frequency assignments for satellite networks from the biweekly circulars BRIFIC for fixed-satellite and broadcasting-satellite radio services were processed and analysed. As a result of the performed examinations of the technical parameters and the further calculations, correspondence was exchanged with ITU and the relevant foreign administrations which had filed their requests in the biweekly circulars. In order to protect the Bulgarian positions on geostationary orbit and the assignments for fixed radio service from interferences, CRC sent objections, in accordance with the procedural rules of the Radio Regulations, to ITU and to the administrations whose satellite networks might potentially affect us, as follows:

Written objections

- in coordination of satellite networks from the fixed-satellite radio service emitting in Space to Earth direction and a possible interference to the feeder link of a satellite from the broadcasting-satellite radio service, pursuant to Art. 7 of Appendix 30A of the Radio Regulations – 8 objections for 14 satellite systems;
- coordination between a satellite network on planned position from the broadcasting-satellite radio service and non-planned satellite network, pursuant to Art. 7 of Appendix 30 of the Radio Regulations – 3 objections for 4 satellite systems;
- *comments on Article 9.3 of the Radio Regulations concerning planned satellite systems of the NGSO* - 46 comments for 47 satellite systems.

Objections submitted via specialised ITU applications

- coordination of a satellite network on non-planned position from the broadcasting-

satellite radio service and non-planned satellite network, pursuant to Art. 4 of Appendix 30 of the Radio Regulations – 1 objection was made for 1 satellite system;

• coordination of a satellite network on non-planned position from the broadcasting-satellite radio service and non-planned satellite network, pursuant to Art. 4 of Appendix 30A of the Radio Regulations – 1 objection was made for 1 satellite system;

• coordination of non-planned satellite station, potentially affecting another non-planned satellite station, pursuant to Art. 9.7 and Art. 9.41 of the Radio Regulations – objections were made for 40 satellite systems, as written notices were sent to the relevant administrations;

• coordination of satellite station from broadcasting-satellite radio service and fixed radio service when both are on primary basis, pursuant to Art. 9.11 of the Radio Regulations – objections were made for 2 satellite systems;

• coordination of satellite station using non-geostationary orbit and satellite system on geostationary orbit, pursuant to Art. 9.12A of the Radio Regulations – objections were made for 33 satellite systems;

• coordination of emitting satellite station and receiving station from fixed radio service included in the table of frequency assignments, pursuant to Art. 9.14 of the Radio Regulations – objections were made for 32 satellite systems.

Electromagnetic compatibility

During the year, electromagnetic compatibility analyses of 65 Bulgarian and 309 foreign VHF radio broadcasting stations with the aeronautical systems ILS, VOR and COM were carried out.

Due to the identified possible interference while carrying out analysis for electromagnetic compatibility with aeronautical radio services, 14 radio frequency assignments were submitted for measurement under the Methodology for measuring A1 type intermodulation products generated by the operation of closely situated VHF-FM radio transmission stations.

1.1.2. Numbering resource

After the entry into force of the LASLEC (prom. SG, no. 20 of 2021), which introduced into the Bulgarian law the provisions of Directive (EU) 2018/1972 - EECC, the following regulations have been brought into line with this law:

• Ordinance No. 1 of 22 July 2010 regarding the rules for use, allocation and the procedures of primary and secondary assignment for use, reservation and withdrawal of numbering resources (amended and suppl. SG, no. 63 of 3 August 2021);

• Rules for terms and conditions of the provision and use of functions of network "calling line identification", "connected line identification" and "tone dialing" (prom. SG, no. 108 of 17 December 2021);

• The existing three types of Functional specifications for number portability were merged into a single document: Functional Specifications for portability of nationally significant numbers from the National Numbering Plan (prom. SG, no. 101 of 3 December 2021).

In accordance with the LEC amendments, the authorisation for the use of numbering resources was amended.

At the end of 2021, the total number of undertakings authorised to use numbering resources, was 25.

In the course of the year, one authorisation for the use of numbering resources was suspended, at the request of Novatel EOOD and one authorisation of Net Is Sat EOOD due to a transfer.

In 2021, 6,400 geographic numbers, 2 international signaling point codes and 4 national r signaling point codes were provided for use. The total number of geographic numbers allocated at the end of the year was 8,836,200.

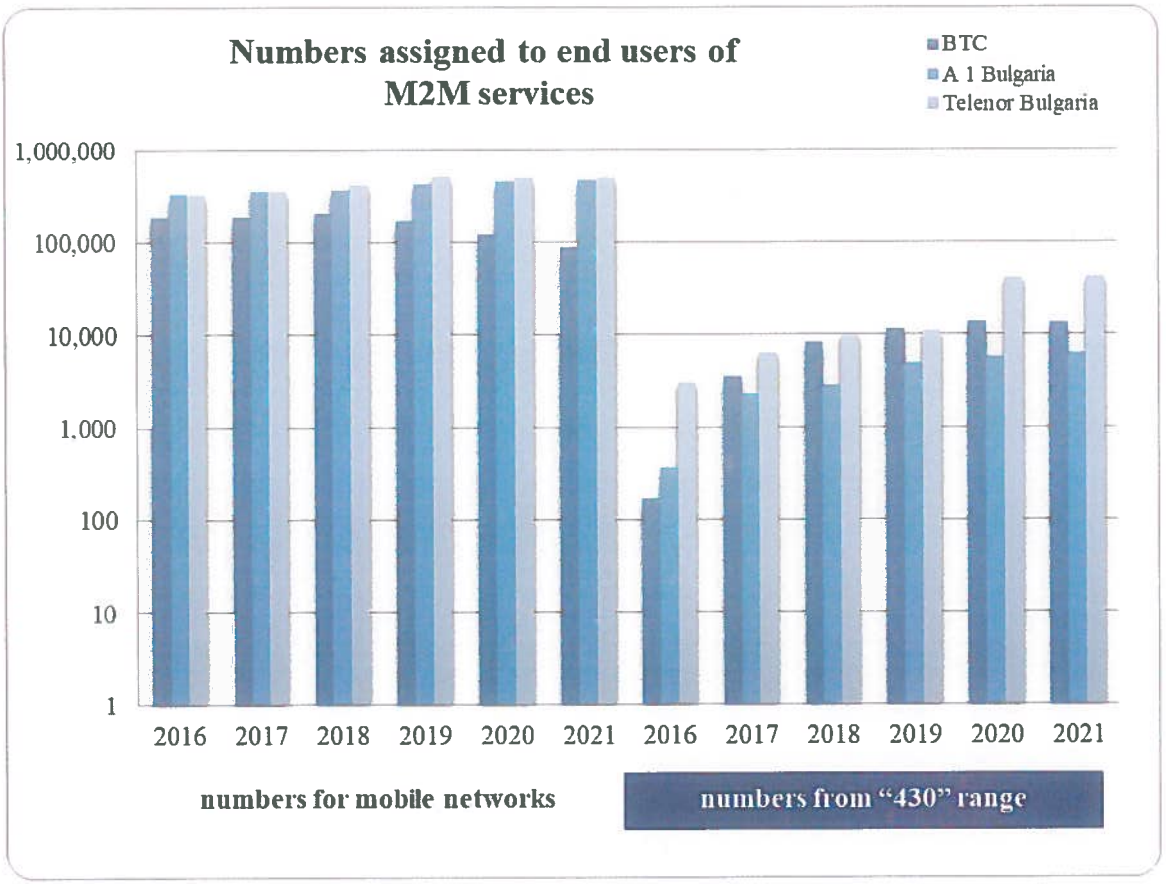
Due to optimisation of networks and services of the undertakings or termination of their activity in 2021, the following were released:

- 27,000 geographic numbers;
- 5 national signaling point codes;
- 400 numbers from the '800' range.

In order to ensure the process of servicing ported numbers and to protect the right of end-users to continue the use of their ported numbers, 700 geographic numbers were ported between undertakings.

The numbering resource within the "430" range - for access to services using Machine-to-Machine (M2M) communication - was assigned to three undertakings – A1 Bulgaria EAD (A1), Bulgarian Telecommunications Company EAD (BTC), and Yettel Bulgaria EAD (Yettel).

In 2021, an increase in the numbers from the "430" range, assigned to end-users, was reported by A1 and Yettel. There was a decline in the numbers from this range assigned by BTC. The trend towards the use of more numbers for M2M services from the ranges for access to mobile networks continued. BTC and Yettel saw an increase in the numbers from the "430" range provided to end-users and a decrease in the numbers from the mobile network access range.



Source: CRC

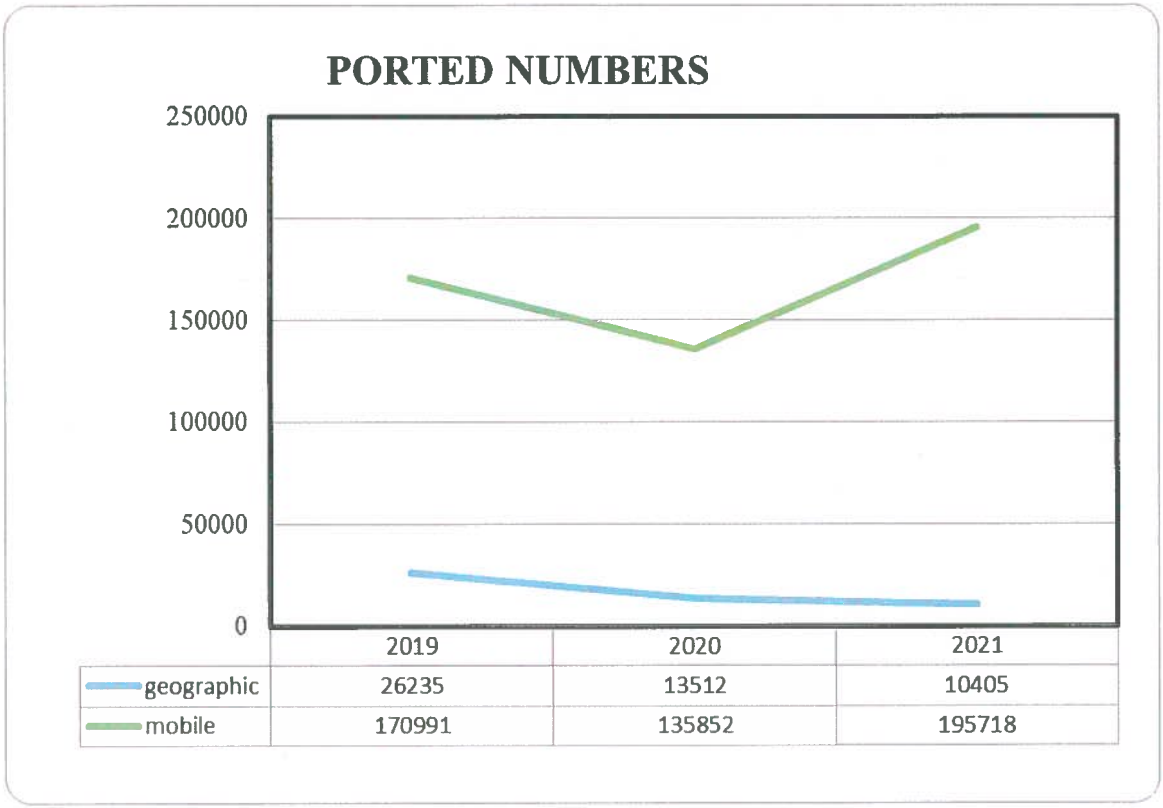
Figure 42

Number portability

In 2021, there was a rise, compared to 2020, in the number of end-users who took advantage of their right to retain their number in the event of a change of the undertaking providing the mobile service. The downward trend in the number of ported numbers from the fixed service was preserved in 2021 compared to 2020. The trend for the porting of more

numbers in mobile networks than numbers in fixed networks was also preserved.

Data on the numbers ported over the last three years are shown in the following figure:



	2019	2020	2021
geographic	26235	13512	10405
mobile	170991	135852	195718

Source: CRC

Figure 43

1.2. Regulation and monitoring of the electronic communications markets

Regulation of the electronic communications markets

In fulfilment of the strategic goal to encourage a sustainable competitive market, a third round of the analysis and assessment of the market of wholesale dedicated capacity was launched (Market 2 of Recommendation 2020/2245/EC of the European Commission on the relevant product and service markets within the electronic communications sector susceptible to ex ante regulation).

CRC prepared a draft decision on the definition, analysis and assessment of the market of wholesale dedicated capacity. The draft decision was put to public consultation by Decision No 413 of 09.12.2021. The activities related to the definition, analysis and assessment of the market of wholesale dedicated capacity will continue in the following year after the public consultation.

Monitoring of the electronic communications market

In accordance with Article 40 of the LEC, as well as Article 15 of the Methodology for the terms and procedures of relevant markets definition, analysis and assessment[80] (the Methodology), CRC regularly collects information from the undertakings providing electronic communications based on a set of parameters for which data is collected by means of special-

[80] https://crc.bg/files/Pravna/SMP-METODIKA-2021.pdf (adopted by the Communications Regulation Commission Decision No 2076 of 23.10.2012, prom. SG, no. 89 of 13.11.2012, amended and suppl. SG, no. 101 of 07.12.2018, amended and suppl. SG, no. 2 of 07.01.2022);

purpose questionnaires. By Decision No 415/09.12.2021, CRC established the templates of forms and instructions concerning the reports to be submitted by undertakings for their activities in the provision of public electronic communications in 2021. The collection of information through the CRC's on-line electronic questionnaire system, which was actually launched in 2020, also continued with regard to the undertakings' activity reports for 2021.

Ensuring compliance with the legal requirements for the provision of roaming services and international calls and SMS messages within the European Economic Area.

In 2021, CRC continued to monitor and control the implementation of the requirements of Regulation (EU) No 531/2012,[81] Implementing Regulation (EU) 2016/2286[82] and Regulation (EU) 2015/2120.[83] In particular, the Commission carried out monitoring and control of:

- *the policies applied to the fair use of regulated roaming services;*
- *compliance with price caps for roaming services within the European Economic Area (EEA);*
- *compliance of retail prices for regulated intra-EEA communications (calls and SMS) applied by Bulgarian providers with the European legislation;*
- *compliance with the requirements for transparency and for bill shock prevention;*
- *compliance with the requirements for offering and applying alternative rates for roaming and regulated communications within the EEA.*

The Commission carries out regular checks in relation to complaints received regarding the use of mobile roaming services. In 2021, 129 inspections were carried out based on consumer complaints regarding compliance with the roaming regulation.

CRC was also actively involved in BEREC's work on assisting the EC to prepare legislative proposals for changes in the roaming regulation.

1.3. Development and technical support of the National Radio Frequency Spectrum Monitoring System

In 2021, a plan for development of the National Radio Frequency Spectrum Monitoring System for Civil Needs (NRFSMS) was adopted for the period 2021 ÷ 2025, which developed the strategic objectives for the development of the radio monitoring system, as well as the main aspects of its expansion and modernisation. A roadmap for the implementation of the plan with the main types of technical devices and systems needed to achieve the objectives and the corresponding stages of their assurance was also developed.

With the supply of a modern mobile station for radio monitoring, radio interference detection and localisation, the renewal of the NRFSMS was initiated (according to the 2021 ÷

---

[81] Regulation (EU) No 531/2012 of the European Parliament and of the Council of 13 June 2012 on roaming on public mobile communications networks within the Union, amended by Regulation 2015/ 2120 of 25 November 2015 and Regulation (EU) 2017/920 of 17 May 2017;

[82] Commission Implementing Regulation (EU) 2016/2286 of 15 December 2016 laying down detailed rules on the application of fair use policy and on the methodology for assessing the sustainability of the abolition of retail roaming surcharges and on the application to be submitted by a roaming provider for the purposes of that assessment;

[83]Regulation (EU) 2015/2120 of the European Parliament and of the Council of 25 November 2015 laying down measures concerning open internet access and retail charges for regulated intra-EU communications and amending Directive 2002/22/EC and Regulation (EU) No 531/2012. [83] Commission Implementing Regulation (EU) 2016/2286 of 15 December 2016 laying down detailed rules on the application of fair use policy and on the methodology for assessing the sustainability of the abolition of retail roaming surcharges and on the application to be submitted by a roaming provider for the purposes of that assessment;

2025 NRFSMS Development Plan) by expanding the functional capabilities for mobile monitoring in the frequency band up to 6 GHz.

Three fixed radio monitoring stations of the compact type systems were also delivered with the intention to expand the capabilities for radio monitoring in the city of Sofia in the frequency band up to 6 GHz.

Activities were regularly carried out regarding the technical and technological support of the activities relating to the control and monitoring of electronic communications networks using RFS, relating to the maintenance of the specialised technological equipment: fixed, mobile and transportable radio monitoring stations, portable measurement equipment, including calibration, where applicable.

At the end of 2021, for the implementation of its control functions, CRC had at its disposal the following main measurement systems:

- 15 (fifteen) fixed stations for RFS monitoring (1 manned and 14 unmanned RMS) in the bands from 20 to 3000 MHz;
- 7 (seven) mobile stations for RFS monitoring in the bands from 20 MHz to 3 GHz;
- 1 (one) mobile stations for radio monitoring, radio interferences detection and localisation in the bands from 20 MHz to 6 GHz;
- 2 (two) portable systems for measurement of the coverage and quality of services provided within the GSM/UMTS networks;
- 2 (two) portable systems for measurement of the coverage and quality of services provided within the GSM/UMTS/LTE networks;
- 6 (six) portable measurement systems for measurement of the coverage and quality of the DVB-T networks;
- 7 (seven) transportable measurement systems in the bands from 1 GHz to 26.5 GHz;
- 7 (seven) portable measurement systems for measurement in the bands from 9 kHz to 3 GHz;
- 14 (fourteen) portable measurement systems:
  - 4 (four) systems in the bands from 8 kHz to 8 GHz;
  - 7 (seven) systems in the bands from 9 kHz to 20 GHz;
  - 3 (three) systems in the bands from 20 MHz to 31 GHz;
  - 4 (four) systems in the bands from 680 MHz to 32 GHz.

According to the 2021 ÷ 2025 NRFSMS Development Plan, future developments are aimed at further expanding the functionality and technological capabilities of the radio monitoring system in the following respects:

1. Ensuring that lawful users can use radio spectrum efficiently and without interference, preventing the illegal use of spectrum and controlling the quality of services provided to end-users.

2. Setting up new fixed radio monitoring stations of the compact systems type to ensure greater territorial coverage of the country and ensuring an efficient regular monitoring on part of the Commission of higher frequency bands.

3. Ensuring systems for measuring the coverage and quality of mobile networks in connection with the use of new frequency bands and the commissioning of next-generation (5G) networks in the Republic of Bulgaria.

4. Ensuring quality control of the services provided through terrestrial digital broadcasting, and preventing the illegal distribution of digital radio and television programmes.

The development of a modern and efficient RFS monitoring system for civil needs requires the investment of considerable funds in its development and maintenance.

The funding provided in 2021 allowed the launch of the long-term plan for development of the the NRFSMS over a five-year period (2021 ÷ 2025) to expand the territorial and frequency

coverage of spectrum monitoring to increase the efficiency for the Commission's ongoing control.

1.4. International activity of CRC in 2021

In 2021, CRC continued to maintain an effective and fruitful international cooperation and to actively participate in the work of specialised organisations in the field of electronic communications and postal services at a global, European and regional level. This contributed to the application of good regulatory practices, the exchange of experience, as well as to the development and better functioning of the internal market for electronic communications networks and services.

Due to the global health crisis with COVID-19, a large part of the international events took place in a virtual format.

Participation in the work of European structures

In 2021, CRC continued to cooperate directly with the European structures with a view to protecting Bulgaria's interests through a consistent and coordinated national position on the EU legislation.

In 2021, the Commission participated actively both at the management and expert level in the work of the Independent Regulators Group (IRG) and BEREC, contributing to the development of common regulatory practices. During the four IRG General Assemblies and BEREC Plenary meetings, as well as the Contact Network meetings which were held during the year, a number of documents were discussed and adopted in implementation of the BEREC Work Programme for 2021, which were directly reflected in the work of CRC, the most important of which are:

- BEREC Guidelines on geographical surveys of network deployments pursuant to Article 22, Paragraphs 2-4 EECC;
- BEREC Report to enable comparable national broadband coverage indicators throughout Europe;
- BEREC Report on the *ex ante* regulation of digital gatekeepers;
- BEREC Report on the outcome of the study on consumer behaviour and attitudes towards digital platforms;
- BEREC Report on the harmonised collection of data for OTT services;
- BEREC Report on the diversification of then5G ecosystem;
- BEREC Report on the handling of third party payment charges on mobile phone bills;
- BEREC Report on the outcome of the study on post-COVID measures to close the digital divide;
- BEREC Report on COVID-19 crisis – lessons learned regarding communication networks and services for a resilient society;
- BEREC Position on the interplay between the EECC and the EC's proposal for a Digital Markets Act (DMA) concerning number-independent interpersonal communication services (NI-ICS);
- BEREC Opinion on the market and technological developments and on their impact on the application of rights of end-users in the EECC;
- BEREC Opinion on the national implementation and functioning of the general authorisation.

In addition to the above meetings, a workshop was held for the Heads of BEREC on the EC's proposal for a Digital Markets Act (DMA[84]).

A BEREC Stakeholder Forum was also held in 2021, where CRC was represented at the level of CRC members. The event provided an opportunity for all stakeholders to exchange ideas on BEREC's work and plans as well as to discuss issues relevant to the telecommunications market. The Forum looked at the contribution of 5G to the sustainable development goals and key aspects of 5G Regulation, the digital decade and the impact of market and technological developments on the enforcement of end-user rights, as well as the 2022 BEREC Work Programme and the activities on sustainability.

During the reporting period, the Commission actively participated in the work of ERGP. The participation of CRC in the two pPlenary meetings and the meetings of the Group's Contact Network have enabled the establishment of CRC positions on the need to form a new regulatory framework in the postal sector. CRC, together with the other members of the Group, was actively involved in setting priorities for the operation of ERGP in 2021 and in analysing the impact of the COVID-19 pandemic on the postal sector. In the past year, the following more important documents were adopted by ERGP:

- A report on the contractual situation of consumers of postal services;
- Updated Rules of Procedure and updated Internal Rules of ERGP;
- A report on the impact of the COVID-19 pandemic on the future of the postal market;
- Draft ERGP Work Programme 2022;
- Report on on-line platforms and e-retailers;
- Report on quality of service, consumer protection and complaint handling;
- Report on contractual relations between postal users and postal operators;
- ERGP Report on core indicators of postal services market and impact of Covid-19 pandemic on them;
- ERGP Report on the implementation of Regulation (EU) 2018/ 644 on cross-border parcel delivery services;
- Report on the harmonised measures related to standardised cross-border parcel delivery;
- Report on European Green Deal impact on postal market;
- Communications Plan for 2022.

With its active participation in the work of BEREC and ERGP, CRC contributed to the preparation and adoption of a number of documents implementing the EECC.

Participation in the activity of specialised international organisations

In 2021, CRC also took part in forums organised by the International Telecommunication Union (ITU), Universal Postal Union (UPU), European Conference of Postal and Telecommunications Administrations (CEPT), European Telecommunications Standards Institute (ETSI), Network of Regulators of the Member States of the International Organisation of the Francophonie (FRATEL[85]) in the field of electronic communications, etc.

Representatives of the Commission participated in the final week of the virtual World Summit on the Information Society (WSIS 2021) Forum. Over 1,550 high-level representatives from governments, the private sector, civil society, academic and international organisations took part in the political sessions. The WSIS 2021 Forum was organised by the ITU as the lead coordinator, in cooperation with the co-organisers, the United Nations Education, Science and

[84] Digital Markets Act

[85] Réseau francophone de la régulation des télécommunications

Culture Organisation (UNESCO), the United Nations Conference on Trade and Development (UNCTAD) and the United Nations Development Program (UNDP), as well as involving more than 30 UN agencies. The event provided an inclusive global multi-stakeholder platform for knowledge and information sharing, improving collaborative networks and sharing best practices in the information and communication technologies (ICT) sector. The theme of this year's edition of the Forum "ICT for inclusive, resilient and sustainable societies and economies (WSIS Action Lines to Achieve the Sustainable Development Goals)" provided an opportunity for stakeholders to share their efforts and innovative ideas for using ICT.

CRC was also represented at the management level in the virtual 21-st Global Symposium for Regulators (GSR). During the GSR-21, a Heads of Regulators Executive Roundtable was held. The event was devoted to co-regulation for digital transformation and one of its main objectives was the adoption of the GSR-21 Best Practice Guidelines, which will help countries optimise their regulatory strategies to ensure faster and inclusive connectivity. The statements made during the event presented the views and experience of regulators from different regions of the world in dealing with the challenges posed by the Covid-19 pandemic, as well as other issues of concern. The importance of cooperation between all stakeholders – regulators, policy makers and all other industry players – was underlined in order to find market solutions to new challenges. The need for bold regulatory approaches to guide the entry of emerging technologies, foster cooperation and stimulate the digital transformation of the world after COVID was emphasized.

Commission experts took part in the ITU Digital World 2021 virtual event, which took place in October 2021 and marked 50 years from the first edition of ITU Telecom, under the motto "Building the Digital World. Together". The event was hosted by the government of the Socialist Republic of Viet Nam. Emphasis was placed on the three important aspects of digital transformation: infrastructure, policy and digitalisation catalysts. During the ministerial roundtables, the experience of various countries in accelerating the digital transformation process was presented.

CRC also participated on-line in a roundtable organised by BEREC and the Global Mobile Industry Association (GSMA). The event involved the holding of a dialogue between BEREC members and representatives of European telecommunication operators on issues related to the promotion of full connectivity, support for sustainable and open digital markets, end-user rights. The Mobile World Congress's (MWC) Ministerial Programme provided a platform for exchanging views on digital inclusion, network resilience and maximising the 5G potential. The event focused on the "connected impact", showing how the right policy frameworks can strengthen digital infrastructure, stimulate innovation and speed up economic recovery even in times of crisis.

Representatives of the Commission also took part on-line in the Congress of the Universal Postal Union. During the congress, the following were examined and adopted: the general policy for the conduct of the UPU mission, the Union's strategic plan for the development of international postal services for the next four-year period, until the next Congress, the International Postal Strategy of Abidjan, proposals for amendments to the Union's acts and their date of entry into force, the UPU's expenditure ceiling for the period 2022-2025, as well as decisions and resolutions on the directions and scope of activities of UPU and its governing bodies until the next congress. During the event, the new members of the two governing bodies of the Union - the Council of Administration and the Postal Operations Council, the Director-General and the Deputy Director-General of UPU - were elected.

CRC was represented at the management level at the 12th International Transport and Communications Forum in the city of Istanbul, Turkiye. The Forum was held under the motto "Logistics-Mobility-Digitization", presenting and discussing topics in the field of digital reform in communications related to digital transformation and global connectivity, the future of

transport in the digital era, innovative approaches to transport in global cities, green logistics etc. A bilateral meeting was held during the event between members of CRC and representatives of the Information and Communication Technologies Authority of the Republic of Turkiye (ICTA) to discuss issues related to radio spectrum monitoring and control and cross-border signal penetration, the development of 5G networks, postal services, etc.

CRC took part in ETSI's 75-th and 76-th General Assemblies (GA), which were held virtually and addressed key issues relating to the activity and interaction with EC/other organisations, the Institute's strategy and its financing as one of the three recognised European standardisation organisations.

CRC also participated in the meetings of the national standardisation organisations (NSOs) for ETSI, traditionally held before GA. The meetings addressed topics of mutual interest, such as amendments to the ETSI agreement with NSOs and the reduction of the length of the public consultation procedure for ENs projects.

The Commission was represented at the 19-th Annual Meeting of the Network of Regulators of Member States of the International Organisation of the Francophonie in the field of electronic communications (FRATEL). The meeting took place under the theme of universal access and service, divided into three roundtables. The first was devoted to changes in the concept of universal service and access. The second roundtable recalled the place of universal service in public policies to promote connectivity, while the third presented the policies in place to ensure the availability of offers, their affordability, and to improve digital inclusion. At the end of the meeting, the Report on the organisation's activities during the past year 2021 and the Action Plan for 2022 were presented.

Radio spectrum experts participated in the three regular meetings of the Working Group Frequency Management (WG FM), including in the commemorative 100th session. The Working Group endorsed draft reports and recommendations important for future regulatory approaches to the operation of the most frequently used by end-users short-range devices and devices used in the local data networks in the 5 GHz and 5.8 GHz bands. Amendments to the European Frequency Allocation Table were adopted and improvements were made to the European Frequency Information System (EFIS). Agreement was reached on a number of disputable clauses from draft decisions determining the use of spectrum from earth stations on mobile platforms (ESOMPs), satellite networks, car radars, ground synthetic aperture radars, etc.

The Working Group Numbers and Networks (WG NaN) held two meetings in the past year. Commission experts took part in the meetings. Reports on Calls to 112 from end devices without SIM cards and Regulatory impact on number portability after migration to a fully IP environment were finally adopted, as well as a Recommendation on the individual identifier of subscriber to the mobile terrestrial electronic communications network TETRA. There was a public consultation on three reports - Numbering resources for non-public networks, eCall functionality and Caller line manipulation.

The Electronic Communications Committee (ECC) held its three meetings with the participation of CRC representatives. The meetings discussed topics related to the harmonised spectrum use, technical parameters and regulatory issues concerning different types of technologies. A number of agreements were reached on spectrum use and responses to EC mandates in areas of current interest such as 5G in mobile networks, including for aircraft, wireless broadband communications and short-range devices, car radars and radio local networks. Decisions authorising the operation of satellite networks in new frequency bands, including mobile platforms, and introducing new satellite systems for personal communications operating in frequency bands below 1 GHz, including personal communications through satellite systems, were adopted. Emphasis was placed on cross-border coordination and the exemption

from authorisation of radio equipment and its free movement in the EU. The CEPT roadmap for 5G was updated.

The Preparatory Group for the World Radiocommunication Conference (WRC-23)[86] continued its work 2021 as well. Hundreds of experts from the European administrations, including the Bulgarian one, as well as delegates from different organisations, participated in the two meetings held. A number of draft abstracts of the European Conference on Postal and Telecommunications Administrations (CEPT) on the agenda items of the conference were approved, new coordinators on three of the topics were appointed and the work of project teams that have progressed in their work was discussed.

The Commission took part at expert level in the six regular meetings of the Committee for ITU Policy (COM-ITU) to CEPT in 2021. The main focus of the Committee's work was in preparation for the major ITU events to be held in 2022, namely the World Telecommunication Standardization Assembly, the World Telecommunication Development Conference and the ITU Plenipotentiary Conference. The project teams set up within the Committee examined the drafts and then the plenary session of the committee adopted the relevant Common European Proposals for these events.

In 2021, the Annual Conference of the European Emergency Number Association (EENA) was held. With their participation, CRC experts contributed to enriching the experience applicable in our legislation on the various aspects of emergency communications and emergency services such as next generation 112 systems, eCall 112 services, cyber security - challenges for emergency systems, localisation of emergency calls, and improving the accessibility of emergency services to disabled people.

Bilateral cooperation

A virtual bilateral meeting between CRC and the Hellenic Telecommunications and Post Commission (EETT) was organised in 2021. The meeting took place in the context of the Memorandum of Understanding signed between the two regulators in the field of electronic communications. At expert level, issues related to the management, use and monitoring of radio spectrum, universal services in telecommunications and postal sectors, cross-border cooperation, etc. were discussed. CRC presented the results from the work on a project under the Operational Programme "Good Governance" on improving regulatory and control activities and raising the quality of the administrative service. In addition, a protocol meeting was held between the chairs and the vice-chairs of CRC and EETT, during which it was noted that the meeting would contribute to better expert work in the future and that it is a prerequisite for deepening the cooperation between the two regulatory authorities.

In 2021, CRC actively participated in various international events at management and expert level with a view to achieving its strategic objectives at national and international level. The implementation of good regulatory practices, the exchange of experience for the development and better functioning of the internal market for electronic communications networks and services will continue to be a strategic area for the development of international cooperation based on multilateral dialogue and an in-depth bilateral partnership with other NRAs.

1.5. Information technology for 2021

The provision of suitable information service by CRC and the support of the electronic administrative services provided is of significant importance for the efficient performance of its

86 Conference Preparatory Group (CPG)

regulatory and monitoring functions. The Commission sets the following priorities for the development of information services:

- Support of existing business and citizen-oriented electronic services and development and support of domestic electronic services;
- Extending the technological options for implementation of interoperable open standards and innovations in the development of the used and deployment of new information systems;
- Establishment of an organisational, communication and information environment for the efficient and at the same time transparent operation of the CRC administration.

In 2021, CRC carried out projects related to improving the information and communication environment:

- The provision of post-warranty support of the information system "Licensing and Registers" which assists the management of information processes for maintenance of the public registers of the Commission and the provision of public access through the Internet, in compliance with the requirements laid down in the LEC, the Law on Electronic Document and Electronic Trust Services (LEDETS) and the Postal Services Act (PSA);
- Supply, installation and warranty support of a cluster server system and provision of the necessary licenses for it;
- Renewal of anti-spam and web-filter licenses;
- Updating an Oracle licensed software;
- Supply of communications and computer equipment.

Project No BG05SFOP001-1.010-0001

In 2020, in implementation of Measure 74 "Building and development of the information systems and registers of CRC for improving the effectiveness of regulatory activity and raising the quality of the administrative service" of the updated Roadmap for implementing the Updated strategy for the development of eGovernment in the Republic of Bulgaria 2019-2023, CRC prepared a draft proposal for applying for grants under the Operational Programme "Good Governance" (OPGG) under procedure BG05SFOP001-1.010. As a result of the approved evaluation report under the procedure, an Administrative contract No BG05SFOP001-1.010-0001-C01 was concluded by the Head of the Managing Authority of the OPGG on 08.06.2020 for the implementation of project No BG05SFOP001-1.010-0001 "Building and development of the information systems and registers of CRC for improving regulatory and control activities and raising the quality of the administrative service". The implementation period of the project is from 01.10.2019 to 31.12.2021.

At the end of 2021, the project activities (Actions 1, 2, 3 and 4) were implemented and put into operation:

- Action 1: Setting up a mechanism to measure and monitor the quality parameters of the Internet access service (Action 1).
- Action 2: Development of an information system "Licensing and Registers" of CRC in line with the principles of e-government (Action 2).
- Action 3: Building an instrument to compare electronic communication services rates (Action 3).

- Action 4: Development of a mechanism to limit the cases of accidental roaming recorded in the territory of the Republic of Bulgaria by developing a mobile application to alert users and collect information from CRC about areas where accidental roaming has been registered (Action 4).

The closing information event was held on 15.12.2021.

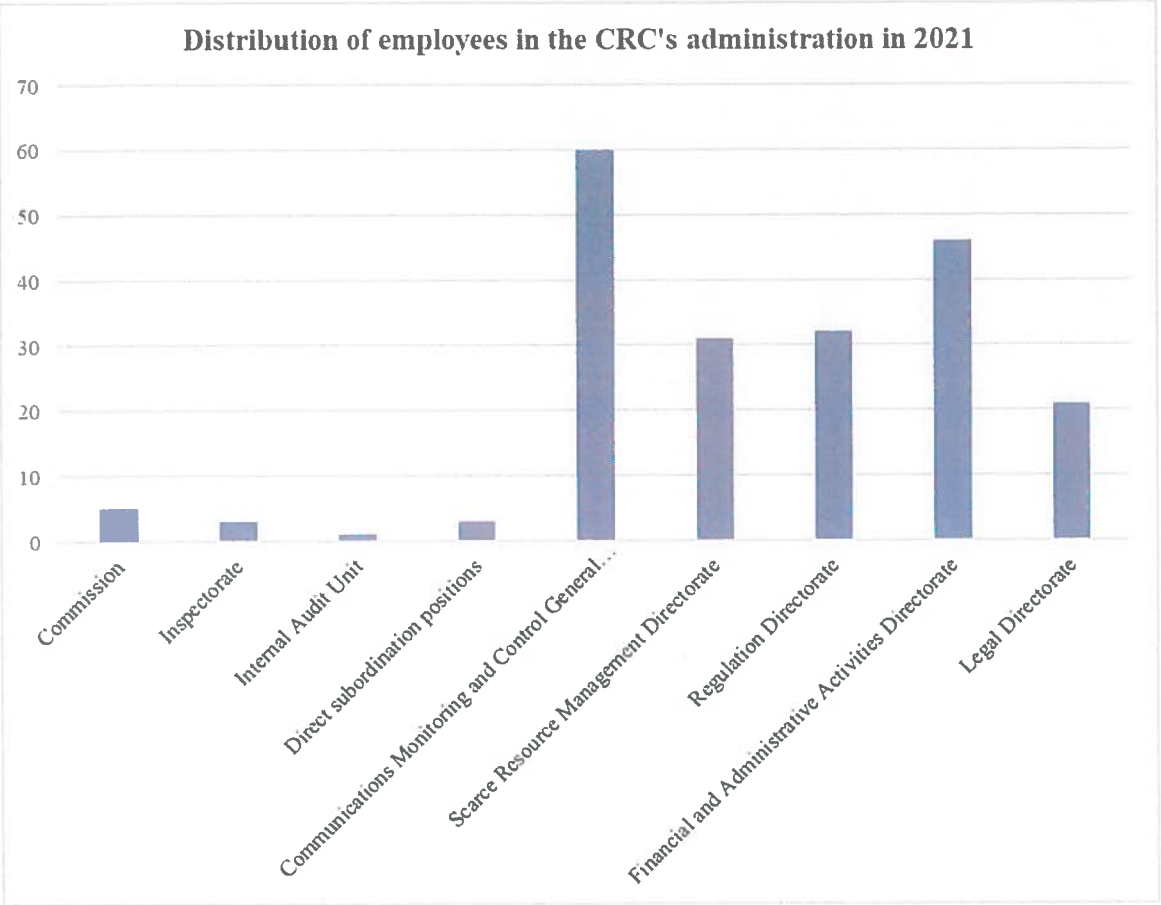
Information about the project was published on the CRC's website: https://crc.bg/bg/rubriki/611/opdu.

1.6. CRC's administrative capacity

A key element for implementing an efficient and modern human resource management and development policy and for strengthening the administrative capacity in CRC is the establishment of a system for continuous development of the professional skills and qualifications of the administration's staff.

In 2021, CRC performed its activities with the following distribution of employees:

- Commission 5
- Internal Audit Unit 1
- Direct subordination positions 3
- Inspectorate 3
- Financial and Administrative Activities Directorate 46
- Communications Monitoring and Control General Directorate 60
- Legal Directorate 21
- Scarce Resource Management Directorate 31
- Regulation Directorate 32

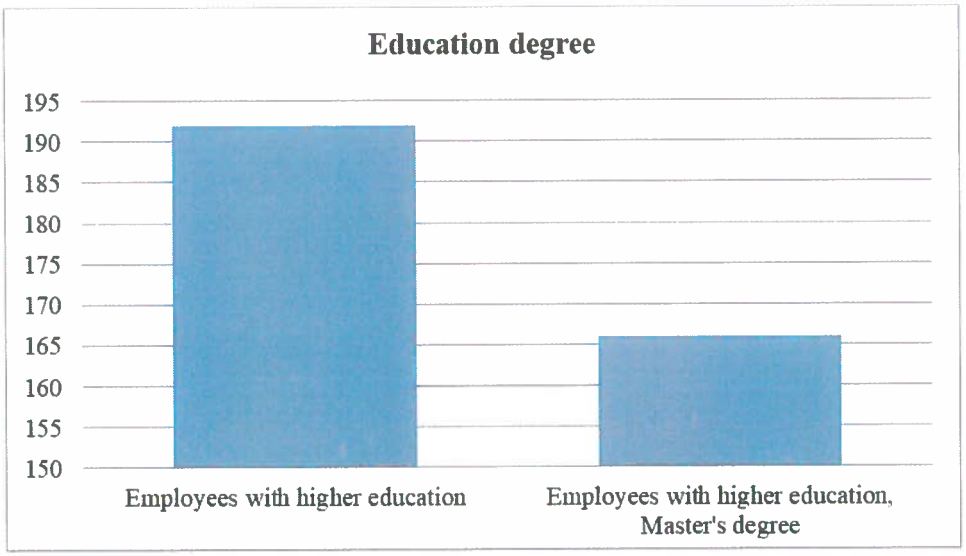


Source: CRC

Figure 44

The total number of CRC's staff was 255 full-time employees.

Of the total number of CRC employees, 192 employees had higher education, as 166 of them had a Master's degree (Fig. 45).



Source: CRC

Figure 45

The employees working in the CRC's administration hold diplomas in the following areas – technical sciences; legal sciences; economic sciences; humanitarian sciences, etc. The largest share is held by technical, followed by economic sciences which is in line with the Commission's work specifics.

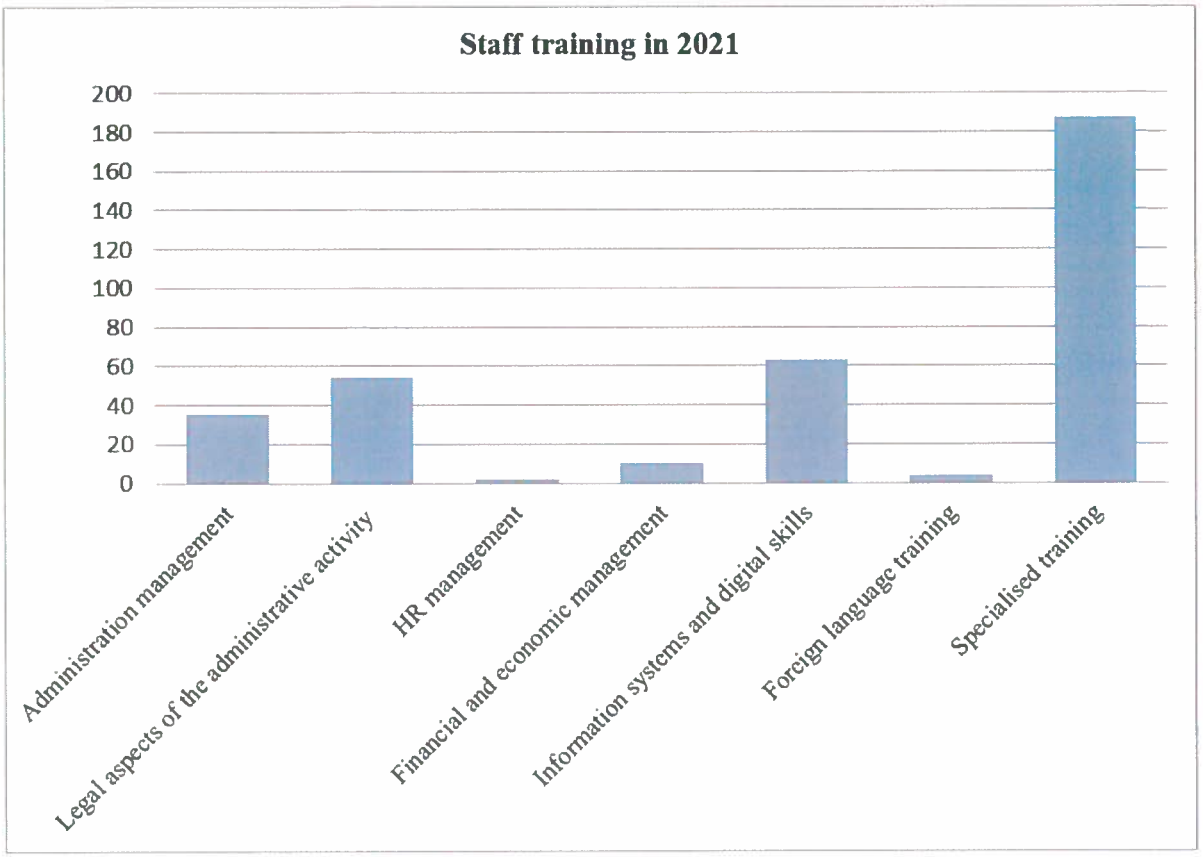
In the Commission's administration, employees are appointed and released in accordance with the provisions of the Law on Civil Servants (LCS), the Ordinance on Recruitment and Selection Procedures in Case of Mobility of Civil Servants, and the established Internal Rules.

In 2021, a total of 11 (eleven) competitions and selection procedures were organised and held in CRC, as a result of which 11 (eleven) new employees were appointed by the end of the year. The terminated employment relationships based on various legal grounds for the same period were 11(eleven).

In 2021, in order to maintain up-to-date and new knowledge and the continuous development of the professional skills of the CRC administration staff, participation was organised in specialised trainings and seminars, by area and number as follows:

- Administration management 35
- Legal aspects of the administrative activity 54
- Human resource management 2
- Financial and economic management 10
- Information systems and digital skills 63
- Foreign language training 4
- Specialised training 187

The new knowledge acquired during the training is exchanged both in a working environment as well as by means of a shared library of materials to be applied by all people working in CRC.



Source: CRC

Figure 46

Two e-surveys were conducted to obtain feedback on the level of satisfaction and practical application of the knowledge received from the training and to examine the areas important for the development of the CRC administration employees in 2021.

The results obtained from the surveys were systematised and, based on them, an analysis was prepared of the needs and the planned participation in new training.

Ensuring health and safety at work is part of the process for improving the working conditions at CRC. The Commission's management is aimed at continuously improving the organisation and management of operations to ensure health and safety at work.

Various measures were taken in 2021 in the organisation of work with the aim of reducing the risk of viral infections, ensuring safety and health at work and a smooth functioning of the CRC administration.

2. Other important activities

2.1. Standardisation

In fulfilment of Article 30 of the LEC, in 2021, CRC performed its duties as a National Standardisation Organisation (NSO) for ETSI. The Commission took part in all ETSI public consultation procedures for the approval of draft European standards and ensured access through its website to all stakeholders in the Republic of Bulgaria for the provision of opinions and comments on the European (EN) standards of ETSI.

CRC regularly provides information to the European Institute on the transposed ETSI standards as national standards, for the introduction of which the Commission is working with

the Bulgarian Institute for Standardisation (BIS). In 2021, 20 standards were introduced by recognition, only by translation of the title, and were published in the BIS Official Bulletin.

CRC participated with its representatives in the work of the Technical Committees (TC) for Standardisation of BIS (TC 47, TC 57, TC 75, TC 80), having relation to electronic communications. All meetings held, including the General Meeting, were held remotely, taking into account the public health protection measures.

2.2. Performance of obligations related to Chapter 15 of the LEC

In 2021, CRC received five notifications of security-related incidents which meet the criteria for an incident with significant power, as defined in the General Requirements for Provision of Public Electronic Communications. Two incidents were related to the provision of a mobile telephone service and mobile Internet, one with TV service and two with a number-free interpersonal service. In fulfilment of its obligation under Article 243b (5), CRC sent the above information to the EC and to the European Union Agency for Cybersecurity (ENISA[87]).

In the beginning of 2021, the advisory councils on the issues of security of public mobile terrestrial electronic communications networks and mobile services and on the security of public fixed electronic communications networks and fixed services launched their activity. A number of meetings were held to present the relevant documents to ENISA and the EC with a view to discussing security-related tasks. Positions were drawn up within the advisory councils, including a common understanding of undertakings as regards:

- security risk management;
- minimum security requirements;
- criteria for determining the impact of a security-related incident;
- assessing the risk profile of network equipment providers; and
- a strategy for using multiple network equipment providers.

At the same time, a differentiated approach was used in the positions, due to the significant difference between small and medium-sized Internet and cable TV access providers and mobile network and service operators. The final signature and publishing on the CRC's website is to take place in 2022.

2.3. Electronic trust services

In fulfilment of its powers under the Law on Electronic Document and Electronic Trust Services, in 2021, CRC confirmed the qualified status of the trust services providers Borica AD, Evrotrust Technologies JSC, InfoNotary Plc., Information Services Plc. and System for electronic payments /SEP Bulgaria JSC and of the trust services provided by them.

CRC maintains an up-to-date national trusted list that contains information about the qualified trust services providers and about the services provided by them. In 2021, new trust services of Borica AD, Evrotrust Technologies JSC and InfoNotary Plc. were entered.

Over the past year, the total number of the issued certificates for qualified electronic seal was over 160, and for qualified electronic signature - over 1,002,700, which represents an increase of 77% since the year before. The increased interest is due, on the one hand, to the possibility of obtaining a remote qualified electronic signature and, on the other hand, to the reduced costs of the service for natural persons, which makes it affordable to consumers. Last but not least, the development of electronic administrative services, which are already over 800, plays a major role in increasing the number of qualified electronic signature certificates issued and used, as well as of qualified electronic time stamp. Data on trust services provided over the last two years are presented in Table 17.

[87] European Union Agency for Cybersecurity

Table 17

Trust service	2020	2021
	number	number
Qualified certificates for electronic signature	**566,689**	**1,002,763**
Qualified certificates for electronic seal	**161**	**167**
Qualified electronic time stamps	**28,134,161**	**219,610,192**
Qualified certificates of website authentication	**253**	**234**
Electronic evidences for qualified validation of electronic signature/seal	**482,825**	**2,233,080**
Qualified preservation service for qualified electronic signature/seal	**45,550**	**7,064**
Electronic evidences for qualified electronic registered delivery service	-	**218,802**

2.4. Communications control

The communications control and monitoring carried out in 2021 regarding compliance with the LEC and the secondary legislation in the area of electronic communications on the territory of the Republic of Bulgaria was focused mainly on protecting the interests of end-users in accordance with the principles of legality, non-discrimination and transparency. For the efficient fulfilment of its control functions, the Commission has built a territorial structure - a central unit in the city of Sofia and five territorial units in the cities of Vratsa, Veliko Tarnovo, Varna, Burgas and Plovdiv.

2.4.1. Monitoring and control of the radio frequency spectrum for civil needs

CRC is performing its main monitoring and control functions with regard to the RFS for civil needs through the established and evolving NRFSMS.

The development of modern technologies and the increasing workload of spectrum require ongoing monitoring and control of the radio spectrum allocated for use.

As the number of users of services provided through the use of RFS continues to grow, there is also an increase in the substantial role of RFS monitoring and control in respect of its effective management.

The stations for radio monitoring of the NRFSMS ensure a continuous monitoring and control of the radio frequency spectrum for civil needs in order to timely locate and eliminate the sources of interference and identify and discontinue illegal radio broadcasting means.

The regular preventive monitoring of the spectrum ensures appropriate conditions for the provision of electronic communications to the lawful spectrum users and guarantees a certain quality of services provided through them to end-users.

As new technologies enter and electronic communications are continuously improving, the need for sufficient free spectrum is also growing, which is essential for the development of competition in the sector.

In 2021, the main activities in the area of RFS monitoring and control were:

*2.4.1.1. **Protection of the interests of end-users*** – setting up conditions for the normal work of lawful users of RFS for civil needs; guaranteeing a certain quality of services provided to end-users, as well as preventing the occurrence of illegal broadcasting through the exercise of preventive and follow-up monitoring and control.

In 2021, due to the regular scheduled monitoring carried out, the undertakings were provided electronically with 13,035 measurement results concerning the monitoring of the basic technical parameters of the countrywide radio broadcasting stations.

As a result of the preventive control, the steady trend towards maintaining the technical parameters of broadcast radio signals within norms and reducing the generated out-of-band and intermodulation emissions, including in the range of the aeronautical service, was preserved in 2021.

2.4.1.2. Control regarding conformity with the rules for the use of radio frequency bands for civil needs

In 2021, through the fixed (manned and unmanned) stations for radio monitoring by NRFSMS, daily scheduled monitoring was carried out in the 20-3000 MHz frequency band on the territory of serviced areas, and through mobile stations for radio monitoring – periodic control and monitoring was carried out throughout the country.

2.4.1.3. Monitoring and control of the conformity of the established broadcasting stations with the approved technical parameters

- *by decisions of CRC* - measurements of basic technical parameters of 23 broadcasting stations for analogue radio broadcasting of radio signals and terrestrial digital television broadcasting were carried out to assess their compliance with the approved technical specifications; it was found that all broadcasting stations have been in compliance with the technical parameters.
- *compliance with the provisions of the authorisations issued* - 6 inspections were carried out and all of them found that the conditions of the authorisations granted have been complied with;
- *fulfilment of prescriptions given* – 10 inspections were carried out in connection with prescriptions given, as 8 of them found that the prescriptions have been fulfilled within the specified time limit, and administrative penalty measures were undertaken with regard to non-fulfilment of the remaining 2 prescriptions.

2.4.1.4. Monitoring for evaluation of the electromagnetic environment

- ***VHF frequency ranges for radio and television broadcasting for evaluation of the electromagnetic environment and cross-border interferences.***

In 2021, in the border areas of the country, special attention was paid to the monitoring in VHF frequency ranges for radio and television broadcasting for evaluation of the electromagnetic environment and cross-border interferences from the Republic of Bulgaria's neighbouring countries.

The measurements carried out in the territory of 29 settlements to assess the electromagnetic environment and register cross-border penetration from the territories of the Republic of Turkiye, Republic of Serbia, Romania, Ukraine, Russia, Republic of North Macedonia and Republic of Greece were summarised and analysed. The results were documented in the drafted 314 measurement reports.

All data obtained from the measurements were analysed for compliance with the protection ratio between the EMF intensity of broadcasting transmission stations (under recommendations Rec. ITU-R BS. 412 and ITU-R BT.1368).

In the summer months, when penetration of cross-border broadcasts along the Bulgarian Black Sea coast intensifies as a result of the influence of the environment (temperature, sea water temperature, and state of sea surface), the electromagnetic environment and cross-border penetration are carefully monitored.

In 2021, measurements were also carried out in 26 settlements from the interior of the country and their results were included in 456 measurement reports in order to assess the electromagnetic environment to help manage the spectrum.

- ***monitoring of frequency ranges intended for mobile PMR networks*** - evaluation of the actual RFS occupancy and registration of illegal broadcasting.

In the territory of 19 settlements, through the radio monitoring stations (fixed and mobile), monitoring of frequency bands intended for mobile PMR networks was carried out and the results were summarised in 297 measurement reports.

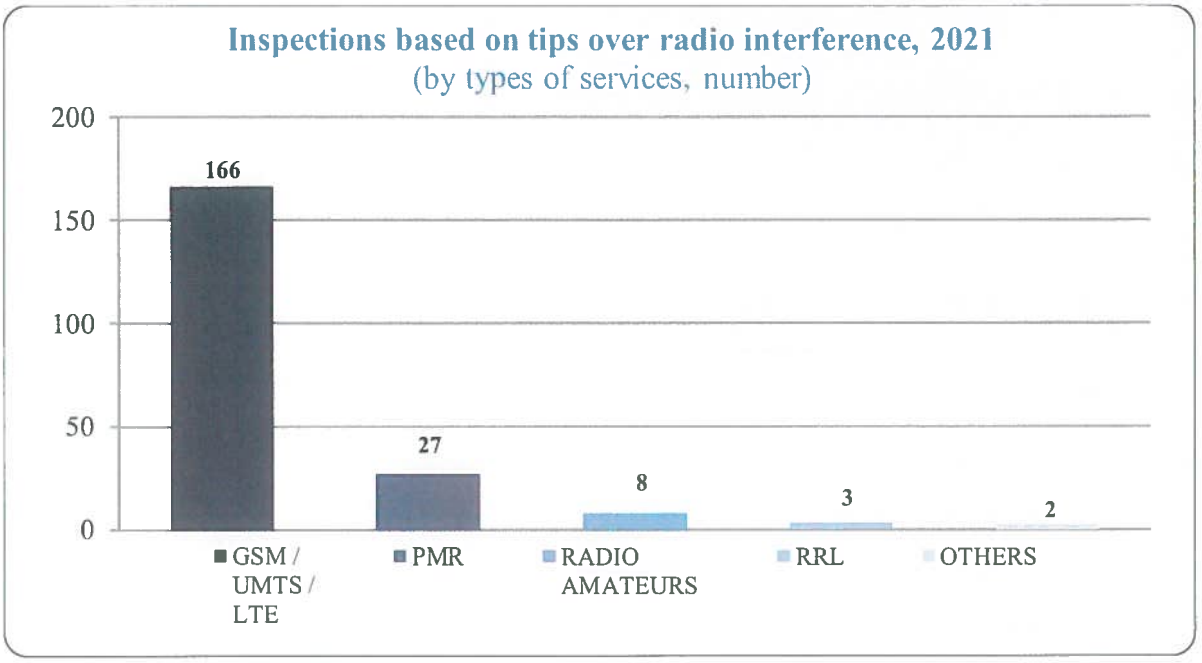
- ***evaluation of the electromagnetic compatibility of VHF/FM radio broadcasting stations in the 87.5÷108.0 MHz band and the radio navigation and communication equipment of the aeronautical services*** operating in the 109.0÷137.0 MHz frequency band.

To guarantee the electromagnetic compatibility and trouble-free operation of the radio navigation and communication equipment of the aeronautical services, measurements were carried out on 4 radio transmission sites under the *Methodology for measuring A1 type intermodulation products generated by the operation of closely situated VHF radio transmission stations*.

2.4.1.5. Monitoring and control over the quality of provided services with a view to the protection of public and end-user interest

- ***monitoring with regard to tips for radio interference received from*** lawful spectrum users, citizens, organisations and departments;

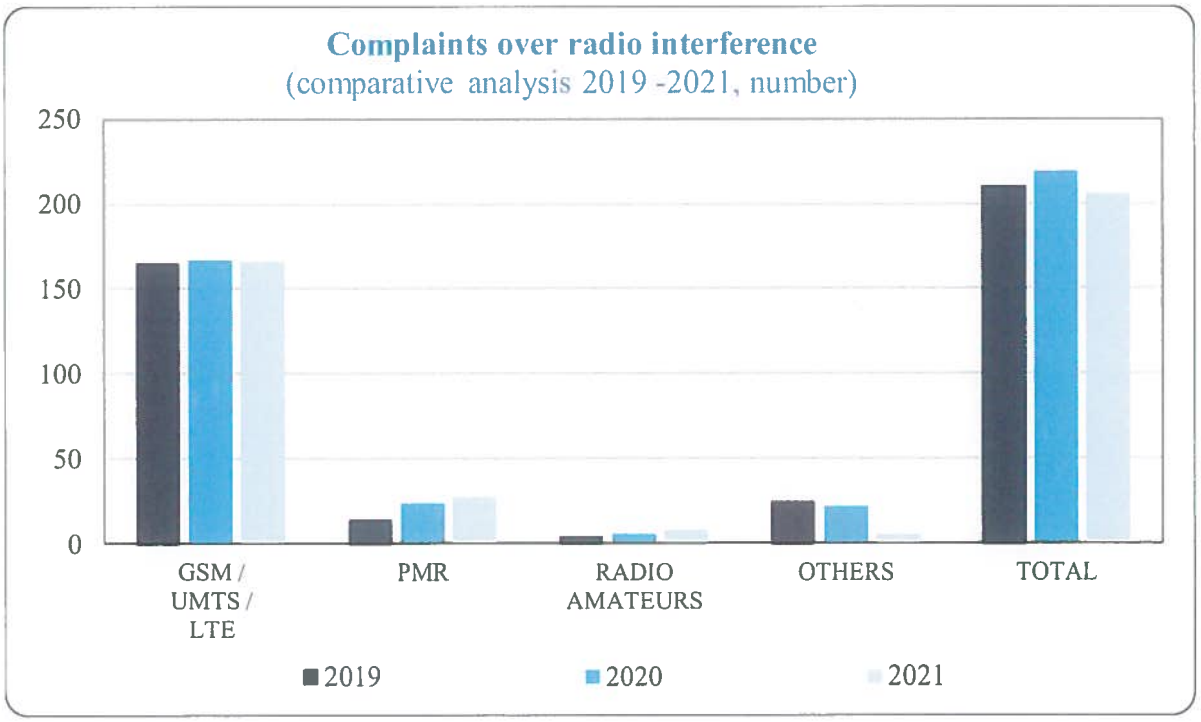
In 2021, 174 cases of radio interference were examined, and the results were included in 206 measurement reports (Figure 47). The necessary measures for quick localisation and elimination of interfering sources were timely undertaken. Interferences from GSM/UMTS/LTE amplifiers (repeaters) transmitting in frequency ranges intended for public electronic communications through mobile terrestrial networks had a relatively high share in 2021 as well. The next place was occupied by cases of registered interferences from defective (household and network) radio equipment. It is estimated that the share of recorded interferences from radio jammers has decreased significantly. Radio interferences resulting from electromagnetic incompatibility and mutual interferences as a result of the shared use of different technology in bands designated for the operation of mobile terrestrial radio networks continued.



Source: CRC

Figure 47

A comparative analysis of the considered cases of interference in connection with inspections carried out under the received tips, by types of services for the period 2019÷ 2021, is presented in Figure 48.



Source: CRC

Figure 48

- monitoring and inspections concerning received tips related to the ***ensured coverage of mobile terrestrial networks, terrestrial digital television of DVB-T standard, and terrestrial analogue broadcasting of radio signals***;

In 2021, 44 tips were examined on issues with ensured coverage of mobile terrestrial networks, terrestrial digital television of DVB-T standard, and terrestrial analogue broadcasting of radio signals, with 50 measurement reports being compiled for the results:

– coverage of ***mobile terrestrial networks*** - in connection with the 9 tips received for lack of coverage of mobile terrestrial networks (GSM/UMTS/LTE) in 2021, the declared coverage was analysed and the necessary measurements were carried out and included in 18 measurement reports; scheduled measurements of GSM/UMTS/LTE mobile networks in 54 settlements and 1 route from the Republican Road Network were carried out and the results were included in 372 measurement reports;

– coverage of ***terrestrial digital television of DVB-T standard and terrestrial analogue radio broadcasting networks*** - in connection with the 35 tips received, inspections and measurements on the territory of the country were carried out and included in 32 measurement reports; scheduled inspections were also carried out of the coverage and quality of the services provided from the DVB-T networks, and their results were recorded in 105 measurement reports.

The results from the RFS monitoring and control carried out in 2021 were summarised in a total of 7,704 measurement reports, and 6,584 measurement reports were drawn up for the conducted scheduled monitoring; a large part of the measurement reports reflected the results from the monitoring carried out by the fixed and mobile radio monitoring stations from the NRFSMS on the entire territory of the country.

2.4.2. Inspection activity

In 2021, in connection with the CRC control functions related to the control over electronic communications provision pursuant to the LEC, in the conditions of an emergency epidemic situation, 2,419 inspections were carried out.

Significant attention was paid to the observance of the LEC requirements in respect of the ***protection of the interests of end-users***, the more important groups of inspections carried out based on tips received from users of electronic communications services being as follows:

- ***problems with the use of roaming mobile services*** - in 2021, the greatest number of inspections were carried out in respect of tips received concerning problems with used roaming mobile services - 133 inspections (by about 15% less than in 2020), of which to A1 BULGARIA EAD - 58 inspections (44%), to YETTEL BULGARIA EAD - 44 inspections (33%), and to BULGARIAN TELECOMMUNICATIONS COMPANY EAD - 31 inspections (23 %); during the inspections, no violations of the LEC were established.

- ***compliance with the requirements of Chapter 15 LEC*** regarding confidentiality of communications and data protection - 103 inspections were carried out (by about 16% more inspections since 2020):

– *sending of unsolicited messages for the purposes of direct marketing and advertising without the prior consent of the users* as well as problems in the use of value-added services - about amounts charged when registering in games, quiz games, purchase of information and entertainment contents and other Information Society Services - 56 inspections were carried out;

– free-of-charge ***provision of itemised bills*** for services used – 47 inspections were carried out;

In relation to inspections carried out in 2021 on the compliance with Chapter 15 LEC, 4 administrative offence acts were drawn up for violations established.

- ***compliance with the requirements of Chapter 14 LEC*** concerning the contracts signed with undertakings providing electronic communication services:

– ***prices of the services offered***, price packages or tariffs (and conditions of their use), details of individual contracts offered, general terms and conditions of individual contracts, etc. - 58 inspections were carried out;

– ***dispute of bills and charged penalties*** - in 2021, there was a significant increase in the number of tips received in connection with dispute of bills and charged penalties; a total of 26 inspections were carried out (by about 53% more than in 2020).

For ascertained violations of Chapter 14 LEC, in 2021, 3 administrative offence acts (AOAs) were drawn up.

- ***quality of the services provided***, non-provision of universal voice service, fixed Internet speed, faults, etc. - 41 inspections were carried out.

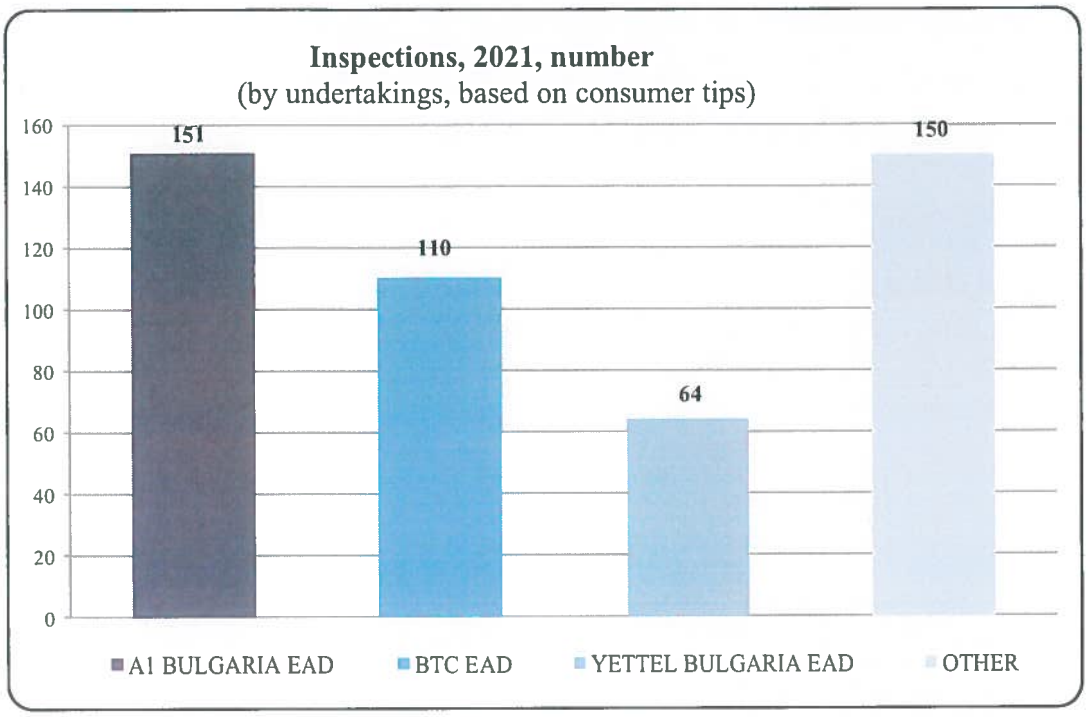
During the inspections, no violations of the LEC were found.

- compliance with the ***General Requirements for the provision of public electronic communications*** - 35 inspections were carried out (by 31% less than in 2020).

For ascertained violations of the General Requirements for the provision of public electronic communications, in 2021, a total of 4 administrative offence acts were drawn up (by about 71% less than in 2020).

- problems in the ***number portability*** implementation in case of changing the telephony service provider - in 2021, 22 inspections were carried out (by about 41% less than in 2020). During the inspections, no violations of the LEC were found.

In 2021, the main share (around 68%) of inspections in connection with user tips received by the Commission from users were performed to the three largest undertakings providing electronic communications services (Figure 49). Some 475 inspections were carried out in relation to end-user tips concerning the services they offer, as follows: A1 BULGARIA EAD - 151 inspections, BULGARIAN TELECOMMUNICATIONS COMPANY EAD – 110 inspections, and YETTEL BULGARIA EAD – 64 inspections.



Source: *CRC*

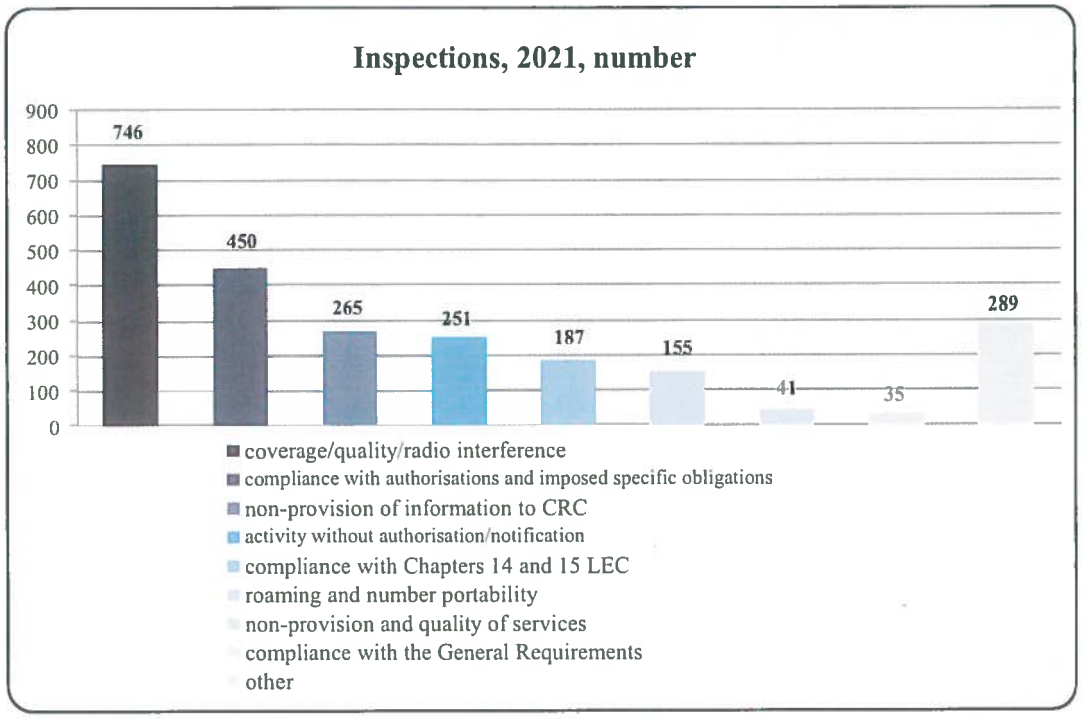
Figure 49

In 2021, 719 of the inspections performed (or about 30%) were *on the basis of risk analysis* – inspections regarding the provision of electronic communications by undertakings that have submitted notifications to CRC to terminate their activity, inspections regarding the performance of activity after terminated authorisations or expired authorisations, inspections of coverage and quality of DVB-T networks and mobile terrestrial networks. During the inspections, no violations of the LEC were found.

Some 450 inspections were carried out for *compliance with the authorisations' conditions and by CRC decisions*, compliance with specific obligations and inspections of electronic communications networks for analogue terrestrial broadcasting for compliance of the transmission stations with the technical characteristics approved by CRC, for fulfilment of prescriptions given. Six administrative offence acts were drawn up for the violations found during the inspections.

In 2021, 265 inspections were carried out on undertakings ***which did not provide information*** or supplied incomplete or incorrect information to CRC and 11 administrative offence acts were drawn up.

Summarised data for the performed control activity and the engaged administrative and punitive liability in offences of the LEC and secondary legislative acts in 2021 are displayed in Figures 50 and 51.

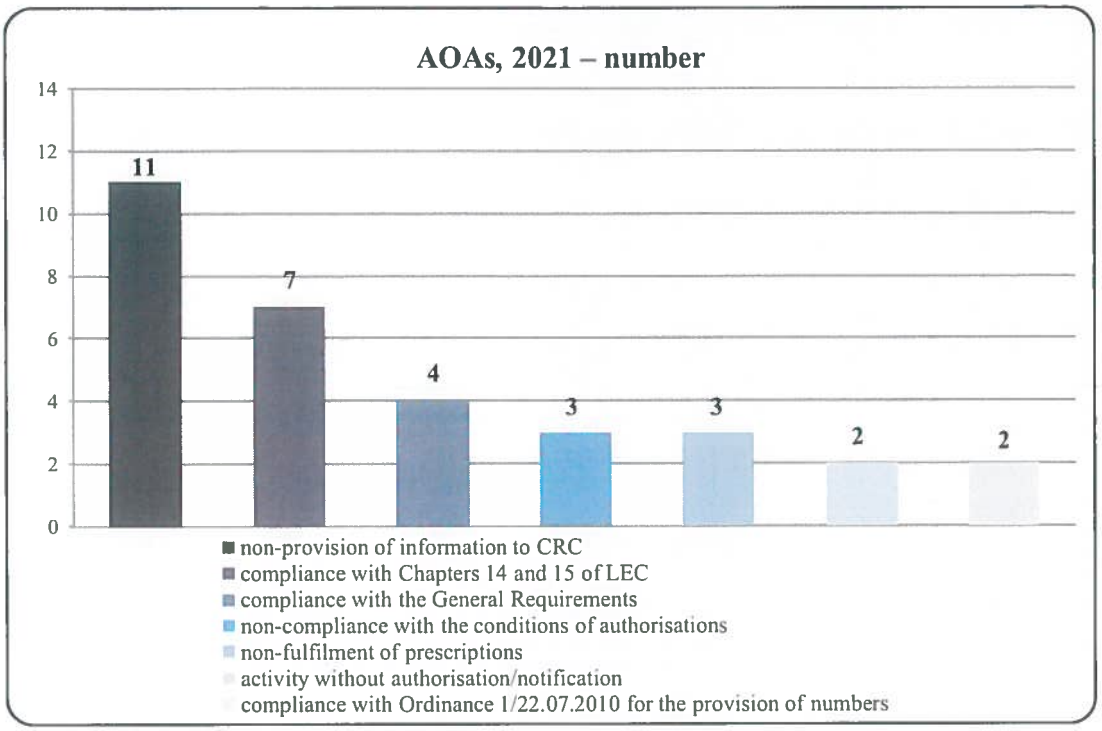


Source: CRC

Figure 50

As a result of the inspections, for the administrative violations of the LEC found, ***32 administrative offence acts*** were drawn up in 2021, with the main share (56%) being held, as was the case in 2020, by acts regarding non-provision of information requested and non-compliance with the ***General Requirements for the Provision of Electronic Communications.***

The preventive control carried out in 2021 resulted in a significant reduction in the number of violations of the LEC, which is why the AOAs drawn up in 2021 were by 36% less than in 2020.



Source: *CRC*

Figure 51

2.5. Quality of the Internet access service and net neutrality

In 2021, the CRC's electronic on-line questionnaire system collected and processed the information on the annual activity report of 1,143 providers of electronic communications services. Of all undertakings which have declared to the Commission their intention to provide electronic communications services, a wholesale and retail Internet access service (IAS) was provided from 945.

The annual undertaking activity questionnaire contains an appendix through which information is collected on the implementation of Articles 3 and 4 of Regulation (EU) 2015/2120[88] on net neutrality and open internet access (Regulation). Such information was provided by 627 undertakings offering retail IAS. The analysis of this information shows that:

- contracts with end-users do not include restrictions on their use of certain services;
- IAS providers do not perform capacity reservation and/or traffic management to ensure the quality of their own content/services or of a content provider with which they have concluded a contract;
- network traffic management measures which include blocking or slowing of certain categories of users, application/content, ports or protocol, are not applied except those in accordance with Article 3 of the Regulation.

This information, together with a clear and comprehensible explanation of the minimum, usually available, maximum and advertised rate of download and upload of Internet access services (Article 4, point 1, letter "d" of Regulation (EU) 2015/2120) is contained in the general terms and conditions of most undertakings. Except in their general terms and conditions, some undertakings have included it in the contracts with end-users or have placed it in a prominent

[88] Regulation (EU) 2015/2120 of the European Parliament and of the Council of 25 November 2015 laying down measures concerning open internet access and amending Directive 2002/22/EC on universal service and users' rights relating to electronic communications networks and services and Regulation (EU) No 531/2012 on roaming on public mobile communications networks within the Union

place on their website. The analysis of the information provided has not revealed any breaches of the requirements of Articles 3 and 4 of Regulation (EU) 2015/2120.

Each year, up to 30 June, CRC prepares an annual report for the EC and BEREC on Internet access and net neutrality pursuant to Article 5 of Regulation (EU) 2015/2120. The report contains analysis of the implementation of Articles 3 and 4 of Regulation (EU) 2015/2120 on the basis of data collected from undertakings regarding Internet access and net neutrality.

In connection with the application of the Regulation and Action 1 of Contract BG05SFOP001-1.010-0001-C01/08.06.2020 of CRC for the provision of a grant under the Operational Programme "Good Governance", co-financed by the European Union through the European Social Fund, the project for "Building a mechanism for measuring and monitoring the quality parameters of the Internet access service" (the Mechanism) was implemented in 2021. The Mechanism enables users of Internet access services to measure download and upload speeds as well as some quality parameters of the service they use. The quality measurement of the fixed Internet access service is performed via the public portal https://nettest.crc.bg, and for mobile Internet access via the **CRC Network Quality** application, accessible via Google Play and App store. A link to the portal of the Mechanism is also available on the website https://www.egov.bg.

The mechanism has been built as a complete system consisting of software and hardware elements allowing measurement of a set of parameters of the Internet access service, storage of measurement results and their visualisation. The measuring server is located at a data exchange point (IXP) where the major Internet providers providing services on the territory of the Republic of Bulgaria are connected.

Apart from measuring the speed and the quality parameters of the Internet access service, the Mechanism provides an opportunity to:

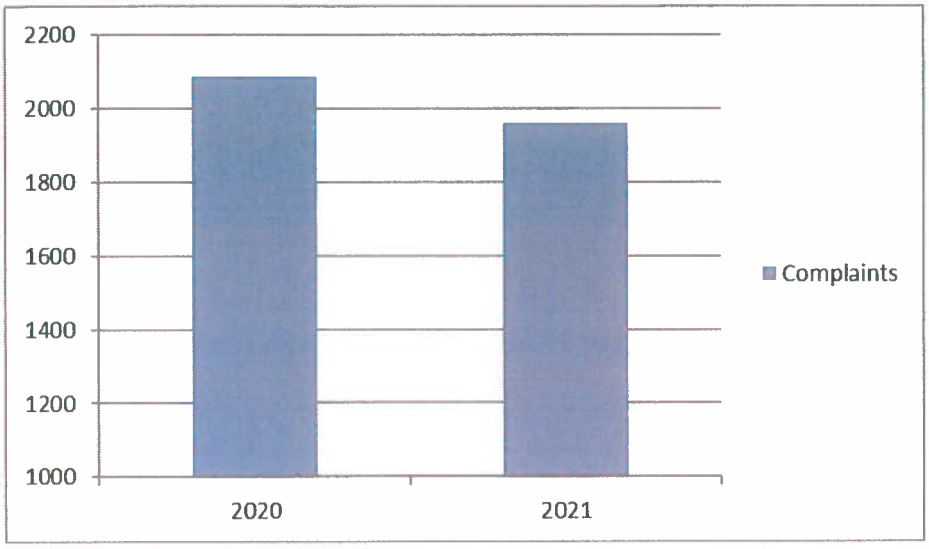
- export the results in a selected format;
- send the results of the measurements made to an e-mail address indicated by the user;
- review, in the History section, the results of all measurements made by a user device through a respective browser or through the CRC Network Quality application;
- access statistical information on measurements made using the Mechanism;
- interactive map on which measurements made are visualised;
- access information to help users published on the Mechanism's portal.

In August 2021, all stakeholders and citizens were invited to test the Mechanism. In October of the same year, the implementation of the project was adopted. Pursuant to Art. 30, Para 1, p. 29 LEC, the Mechanism is approved and maintained by CRC. The approval of the Mechanism, including the conditions for carrying out measurements for the purpose of legal protection, should follow a public consultation procedure under Article 37 LEC. Such a procedure was opened at the beginning of 2022. However, the Mechanism is active and accessible to end-users.

2.6. Protection of the interests of the electronic communication services users

In 2021, CRC received 1,959 complaints from end-users, which represents a reduction (by about 6%) compared to 2020 (2,086 complaints). Most complaints relate (continuing the trend of previous years) to the charging of services, access to and payment of digital content, termination of contracts for electronic communications services and the use of "accidental roaming" (border roaming in the territory of the Republic of Bulgaria).

Complaints received by CRC, 2020 and 2021



Source: CRC

Figure 52

Most of the tips received during the year concern matters that fall outside the control and regulatory powers of CRC. In such cases, the regulator also acts as mediator and forwards the case to the provider concerned for the purpose of out-of-court settlement of the dispute.

A number of tips were forwarded by competence to other state bodies (Commission for Consumer Protection, National Revenue Agency, Commission for Financial Supervision, Commission for Personal Data Protection, Ministry of Health, etc.).

In 2021, the regulator's initiative for organising and holding meetings with the three mobile operators - A1 BULGARIA EAD, BTC EAD and YETTEL BULGARIA - was continued. In 2021, CRC held two meetings where issues related to the bringing of contracts for electronic communications services in compliance with the new legal framework laid down in LEC were resolved, including a reduction in their volume.

In order to protect the users of mobile services, in 2021, CRC developed and launched a mobile application ROAMING PROTECT BG. The application was created in implementation of a project under the Operational Programme "Good Governance". It is free of charge and available in the mobile stores GooglePlay (for devices using Android) or AppStore (for devices using iOS), at the following addresses:

https://play.google.com/store/apps/details?id=bg.crc.roamingapp – for users of Android devices;

https://apps.apple.com/bg/app/roaming-protect-bg/id1571033575 - for users of iOS devices.

There are also short instructions for its installation and use. Once countries are listed in the ban list of the application, the application will alert whenever the device is connected to the roaming network that you should not connect to.

An interactive map is published on the CRC website at https://roaming.crc.bg where the non-intentional roaming cases registered by the application are visualised and information is provided about the areas of the Republic of Bulgaria with the highest risk of inadvertent roaming. The map provides capabilities for zooming, a perspective shift and filtering of results by period, operator, country and region.

The development of another web application was launched in 2021 under a project under the Operational Programme "Good Governance", a tool for comparing tariffs of electronic communications services. The objective of the tool is to provide more effective protection for

consumers of electronic communications services by increasing the transparency of tariffs and tariff plans offered and better control of their budget.

The tool is available at https://comparetool.crc.bg/public.

Cooperation with the Commission for Consumer Protection

There is a shared competence between CRC and the Commission for Consumer Protection (CCP) regarding some of the issues related to consumer protection in the area of electronic communications services. Tips related to distance contracts, unfair trade practices, removing unfair contract clauses, charging of unsolicited services and digital content, fall within the competence of CCP. In this respect and in implementation of the law, CRC has referred many consumers' issues to CCP.

In 2021, CRC and CCP continued to cooperate in the framework of the work of the sectoral conciliation committees for the consideration of disputes in the field of electronic communications and postal services, established with the provision of Article 182 (4) of the Law on Consumer Protection.

Legal representation in CRC cases

In 2021, CRC's legal representatives took part in 138 sessions on administrative and criminal matters before the country's regional and administrative courts. During the year, 73 confirmatory judgements were delivered on disputed CRC's punitive decrees, and the number of annulment judgements was 28. Nine complaints were filed before the administrative courts under the individual administrative acts issued by CRC. Five CRC decisions were confirmed during the year.

2.7. Activities under the Law on Electronic Communications Networks and Physical Infrastructure (LECNPI)

In the exercise of its powers in 2021, CRC ruled on the following proceedings on requests for the resolution of disputes between electronic communications network operators and electricity distribution companies:

By Decision No 32 of 28.01.2021, CRC gave binding instructions to ELEKTRORAZPREDELENIE SEVER AD to revise and publish on its official website Appendix No 5 to the "General terms and conditions of contracts for access to and/or shared use of physical infrastructure". The electricity distribution company complied with the binding instructions and published the revised appendix in March 2021.

By Decision No 46 of 04.02.2021, CRC gave binding instructions to ELEKTRORAZPREDELENIE YUG EAD to propose the conclusion of a contract with ET VESELIN ZHELYAZKOV for the access and use of physical infrastructure of ELEKTRORAZPREDELENIE YUG EAD in accordance with LECNPI, its implementing acts and the "General terms and conditions of contracts for access to and use of elements from the electricity distribution grid of ELEKTRORAZPREDELENIE YUG EAD by electronic communications network operators", without setting any additional conditions, including without requiring the conclusion of an agreement and/or the preparation of a common project with another electronic communications network operator.

By Decision No 87 of 25.02.2021, CRC rejected a request by PERNIK LAN OOD for the provision of binding instructions to BULGARIAN TELECOMMUNICATIONS COMPANY EAD in connection with the prices set by the network operator for access to an underground duct network.

By Decision No 157 of 22.04.2021, CRC gave binding instructions to ELEKTRORAZPREDELENIE YUG EAD to enable ET Dimitar Vasilev-94 to bring the contract of access to physical infrastructure into compliance with LECNPI, the regulations implementing it and the published "General terms and conditions of contracts for access to and

use of elements of the electricity distribution grid of ELEKTRORAZPREDELENIE YUG EAD by electronic communications network operators", provided that ET Dimitar Vasilev-94 filed an explicit application for bringing the contract into compliance. By Decision No 158 of 22.04.2021, CRC gave binding instructions to ELEKTRORAZPREDELENIE YUG EAD to enable NIKO NET COm EOOD to bring the contract of access to physical infrastructure into compliance with LECNPI, the regulations implementing it and the published "General terms and conditions of contracts for access to and use of elements of the electricity distribution grid of ELEKTRORAZPREDELENIE YUG EAD by electronic communications network operators", provided that Niko Net Com EOOD filed an explicit application for bringing the contract into compliance.

By Decision No 278 of 29.07.2021, CRC gave binding instructions to ELEKTRORAZPREDELENIE YUG EAD to amend the "Technical conditions for access to and use of poles - part of a low voltage overhead network of ELEKTRORAZPREDELENIE YUG EAD by operators of electronic communications networks" which represent Appendix No 1 and are integral part of the "General terms and conditions of contracts for access to and use of elements of the electricity distribution grid of ELEKTRORAZPREDELENIE YUG EAD by electronic communications network operators", as follows:

- to bring the last sentence of p. 6.1.2 and p. 1-7 of the "Requirements for the design and execution documentation, tests" from Appendix 1 "Technical parameters of accessories and bearing reinforcement" in compliance with Art. 4, Para 2 of the Ordinance on the rules and standards for the design, deployment and dismantling of electronic communications networks", by deleting them;
- to bring p. 6.2.1 concerning the air-cable transition in compliance with Art. 15, Para 1, p. 4 and p. 5 of the Ordinance on the rules and standards for the design, deployment and dismantling of electronic communications networks, by deleting it;
- to bring p. 6.7.6 and Appendix 2 "Manner of suspension of elements of electronic communications networks on poles - part of the low voltage overhead network of ELEKTRORAZPREDELENIE YUG", as well as all places in the General Terms and Conditions where a limit on the number of elements placed on a pole is foreseen, in compliance with Art. 15, Para 2, second sentence of the Ordinance on the rules and standards for the design, deployment and dismantling of electronic communications networks", by deleting these conditions.

In 2021, at the request of LINEINI MREGI OOD, CABLE TV DELTA OOD and MULTIMEDIA-BG EOOD, CRC provided assistance for a voluntary resolution of a dispute with BULGARIAN TELECOMMUNICATIONS COMPANY EAD by expressing its opinion on the dispute by Letter Ref. No. 12-03-46-2/28.05.2021 of CRC. The parties that were dissatisfied with the outcome of the procedure submitted a request for giving binding instructions to BULGARIAN TELECOMMUNICATIONS COMPANY EAD. With Decision No. 70 of 24.02.2022, CRC rejected Requests Ref. No 12-03-7/05.10.2021 by LINEINI MREGI OOD, CABLE TV DELTA OOD and MULTIMEDIA-BG EOOD to give binding instructions to Bulgarian Telecommunications Company EAD in connection with the General Terms and Conditions for access to and/or shared use of passive infrastructure (underground duct network) of the network operator.

The relatively lower number of procedures compared to 2021 is a clear trend toward a decreasing number of the cases of addressing CRC with requests for resolution of disputes concerning access to physical infrastructure.

In order to facilitate the parties to disputes pursuant to the LECNPI, by Decision No 357 of 14.10.2021, CRC adopted draft Rules of Procedure of the Communications Regulation Commission on dispute settlement under Chapter Eight of the LECNPI, which was discussed in a public consultation procedure with the sector and other stakeholders. The act provides for rules to be applied by the specialised commissions and by CRC when considering requests for giving

binding instructions pursuant to Art. 82-85 LECNPI and for assisting in the voluntary resolution of disputes pursuant to Art. 86 of the Law. The rules create clarity and stability for the participants in the procedures, thereby supporting and facilitating the process of dispute resolution and achieving the objectives of the law, including with regard to the development of electronic communications. The rules are aimed at increasing the transparency of decisions adopted by CRC. The rules also fall under Measure 20 of the Connectivity Toolbox, drawn up in conjunction with Commission Recommendation (EU) 2020/1307 of 18 September 2020 on a common Union toolbox for reducing the cost of deploying very high capacity networks and ensuring timely and investment-friendly access to 5G radio spectrum, to foster connectivity in support of economic recovery from the COVID-19 crisis in the Union. The rules were adopted by Decision No. 432 of 22.12.2021 of CRC and were published on the Commission's website.

IV. BUDGET

CRC budget implementation for 2021

The Commission Chairman is a primary budget administrator pursuant to Article 50 LEC.

Pursuant to Article 35 (1) of the Law on State Budget of the Republic of Bulgaria (LSBRB) for 2021, CRC was allocated with:

- *revenue in the amount of BGN 130,806 thousand;*
- *expenses in the amount of BGN 21,486.5 thousand.;*
- *transfers in the amount of BGN 109,319.5 thousand.*

The Commission administered revenue pursuant to Article 51 (1) LEC.

In 2021, the revenue earned from fees, fines, financial penalties and interest amounted to BGN 122,898 thousand – 94 % of the annual plan.

The reason for non-fulfilment of the annual plan, in the fee revenue part for 2021, was the result of the lack of revenue from one-off fees for the extension of two authorisations in the 1800 MHz band.

In 2021, three adjustments were made to the expenditure part of the Commission's budget based on Article 106(3) of the LSBRB for 2021 and Article 6, Paragraph 4 of Ministerial Decree No 408 of 23 December 2020 on the implementation of the State Budget of the Republic of Bulgaria for 2021. With the adjustments, the expenditure part of the CRC budget for 2021 was reduced by BGN 2,952.8 thousand, at the expense of the operating costs (BGN 240 thousand) and the capital expenditure (BGN 2,712.8 thousand).

In view of the adjustments made, the Commission's revised expenditure plan was changed to BGN 18,533.7 thousand and the total costs recorded amount to BGN 17,810 thousand, or fulfilment of 96%.

Transfers to the Ministry of Transport, Information Technology and Communications pursuant to Article 19 (1) LEC

In 2021, transfers were made to the Ministry of Transport, Information Technology and Communications amounting to BGN 109,319.5 thousand - 100% of the regulated level in Article 35 (1) LSBRB for 2021.

Review of collected fees and administrative costs incurred in 2021:

The structure of the revenue from fees under the CRC budget for 2021 was as follows:

Table 18

Revenue from fees	Value (BGN '000)
Revenue generated for 2021, incl.:	**122,037**
- one-off fees under the LEC, including one-off fees for administrative services	78,458 18
- one-off fees under the PSA	6
- one-off fees under the LECNPI	1
- administrative annual charge on control under the LEC	2,424
- administrative annual charge on control under the PSA	881
- annual fees for the use of radio frequency spectrum	33,143
- annual fees for the use of positions on geostationary orbit with the appropriate radio frequency spectrum	124
- fees for the use of numbering resources	7,000

In connection with the change of Article 141 (2) LEC (prom. SG, no. 41 of 2007, amended and suppl., prom. SG, no. 20 of 2021), regulating the payment of the control fee until 15 July of the following year, for which the fee is due, instead of four installments, the revenue recorded from the administrative control fee in 2021 was BGN 2.4 million, compared to BGN 4 million in the previous years.

The revenue earned from fines, sanctions and interest amounted to BGN 861 thousand.

In connection with the enforcement of acts for the establishment of public state receivables to be collected and enforced punitive decrees issued by the National Revenue Agency, revenue at the amount of BGN 29 thousand were collected in 2021.

The Commission's budget funds, as allocated in the LSBRB for 2021, were spent on financing its activities (including projects related to market regulation and liberalisation), for participation in the work of BEREC and to ensure effective and efficient control.

The structure of the Commission's expenses for 2021 was as follows:

Table 19

Type of expenses	Value (BGN '000)	Share (%)
1. Salaries	5,559	31
2. Social security contributions	1,580	9
3. Other remunerations and payments	208	1
4. Operating costs	2,617	14
5. Taxes and charges paid	19	1
6. Membership fee	89	1
7. Capital expenditure	7,738	43
Total costs	**17,810**	**100**

In 2021, the budgetary funds spending was carried out in strict compliance with the financial discipline and the principles of legality, appropriateness, effectiveness and efficiency. Projects assigned to CRC by legislative acts were implemented of priority.

The CRC investment policy in 2021 included:

- *costs of ICT projects - supply of hardware for the activity "building a mechanism to monitor quality of Internet access service parameters" under the Operational Programme "Good Governance", delivery of UPS modules, computer equipment and communication equipment;*
- *expenditure on equipment of the National Radio Frequency Spectrum Monitoring System for Civil Needs (NMS) - delivery of a mobile radio interference detection and localisation station, mobile radio frequency spectrum monitoring station, combined mobile station for radio monitoring, radio interference detection and localisation, and measurement of mobile networks, delivery of compact radio monitoring and radio location systems for NMS;*
- *intangible fixed assets - a platform for application for and provision of rights for the use of the radio frequency spectrum based on registration and a register of transceiver stations on terrestrial networks capable of providing electronic communications services, activities performed under Article 151, Para 1, point 16 LSP and short-range Wi-Fi access points.*

CONCLUSION

We live in a global and dynamic world in which technology and telecommunications have an exceptional impact on the lives and development of society. In the past 2021, Bulgaria and the world faced social and economic challenges of unprecedented magnitude, linked to the COVID-19 epidemic. This environment has shown the growing need for connectivity, both between people and in the management of different processes in the areas of industry, transport, environment, healthcare, education. Processes without the effective management of which future development is unthinkable, at national, European and global level.

Against this background, the Communications Regulation Commission has continued to fulfil its mission and objectives and has achieved the results reflected in this annual report.

By analysing what has been achieved and taking into account the challenges that are still included in the agenda in the area of electronic communications and services, at the end of 2021, the Commission developed a Strategic Plan of its activity for the period 2022-2024. It sets forth CRC's vision for the next three years related to its establishment as a modern and highly efficient state regulatory authority through the continuous improvement of the regulatory and control activity in response to the challenges of the continuously evolving communications environment, contributing to an efficiently functioning digital single market. The plan sets out the main strategic objectives with identified indicators to report on their implementation.

In 2022, the draft Regulatory Policy on the management of radio frequency spectrum for civil needs for the period 2022-2024, drawn up at the end of the reporting period, is due to be adopted. The implementation of the Regulatory Policy will contribute to the development of wireless networks and ensure the harmonised and coordinated use of radio spectrum in a way that will bring the greatest benefit to society.

The main priorities for the next year and the years to come continue to be the holding of public consultations and tenders for the provision of a harmonised radio frequency spectrum in the 700 MHz, 2.6 GHz, 3.6 GHz and 26 GHz bands as well as other harmonised bands for wireless broadband services, and the bringing into operation of the register of the granted rights for the use of the radio frequency spectrum based on registration and the register of transceiver stations on terrestrial networks capable of providing electronic communications services, activities under Article 151, Para 1, point 16 LSP and short-range Wi-Fi access points.

As technologies evolve and next generation mobile networks enter, the task of strategic planning and spectrum control is becoming increasingly complex and requires the Commission to maintain and develop a modern radio frequency spectrum monitoring system for civil needs in order to respond adequately to the challenges of the new digital technologies as a regulatory and control authority.

The renewal and modernisation of the National Radio Frequency Spectrum Monitoring System for Civil Needs, which was launched in 2021, will continue to be built on, according to the adopted System Development Plan for the period 2021-2025. A new mobile station was put into operation during the reporting year for specialised measurements, including on-the-go (in a "drive test" mode) to detect and locate interfering sources and illicit broadcasts in the range up to 6 GHz, which has been extended to 32 GHz by means of portable measurement devices.

In 2022, the radio spectrum monitoring and control system is planned to be upgraded with three new specialised mobile radio monitoring stations and 6 fixed stations of the type compact radio monitoring systems. The stations will have advanced functional and technological capabilities, equipped with the latest generation of specialised radio monitoring equipment, specialised measurements for mobile network coverage and quality, and analysis of the results obtained using a specialised software. The new equipment will allow the verification of the coverage provided and the quality of mobile services provided to end-users, including 5G networks.

In 2022, the Mechanism for measuring and monitoring the quality parameters of the Internet access service is to be approved for the purpose of implementing Article 4 (4) of Regulation (EU) 2015/2120, as a remedy in the event of a continuous or regularly recurring discrepancy between the actual performance of the Internet access service or other quality of service parameters and the performance indicated by the provider of Internet access services.

This approval is directly related to Action 1 of the project implemented during the year under Operational Programme "Good Governance" co-financed by the European Union through the European Social Fund - "Building and development of the information systems and registers of CRC for improving regulatory and control activities and raising the quality of the administrative service".

CRC also plans to implement projects related to e-government, as public procurements were carried out and contractors were selected for the following projects:

- "Development, deployment and maintenance of an information system ensuring the granting of individual rights to use radio frequency spectrum on the basis of registration";
- "Development, deployment and maintenance of an information system providing for the registration activities of transceiver stations on terrestrial networks enabling the provision of electronic communications services, activities under Article 151, Para 1, point 16 LSP and short-range Wi-Fi access points".

The contents in this annual report give a reliable picture of the trends in electronic communications and services in 2021, the work carried out by the Communications Regulation Commission, the results achieved and the objectives set for the future to create a predictable and well-functioning regulatory environment for the development of telecommunications in Bulgaria.