REPUBLIC OF SERBIA

RATEL

REGULATORY AGENCY FOR
ELECTRONIC COMMUNICATIONS
AND POSTAL SERVICES

AN OVERVIEW

OF THE ELECTRONIC COMMUNICATIONS AND POSTAL SERVICES
MARKETS IN THE REPUBLIC OF SERBIA IN 2021

AN OVERVIEW OF THE MARKET

OF THE ELECTRONIC COMMUNICATIONS AND POSTAL SERVICES MARKETS IN THE REPUBLIC OF SERBIA IN 2021

Belgrade, November 2022

CONTENTS

A WORD OF INTRODUCTION

In recent years, electronic communications and postal services have proved to be essential for the maintenance of both private and business relations. As challenges in the areas of RATEL's competence rose, we remained committed to contributing to the connectivity and unhindered functioning of the communications markets. Throughout 2021, RATEL stayed on the course of safeguarding market competition, providing better end-user protection, enhancing quality of services, improving working conditions for the electronic communications and postal service operators, as well as co-ordinating the activities of prevention and protection against security risks in ICT systems.

Based on the previous year's results regarding electronic communications and postal services, it can be concluded that operators successfully resolved all challenges and made it possible for individuals and business to stay connected, to work and get educated, conduct business remotely - all thanks to high quality and reliable networks and services. Since these markets are in constant development, growth trends have been recorded in most segments.

The total electronic communications market income of the Republic of Serbia in 2021 was around 220.7 billion dinars, an increase of 3.9% compared to the year before. Electronic communications income accounts for 3.5% of the national BDP. Most of the total income, reaching 60.2%, is generated by the mobile telephony service.

The total investment in the electronic communications sector in 2021 was 63.2 billion dinars, which is 31% more than the previous year, when it amounted to 48.2 billion dinars. The biggest share was the investment in media content distribution amounting to 25 billion dinars, accounting for 40.1% of the total investment, coupled with the investment in mobile telephony amounting to 16.9 billion dinars, accounting for 26.8% of the total investment.

The number of fixed telephony subscribers continued to drop, amounting to 2.37 million at the end of 2021. The total traffic via fixed network in 2021 shrank by 18% compared to the previous year, settling at 2.42 billion minutes in national and 138 million minutes in international traffic.

n 2021, the total number of mobile network users grew by 2.9%, with penetration rate reaching 123.72%. During the same year, mobile operators earned around 132.9 billion dinars, generating a growth of 6.1% compared to the previous year, while the investment in this market segment increased by 35% in comparison to the previous year, reaching the amount of 16.9 billion dinars.

The volume of outbound voice traffic (in minutes) keeps growing, resulting in an increase of 1.8% in 2021, in comparison to the year before. Over the previous year, each mobile telephony subscriber spent on average 6 minutes and 46 seconds on the phone. On the other hand, the number of sent messages keeps dropping, with around 1.7 texts per subscriber daily.

As of July 1, 2021, the "Roam Like Home" rule is applied to roaming prices in the Western Balkan region, abolishing additional charge to national retail prices of mobile communication network services and enabling the users to benefit from the same conditions of payment both in regional roaming and national traffic.

The total number of active mobile broadband Internet access users has increased by 8.5% compared to the previous year, reaching 7.1 million. The data show that the number of subscribers purchasing the services of mobile broadband Internet access independently from voice service has grown by 13.3% in comparison to the previous year. The volume of the generated traffic was 1.4 times bigger than that of the previous year, amounting to 647 million GB.

In 2021, 72.3% households had fixed broadband Internet access. The total number of Internet subscribers was 1.8 million, 4 times more than the previous year. As for the type of access, the highest share, of almost 48%, was accounted for by the subscribers that use optical cable for Internet access. The increase in the number of subscribers was reflected in the rise of revenues stemming from fixed broadband Internet access service, which increased by 3%, compared to 2020.

The Internet was most used for making telephone calls/video calls (93.7%) and text messaging via Skype, Messenger, WhatsApp, and Viber (84.7%), and for reading online news and magazines (76.8%). Online purchase of goods and services remains on the rise.

The total number of media content distribution users in 2021 was 2.14 million, which is a 1.7% increase compared to the previous year, mainly thanks to the expansion of IPTV and DTH (Direct-To-Home) subscribers.

One of RATEL's priorities is the protection of electronic communications and postal service users' rights.

RATEL enabled the use of its RATEL NetTest application, a tool that measures the quality of Internet services. The aggregated results are made publicly available to end-users, on the map, by district or municipality. By viewing the measurement results on a sufficiently large sample in the selected area, the end-user can get information on the operator's network quality, by district or municipality. Users can only view their own search history on the portal. RATEL NetTest LAN connection measurements are also used, according to the prescribed instructions, in cases of subscribers' complaints regarding the quality of Internet data transfer.

The user whose complaint to the electronic communications operator was rejected or was not resolved within 15 days is entitled to address RATEL for mediation in an out-of court dispute settlement. In 2021, 1,108 new complaint-related cases were formed, with 580 complaints resolved in favour of the subscriber. Most of the complaints related to the amount on the mobile telephony bill and quality of services provided, particularly the Internet.

In accordance with the Law on Postal Services, RATEL is authorized to mediate in an out-of-court dispute resolution between the postal operator and user, following the user's complaint. During 2021, RATEL acted upon 91 user complaints, the majority of which related to a delayed delivery of postal items, damaged items, or non-delivery of postal items.

Postal markets have been generating increased revenues for five years in a row, and those amounted to more than 18% in 2021. On average, in 2021, 126 postal items were delivered per household, which is 44 postal items per inhabitant. The income from the provision of postal services is around 27.7 billion dinars, or approximately 0.44% of the national GDP.

Despite being dominant, with a share of 84% in the total volume of provided postal services, universal postal service (UPS) accounts for only 41% (11.2 billion dinars) of the total revenues, whereas other postal services (OPS) generate an income of 16.5 billion dinars. The reserved service share in the UPS scope is 96.7%, with letter-post items up to 20 g being the dominant reserved area category, accounting for 92.5% of the UPS volumes. The revenues stemming from the reserved area within the UPS were more than 91%, out of which letter-post items up to 20 g account for more than 85% of the income.

The UPS revenues grew by 24%, which is primarily due to price augmentation, while the volume dropped by 0.1%. On the other hand, the OPS income has been growing continuously, increasing in 2021 by 15%, primarily because of the volume growth (by 11%), but also as a result of price increase.
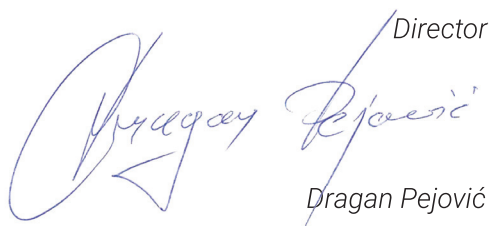
In comparison to 2020, the volume of postal items stemming from e-commerce grew by 20%, reflecting on an increase of 21% in the revenues generated by e-commerce. Compared to 2018, express volumes grew by 38%, whereas the volume of postal items stemming from e-commerce rose by 115%.

The security of networks and information and communication (ICT) systems being of key importance to all market participants, RATEL, performing the tasks of the National Centre for Prevention of Security Risks in ICT systems of the Republic of Serbia (National CERT), is authorized to present the data on incidents in ICT systems that can compromise information security.

During 2021, 280 such incidents were reported to the National CERT, including incidents reported by international CERTs. The incidents that managed to compromise the ICT system security and for which there is reasonable doubt that they constitute a criminal offense, were reported in accordance with the provisions of relevant laws and regulations or forwarded to the Special Prosecutor's Office for High-Tech Crime.

During 2021, an increase in unauthorized collection of data and breaches of ICT systems was recorded, with the number of reported cases of ICT system unavailability being bigger than the year before. Over the last year, the volume of cyber attacks carried out globally rose on average by 50%, while the cyber attack growth trend has been recorded in the Republic of Serbia as well, making the need for the enhancement of protection and defence of critical infrastructure even more indispensable.
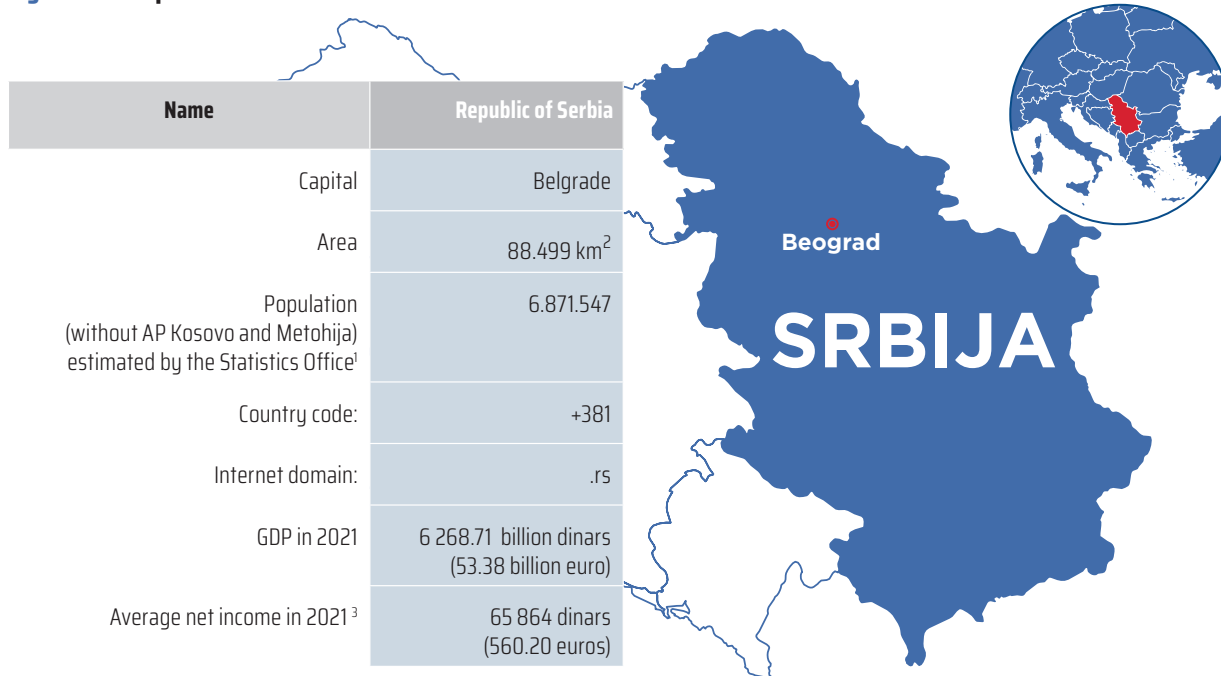
The purpose of an Annual Overview of the Telecom and Postal Services Markets in the Republic of Serbia is to help market participants grasp the existing situation and predict further development trends. By doing so, RATEL endeavours to contribute to the successful business operations of service providers and improve the quality of services on the national market.

Director

Dragan Pejović

BASIC FEATURES OF TELECOMMUNICATIONS MARKET IN THE REPUBLIC OF SERBIA

1

Figure 1.1. Republic of Serbia – Basic Facts

Name	Republic of Serbia
Capital	Belgrade
Area	88.499 km^2
Population (without AP Kosovo and Metohija) estimated by the Statistics Office[1]	6.871.547
Country code:	+381
Internet domain:	.rs
GDP in 2021	6 268.71 billion dinars (53.38 billion euro)
Average net income in 2021 [3]	65 864 dinars (560.20 euros)

Beograd

SRBIJA

The data used for the overview of telecom market in the Republic of Serbia have been obtained based on the questionnaires provided by the telecom market participants, and they mainly refer to the territory of the Republic of Serbia without Kosovo and Metohija since this area is under the control of the United Nations, pursuant to the Security Council Resolution 1244, temporary regulating, inter alia, the authority of the international civilian mission in the territory of AP Kosovo and Metohija.

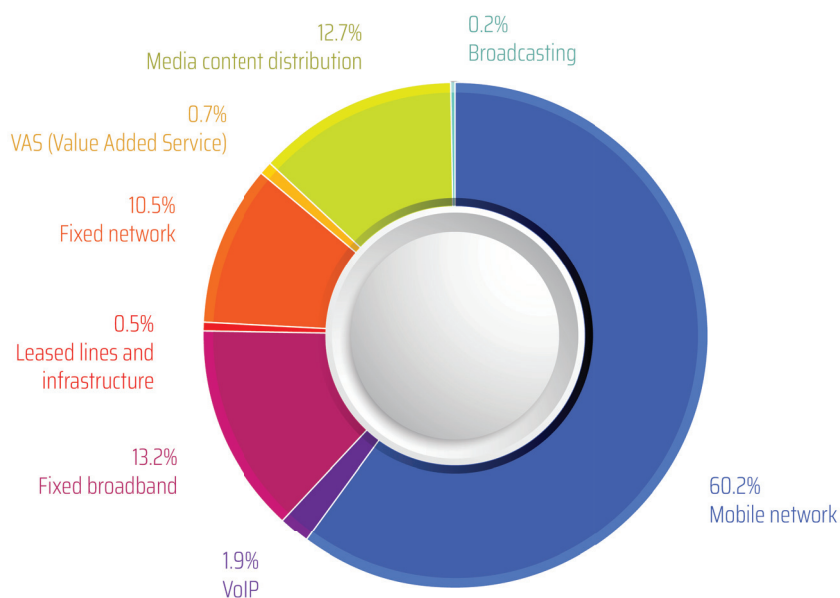1   Estimate of the Republic Institute of Statistics (RZS) for January 1, 2021
2   RZS assessment – as a sum of four quarters. Data taken from the publication "Statistical Calendar of the Republic of Serbia, 2022", Republic Institute of Statistics, Belgrade, 2021 (the average exchange rate of the dinar against the euro for 2021 is 117.5736), p. 35.
3   Ibidem, p. 41.

The total revenues made in the electronic communications market of the Republic of Serbia in 2021 amounted to approximately 220.7 billion dinars which is by 3.9% more compared with the previous year. The total revenues amounted to 1.9 billion euros, which is a slight growth compared to 1.8 billion in euro 2020. The share of revenues from electronic communications in the Serbian GDP in 2021 was around 3.5%.

In terms market share accounted for by different services in the Serbian electronic communication market in 2021, the same as in the previous years, the largest share went to mobile service provision, accounting for 60.2% of the total revenues.
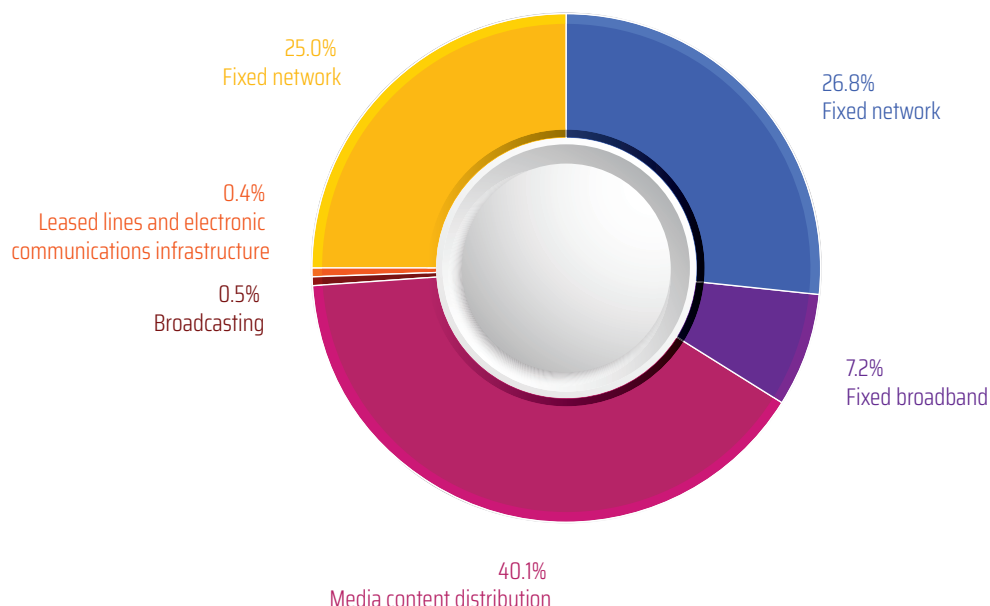
Figure 1.2. Structure of revenues by services in 2021

12.7%
Media content distribution

0.2%
Broadcasting

0.7%
VAS (Value Added Service)

10.5%
Fixed network

0.5%
Leased lines and infrastructure

13.2%
Fixed broadband

1.9%
VoIP

60.2%
Mobile network

Source: RATEL

The total investments made in the electronic communications sector in 2021 amounted to 63.2 billion dinars (537.7 million euros), which is by 31% more than in the previous year when they amounted to 48.2 billion dinars. Considered in euros, the investments increased from 410.5 to 537.7 million euros, which also a 31% increase. Investments made in media content distribution have the largest share with more than 25 billion dinars (215 million euros) and account for nearly 40.1% of the total investments in 2021, while investments in mobile networks which amounted to 16.9 billion dinars (144 million euros) account for 26.8% of the total investments made in 2021.

Figure 1.3. Structure of investments by services in 2021

25.0%
Fixed network

0.4%
Leased lines and electronic
communications infrastructure

0.5%
Broadcasting

26.8%
Fixed network

7.2%
Fixed broadband

40.1%
Media content distribution

Source: RATEL

A comparative overview of the number of users and penetration rate of public fixed communication networks, public mobile communications networks, broadband Internet, media content distribution systems and bundle services for the period 2017-2021 are given in Table 1.1.

Low usage basket of electronic communications services shows average monthly expenses of a subscriber/inhabitant for telecommunications services. Tables 1.2 and 1.3 illustrate low usage and high usage baskets, representing monthly expenditure per subscriber of electronic communication services in Serbia, based on weighted average, with comparative data for 2019, 2020 and 2021. According to the collected data on natural entities and the data received from the Statistics Office on net income, in 2021, the cost of the low basket equalled 1.83% and the average net salary, and the cost of the high usage basket equalled 8.45% of the average net salary.

Table 1.1. A comparative overview of the number of users of basic electronic communications services in the Republic of Serbia (2017-2021)

Year		2017	2018	2019	2020	2021
Service	Indicator					
Fixed telephone - subscribers	Million	2.48	2.43	2.42	2.41	2.37
	Per 100 households	99.74	97.87	97.34	97.01	95.45
Mobile telephone - users	Million	8.62	8.43	8.45	8.26	8.50
	Per 100 households	122.46	120.42	121.40	119.25	123.72
Fixed broadband - subscribers	Million	1.48	1.55	1.62	1.73	1.80
	Per 100 households	59.52	62.39	65.27	69.56	72.34
Media content distribution - subscribers	Million	1.70	1.88	2.00	2.10	2.14
	Per 100 households	68.28	75.55	80.42	84.51	85.94
Bundle services - subscribers	Million	1.17	1.27	1.42	1.56	1.63
	Per 100 households	46.95	51.23	56.90	62.54	65.39

Table 1.2. Low usage basket of electronic communications services

LOW USAGE BASKET	2019		2020		2021	
	Average bill (dinars)	% of the average salary	Average bill (dinars)	% of the average salary	Average bill (dinars)	% of the average salary
Fixed phone	647.06	1.18%	653.50	1.09%	601.16	0.91%
Mobile phone (prepaid)	323.00	0.59%	310.70	0.52%	308.19	0.47%
TV (public broadcasting service tax) *	220.00	0.40%	255.00	0.42%	299.00	0.45%
Total	1,190.06	2.17%	1,219.20	2.03%	1,208.35	1.83%
Average net salary (RSD)***		54,926		60,073		65,864

Source: RATEL

Table 1.3. **High usage basket of electronic communications services**

HIGH USAGE BASKET	2019		2020		2021	
	Average bill (dinars)	% of the average salary	Average bill (dinars)	% of the average salary	Average bill (dinars)	% of the average salary
Fixed phone	647.06	1.18%	653.50	1.09%	601.16	0.91%
Mobile phone (prepaid)	1,783.88	3.25%	1,754.67	2.92%	1,804.62	2.74%
TV (public broadcasting service tax) *	220.00	0.40%	255.00	0.42%	299.00	0.45%
Internet **	1,435.86	2.61%	1,546.74	2.57%	1,360.01	2.07%
Media content distribution	1,339.44	2.44%	1,305.76	2.17%	1,500.50	2.28%
Total	5,426.24	9.88%	5,515.67	9.18%	5,565.29	8.45%
Average net salary (RSD) ***		54,926		60,073		65,864

Notes:

* Since January 2016, pursuant to the Law on Temporary Regulation of Public Media Service Tax Collection (Official Gazette of RS, no. 112/15), a monthly public broadcasting service tax is collected.
** Fixed broadband (excluding the mobile Internet package)
*** www.stat.gov.rs – As of 2018, average salary is calculated based on the data obtained through Withholding Tax Return Form, according to new methodology.

Source: RATEL

According to available data, the total number of people in the Republic of Serbia employed in the telecommunications sector in 2021 amounted to 13.94 thousand.
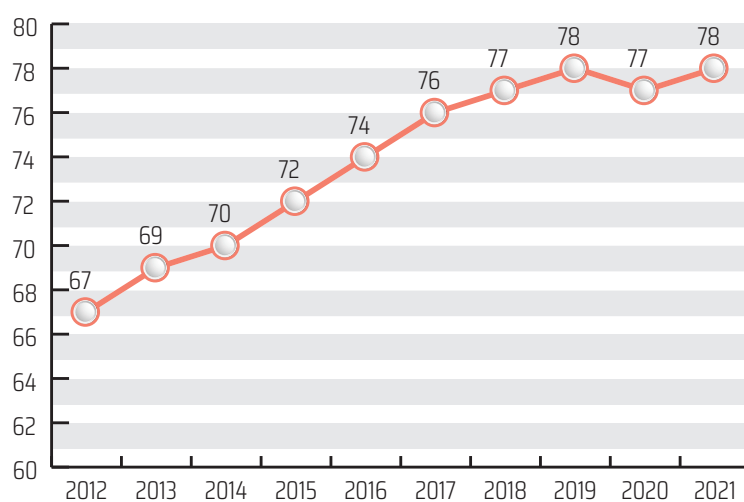
EU TELECOM MARKET STATE OF PLAY

2

Fixed broadband access

The number of fixed broadband subscribers in the EU Member Countries, households-wise, increased by 1% in 2021.

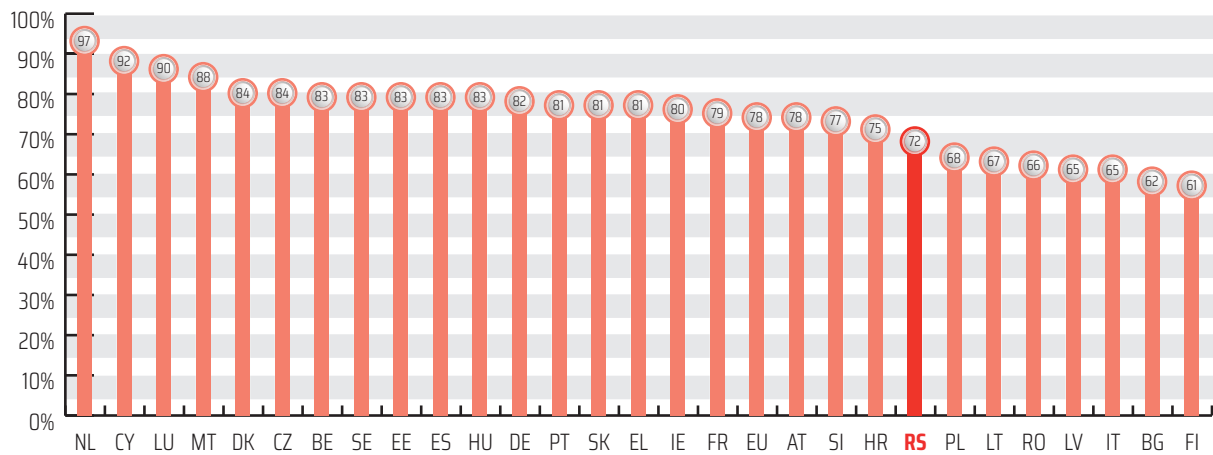**Figure 2.1. Average number of fixed broadband subscribers per 100 households - EU**

Figure 2.2. **Fixed broadband penetration rate (per 100 households) – EU by Member States**

In the EU Member States the number of fixed broadband subscribers ranges from 61% to 97%. The Netherlands, Cyprus and Luxemburg have the highest rate of fixed broadband subscribers per 100 households (over 90%). On the other hand, Finland and Bulgaria have the lowest rates, below 65%. It is a valid assessment that this may in part be a result of the fixed-mobile substitution. At the end of 2021, the number of fixed broadband subscribers per 100 households in Serbia was 72.

DSL still has the largest share in fixed broadband structure, with 46% of total fixed broadband subscribers in the EU. Compared to the previous year, the total number of subscribers using FTTH/B increased from 19% to 31%, while cable access dropped from 26% to18% year on year. Cable access is by far more present in the Serbian market, with 45% of the total fixed broadband subscribers, whereas DSL take-up was 30% and FTTH/B 19% at the end of 2021.

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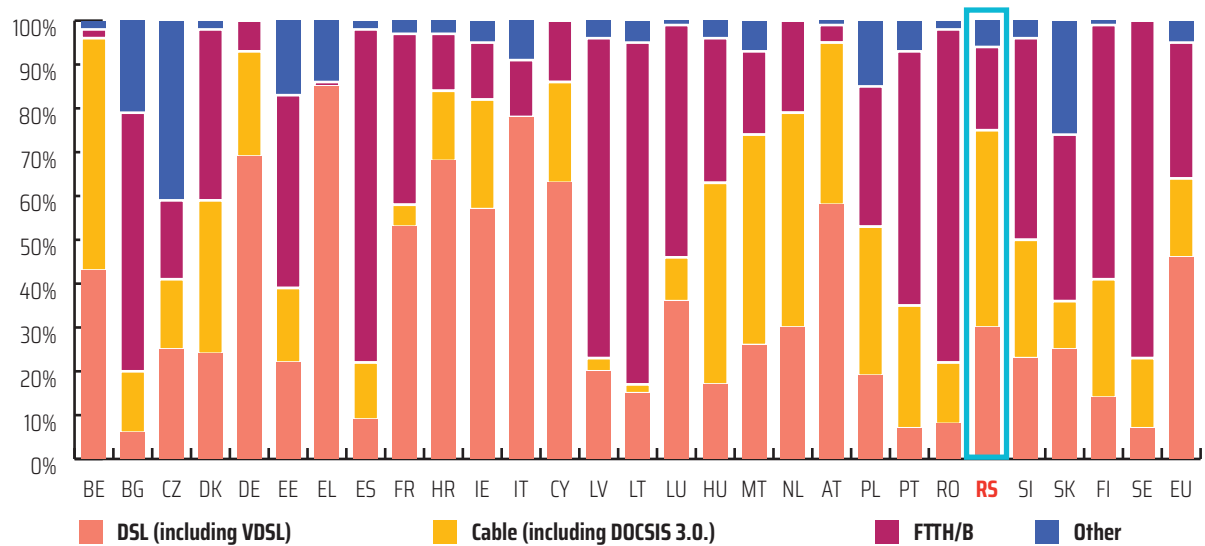**Figure 2.3.** **Fixed broadband user distribution in terms of technologies in the EU**

18%
Cable (including DOCSIS 3.0.)

46%
DSL (including VDSL)

31%
FTTH/B

5% Other

Source for the EU:
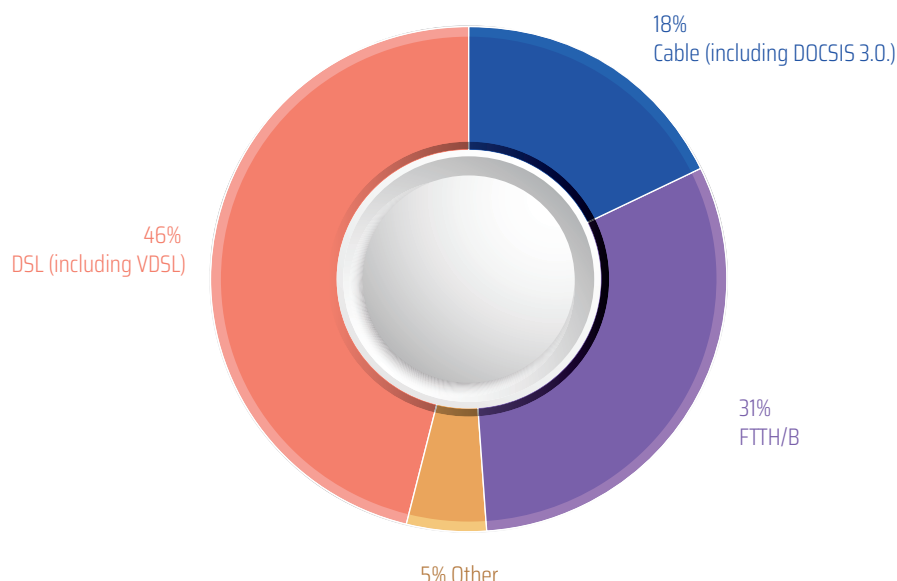
EC - Communications Committee – COCOM, https://digital-strategy.ec.europa.eu/en/policies/desi-connectivity**, as on 2 August 2022;**

Figure 2.4. shows the usage of different broadband technologies in the EU Member States and the Republic of Serbia. DSL market share ranges from 6% to 86% and it generally has a lower rate in the East Europe where FTTH/B is widely used. Cable access is present in all countries except for Greece and Italy where DSL is dominant. On the other hand, DSL holds a small share in Bulgaria, Romania, Portugal, Spain and Sweden. Cable access has large share in Belgium, Hungary, Malta and the Netherlands. FTTH/B is the most used technology in Lithuania, Latvia, Sweden, Romania, Spain, Bulgaria and Finland. In Serbia in 2021, cable access was dominantly used, outnumbering the subscribers using DSL technology, whereas FTTH/B was used by 19% of the total fixed broadband subscribers.

Market share of the incumbent operators in the total number of fixed broadband subscribers remains high in the EU, the average being approximately 39%, the same as last year. Luxemburg has the incumbent with the largest market share of 63%, whereas in Croatia, Austria, Cyprus, Latvia, Estonia, Lithuania and Denmark, the incumbent operators have a share of over 50%. The share of the incumbent is below 30% in the Czech Republic, Romania Bulgaria and Poland. The share of the incumbent in the total number of fixed broadband subscribers in Serbia is above the EU average, with 55% (Figure 2.5).

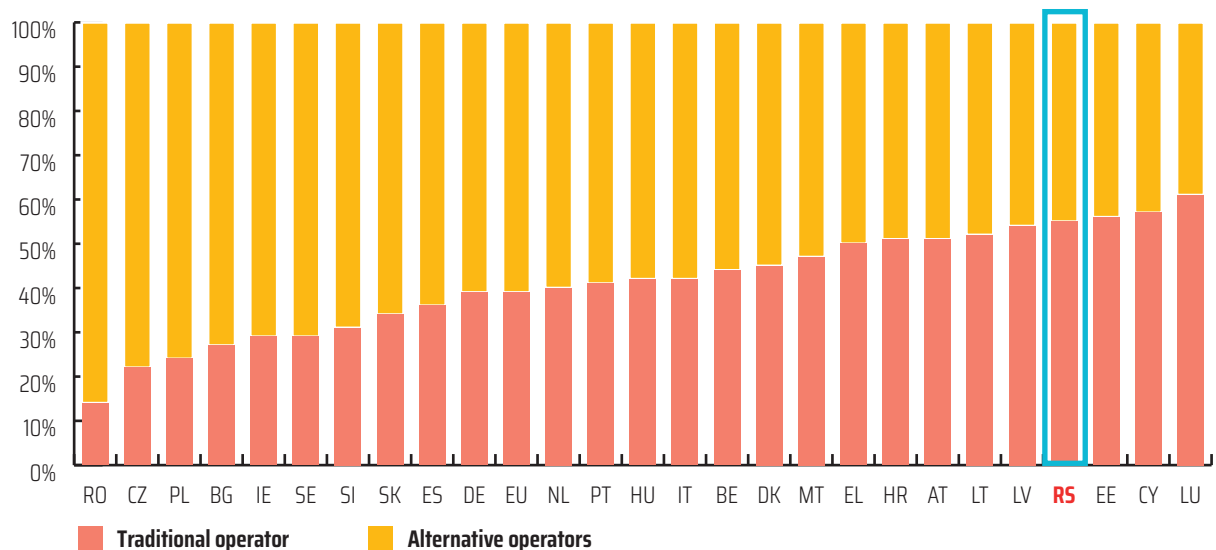**Figure 2.4. Fixed broadband user distribution in terms of technologies**

Legend: DSL (including VDSL) — Cable (including DOCSIS 3.0.) — FTTH/B — Other

Source for the EU:

EC - Communications Committee – COCOM, https://digital-strategy.ec.europa.eu/en/policies/desi-connectivity**, as on 15 November 2021;**

Source for Serbia: RATEL

Figure 2.5. The shares of the incumbent and alternative operators in the total number of fixed broadband subscribers

Legend: Traditional operator — Alternative operators

Source for the EU:

EC - Communications Committee – COCOM, https://digital-strategy.ec.europa.eu/en/policies/desi-connectivity**, as on 2 August 2022;**

Source for Serbia: RATEL

NGA network coverage continues to grow in the EU. Around 90% of the total number of households in the EU have NGA network coverage, compared with 62% seven years ago, noting that NGA includes FTTH, FTTB, VDSL and Cable DOCSIS3.0. By mid-2020, VDSL had the largest coverage among NGA technologies of 55%, followed by FTTP (50%) and by cable access (45%). NGA coverage has largely increased in rural areas where it grew by 9% over the past year, now reaching 69%.

Malta, Cyprus, Luxemburg and Belgium are NGA leaders. In 19 Member States NGA is available in at least 90% of households, whereas the take up in France is 74% and in Finland 75%. In Serbia the NGA is available in 74% of households.

**Figure 2.6. NGA coverage in the total number of households**

Source for the EU:

EC - Communications Committee – COCOM, https://digital-strategy.ec.europa.eu/en/policies/desi-connectivity**, as on 2 August 2022;**

Source for Serbia: RATEL

In the EU, 40% of the subscribers used Internet packages of at least 100 Mbps, whereas 7% of the subscribers had access to connections of 1 Gbps and higher. The leading countries in terms of ultra-high-speed Internet subscribers (100 Mb/s and higher) are Sweden, Spain, Portugal, Hungary, Belgium, Luxemburg, Romania and Malta, where more than 60 % of users have access to such speeds, whereas the least connections at these speeds (below 20%) are available in Greece (8%), Croatia (16%) and Austria (18%). In Serbia, 36% of the subscribers used Internet packages of at least 100Mbps, whereas the number of subscribers with access to connection of over 1 Gbps is insignificant.

**Figure 2.7.** **Fixed broadband users share, according to connection speed**
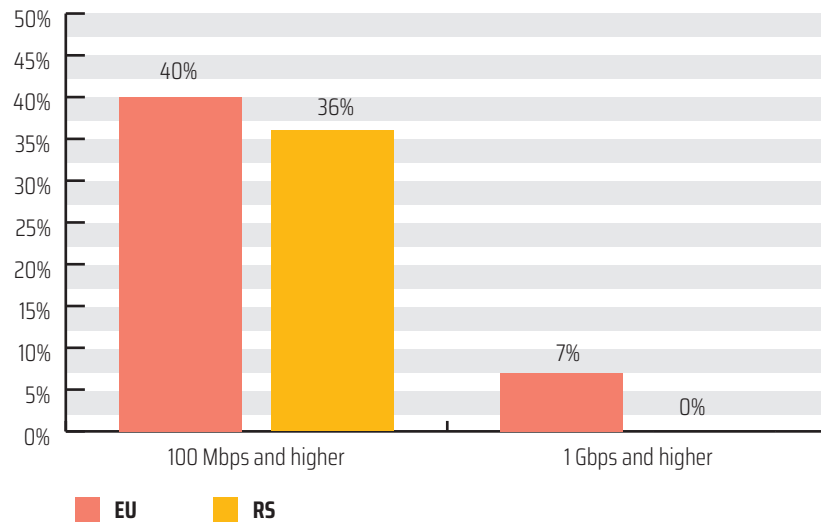
Source for the EU:

EC - Communications Committee – COCOM, https://digital-strategy.ec.europa.eu/en/policies/desi-connectivity**, as on 2 August 2022;**

Source for Serbia: RATEL

Mobile broadband is largely used along fixed broadband in the EU. In Ireland, Denmark. Finland, Luxembourg and Sweden the mobile broadband penetration rate is above 95%. Bulgaria has the lowest mobile penetration rate of 73%. In Serbia, at the end of 2021, the number of active mobile broadband users per 100 inhabitants was 96, which is above the EU average (87).

Figure 2.8. **Mobile broadband penetration rate**
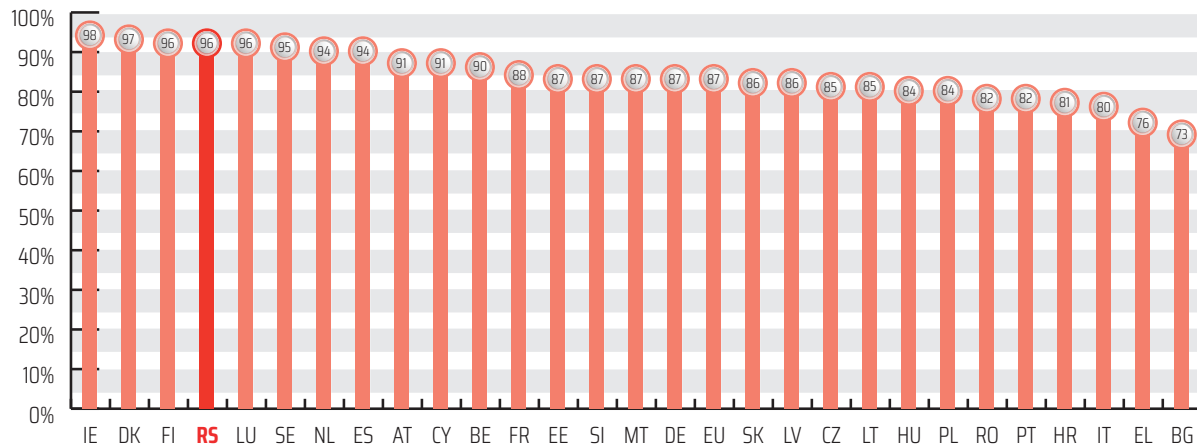
THE DIGITAL ECONOMY AND SOCIETY INDEX (DESI)

3

The Digital Economy and Society Index (DESI) is a composite index that summarises relevant indicators on digital performance and tracks the evolution of EU member states in digital competitiveness. DESI provides an insight in country's general performance and offers a simple way to identify areas with room for improvement. DESI consists of 4 components: Human capital, Connectivity, Integration of digital technology and Digital public services (Figure 3.1).

Figure 3.1. DESI components

DESI is calculated for EU member states since 2014 and for Serbia since 2017, thus enabling Serbia to be positioned at the European digital performance map. DESI for Serbia in 2021 has been calculated according to the EC methodology of November 2021.

The 2021 DESI methodology has been adjusted to reflect major policy initiatives, including the 2030 Digital Compass, which will have effect on the EU digital transformation.

In order to align DESI with the four cardinal points and targets of the Digital Compass, upgrade the methodology and take into account the latest technological and political developments, the Commission has introduced several changes in 2021 DESI edition. The indicators are structured around four cardinal points of the Digital Compass, replacing the earlier structure consisting of 5 categories. Eleven 2021 DESI indicators are intended to measure the Digital Compass targets. DESI is expected to be further aligned with the Digital Compass, in order to monitor all targets in the reports.

Use of Internet services has been excluded as a result changes made to the methodology, while different indicators have been modified, included, or excluded from the other four categories. Thus, Human capital now includes an additional indicator, Connectivity includes two additional indicators, Integration of digital technology includes four additional indicators, whereas for Digital public services one indicator has been replaces by a new one.

DESI by dimensions for all EU countries and Serbia is given in Figure 3.2. Values for Serbia and the EU Member Stats aren't fully comparable because the values for the European countries have been aligned with the latest methodology, which had been published in August 2022 and modified compared to the previous one in terms of used indicators, their sources and weighted values applied in calculation.

**Figure 3.2. DESI scores of the EU countries and Serbia in 2021**
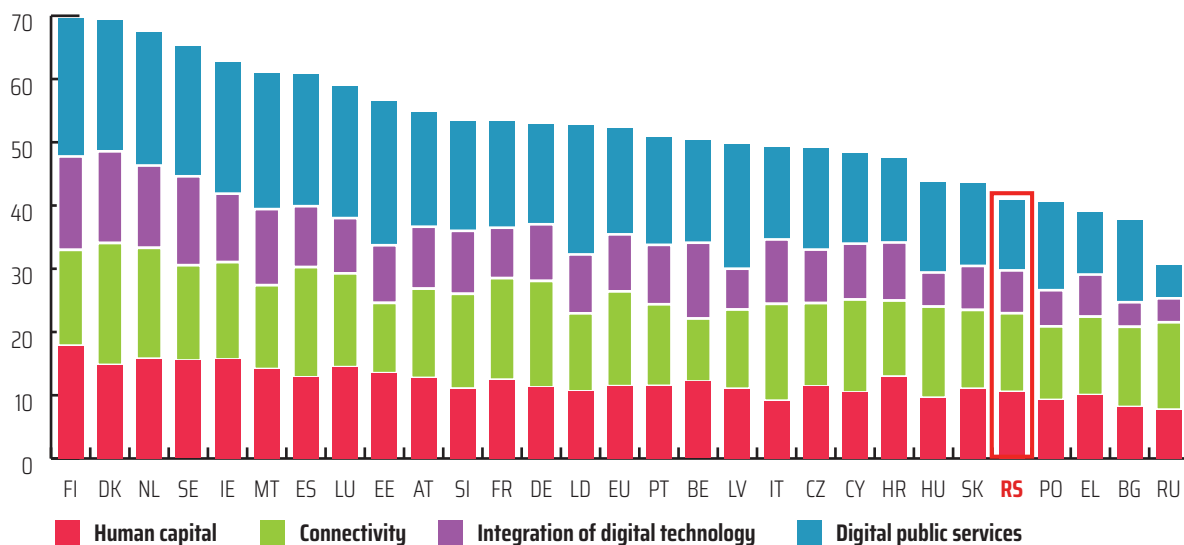
Source for EU countries: https://digital-agenda-data.eu/charts/desi-components, as on 3 August 2022.
Source for Serbia: RATEL

Finland, Denmark and the Netherlands were the most advanced digital economies in the EU in 2021, whereas Romania, Bulgaria and Greece are lagging behind.

Serbia is ranked 24th on the list of the European countries, compared to the 19th place the previous year. The lower ranking is a result of lower values in the Integration of digital technology, Connectivity and Digital public services categories, and also, of the changes made to the methodology and the indicators used, in respect to the previous year. This result still places Serbia it in the cluster of the countries with a relatively low performance, such as: Romania, Bulgaria, Greece, Poland, Slovakia, Hungary, Croatia, Cyprus and Czech Republic. Average DESI values and values for each category are shown in Figure 3.3.

Figure 3.3. Comparative DESI overview
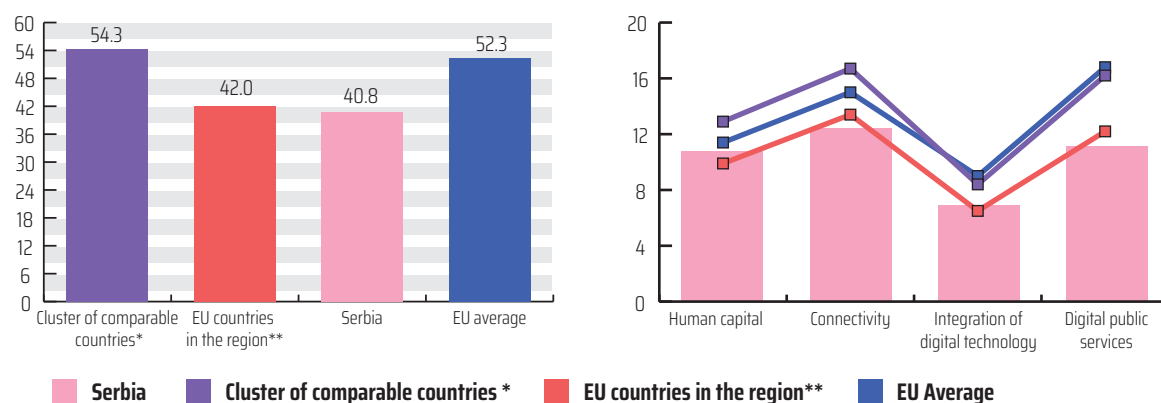
* Cluster of comparable countries includes countries at a similar level of digital development: Romania, Bulgaria, Greece, Poland, Slovakia, Hungary, Croatia, Cyprus and Czech Republic.
** EU countries in the region: Slovenia, Hungary, Romania, Bulgaria, Croatia and Greece.

Each dimension includes several sub-dimensions and the values of their indictors are calculation components of DESI. The index is a sum weighted values for the four dimensions. Sub-dimensions also have weighted values, whereas some individual indicators have double value compared to other indicators within the sub-dimension. Biggest changes are evident in the Integration of digital technology dimension, while slight changes have been made to the Connectivity dimension. Weights attributed to the DESI dimensions and sub-dimensions used in the calculations for Serbia are given below.

DESI Dimensions / Sub-dimensions	Weight	
1. Human capital	25%	
1a. Internet user skills		50%
1b. Advanced skills and development		50%
2. Connectivity	25%	
2a. Fixed broadband take-up		25%
2b. Fixed broadband coverage		25%
2c. Mobile broadband		40%
2d. Broadband price index		10%
3. Integration of digital technology	25%	
3a. Digital intensity		15%
3b. Digital technologies for businesses		70%
3c. e-Commerce		15%
4. Digital public services	25%	
4a. e-Government		100%

Average DESI values by dimensions are given in Figure3.4.

Figure 3.4. **Average DESI values by dimensions**

Serbia ■ Cluster of comparable countries ■ EU countries in the region ■ EU average
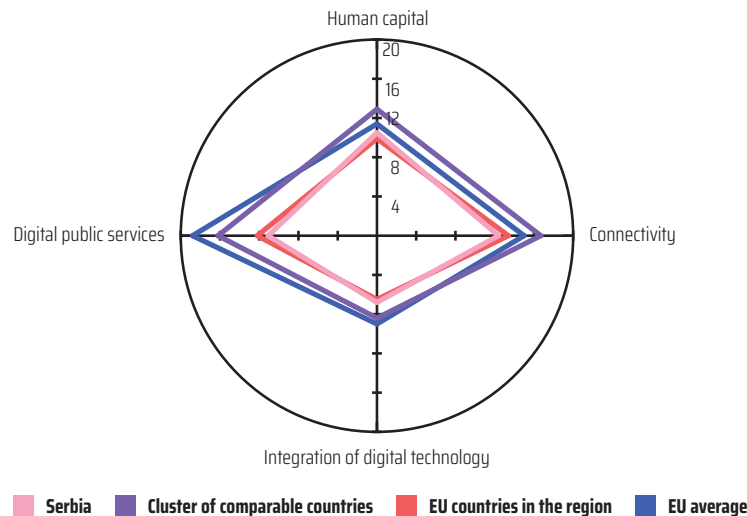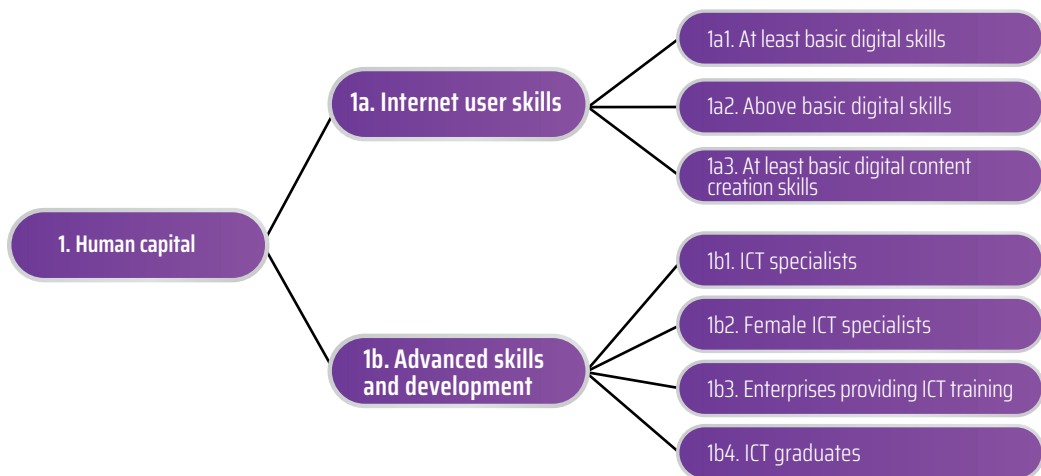
Human Capital Dimension

The Human Capital dimension measures digital skills, basic and advanced, needed to take active part in the digital society and to use digital products and services. Hence, digital skills together with the Internet access, analysed under the previous dimension, are considered to be necessary infra-structure for the digital economy and society..

Sub-dimensions and indicators under Human Capital dimension are given in Figure 3.5.

Figure 3.5. **Human Capital – sub-dimensions and indicators**

The leading countries in this dimension are Finland, Sweden and the Netherlands, whereas the countries with the lowest score in the EU are Bulgaria, Romania and Italy. The values for Human Capital dimension in the EU and Serbia are given in Figure 3.6, whereas the comparison with the comparable countries cluster and countries in the region is shown in Figure 3.7.

Figure 3.6. The values for Human Capital dimension in the EU and Serbia in 2021
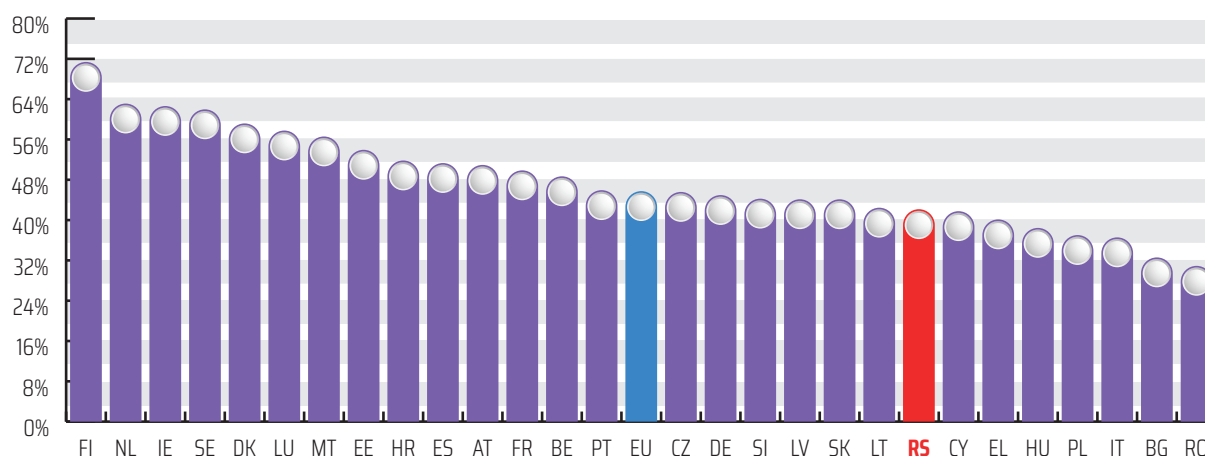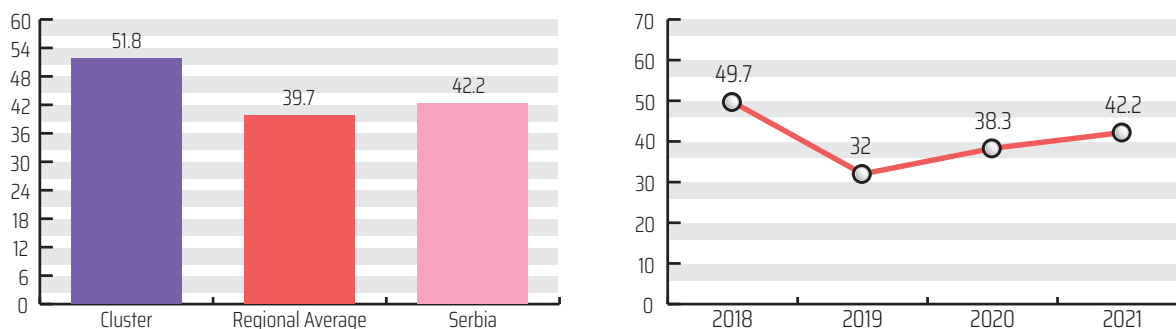

Figure 3.7. Overview of compared values for the Human Capital dimension

Compared with the European countries, Serbia is among the less successful in this dimension. Despite the overall progress made year on year. "At least Basic Skills" and "Above basic digital skills" indicators have lower values compared with the previous year due to the modifications made to the methodology. Furthermore, a new indicator was introduced involving the share of enterprises providing ICT training to the staff. The rate of ICT graduates is slightly lower in respect to the previous year. The values of individual indicators under Human Capital dimension for Serbia in 2021 are given below.

| Human Capital Indicatorst	Serbia	Min*	Max*
1a1 At least basic digital skills	29.0%	0%	100%
1a2 Above basic digital skills	12.0%	0%	66%
1a3 At least basic software skills	4.3%**	0%	100%
1b1 ICT specialists	3.2%	0%	10%
1b2 Female ICT specialists	1.7%	0%	50%
1b3 Companies providing ICT training to the staff	16.1%	0%	50%
1b4 ICT graduates	7.1%	0%	10%

Source: Statistics Office
*   Minimum and maximum value is predefined and used to normalize different units of indictors, converting them into values on scale from 0 to 10.
** 2020 data.

Connectivity Dimension

Connectivity refers to infrastructure necessary for the digital economy and society, hence this dimension provides information on the types and quality of the Internet access and availability. The sub-dimensions and their indicators are given in Figure 3.8.

Figure 3.8. Connectivity: Sub-dimensions and their indicators
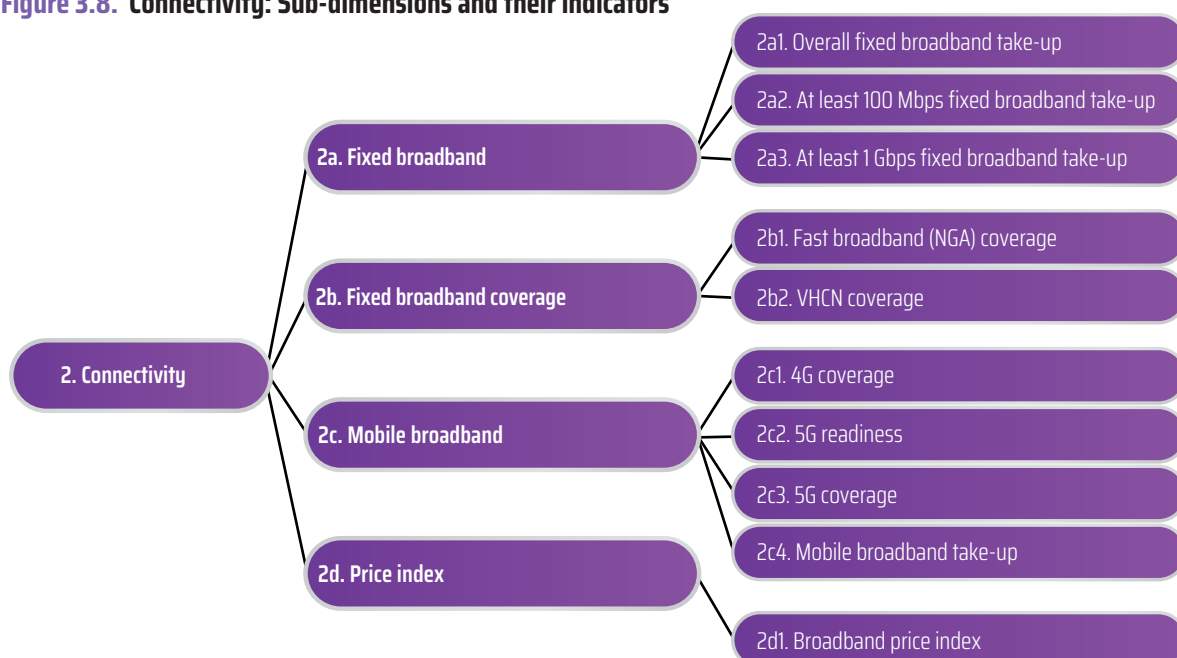
The leading countries in this dimension are Denmark, the Netherlands and Spain, whereas the co-untries with the lowest score in the EU are Belgium, Estonia and Poland. The values for Connectivity dimension for the EU countries and Serbia are given in Figure 3.9, while the comparison between Serbia and the cluster of comparable countries and countries in the region is given in Figure 3.10.

Figure 3.9. **2021 Values for Connectivity dimension for the EU countries and Serbia**
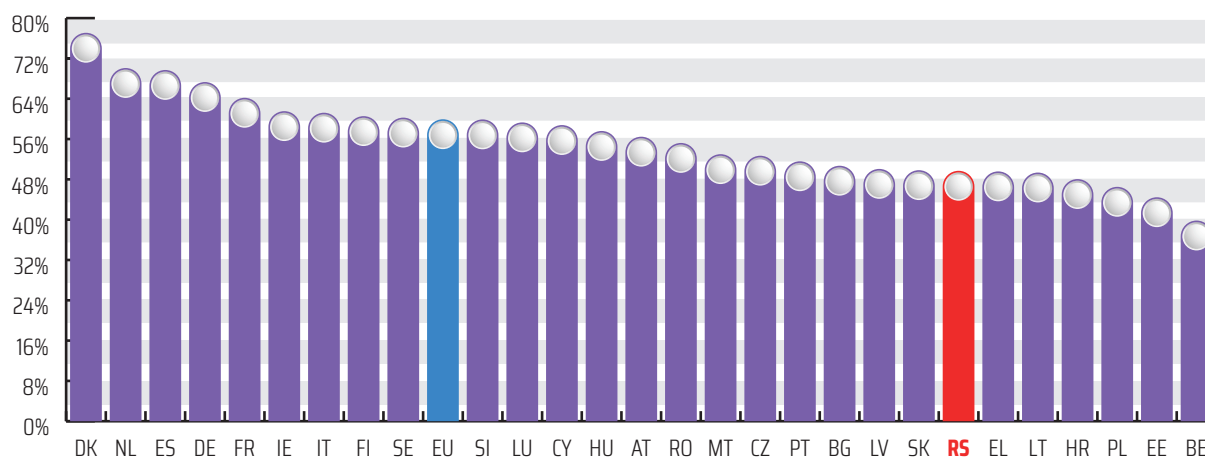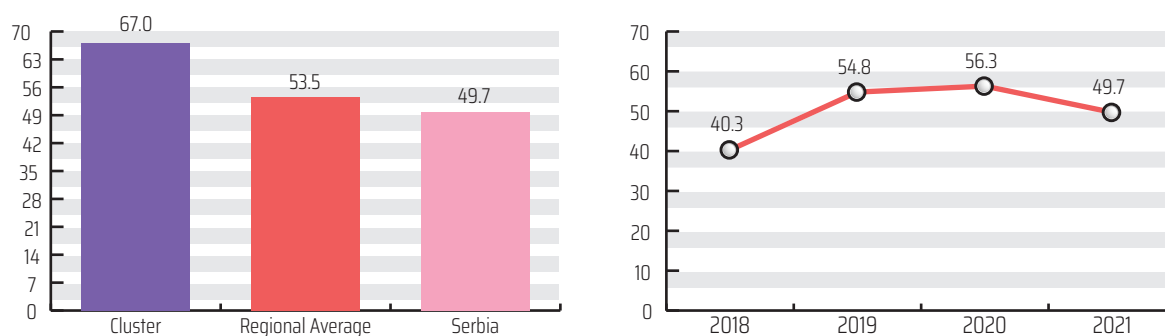

Figure 3.10. **Comparative overview of values for Connectivity dimension**

Serbia scored lower in respect to the last year, which affected its position on the list of the European countries for this dimension. However, methodological differences in the calculation of values for Serbia and for the EU countries in 2021 and 2022 also had a significant impact on Serbia's position on the list. The indicators reflecting fixed broadband access are comparable to or higher than the last year's score. The lower score is a result of zero values for 5G related indicators. The values for each indicator of the Connectivity dimension for Serbia are given below.

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| Connectivity Indicators	Serbia	Min	Max
2a1 Overall fixed broadband take-up	72.3%	50%	100%
2a2 At least 100 Mbps fixed broadband take-up	26.3%	0%	100%
2a3 At least 1 Gbps fixed broadband take-up	0.04%	0%	50%
2b1 Fast broadband (NGA) coveragt (at least 30 Mbps)	73.9%	25%	100%
2b2 Fixed Very High-Capacity Network (VHCN) coverage	59.1%	0%	100%
2c1 4G coverage	98.6%	40%	100%
2c2 5G readiness	0%	0%	100%
2c3 5G coverage*	0%	0%	100%
2c4 Mobile broadband take-up	95.9%	0%	100%
2d1 Broadband price index	63.57	25	100

Source: RATEL
* Decision on 5G spectrum auction has not been reached in 2021.

Integration of Digital Technology Dimension

The Integration of Digital Technology dimension reflects the fact that in the digitisation is one of the main drivers of economic growth. By adopting digital technologies (cloud, Big data, IoT, etc.) businesses can enhance efficiency, reduce costs and better engage customers and business partners, therefore it is crucial for competitiveness. Sub-dimensions and indicators under the Integration of Digital Technology Dimension are given in Figure 3.11.

Figure 3.11. Integration of Digital Technology - sub-dimensions and indicators
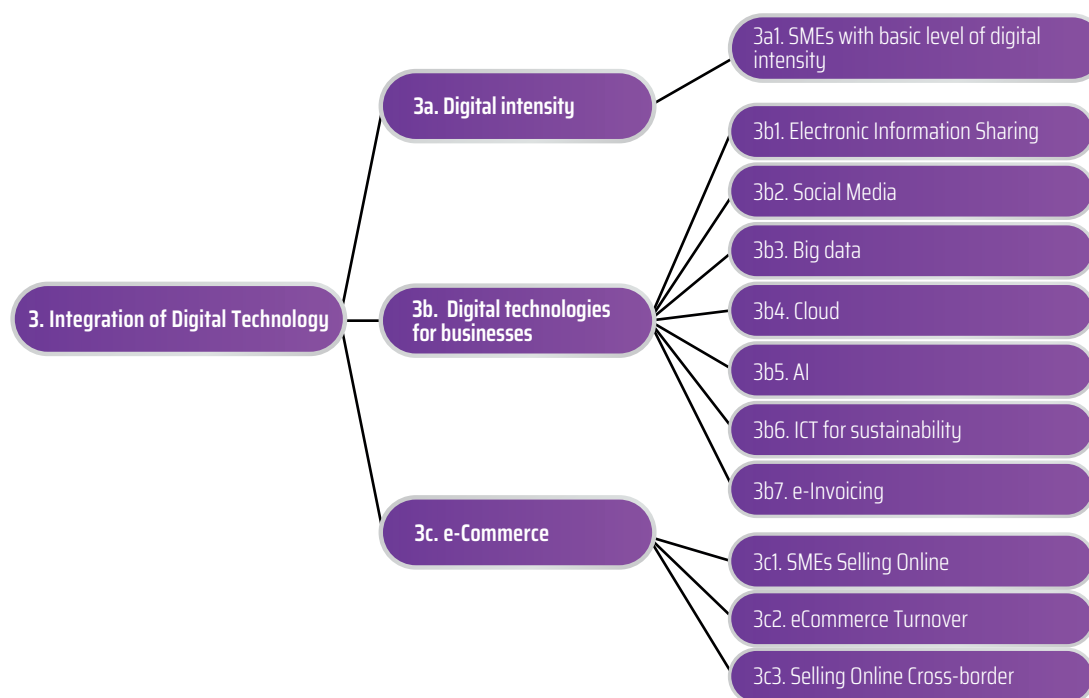
The leading countries in this dimension are Finland, Denmark and Sweden, whereas the countries with the lowest score in the EU are Romania, Bulgaria and Hungary. The values for Integration of Digital Technology dimension in the EU and Serbia are given in Figure 3.12, whereas the comparison with the comparable countries cluster and countries in the region is shown in Figure 3.13.

Figure 3.12. The values for the Integration of Digital Technology dimension in the EU and Serbia for 2021
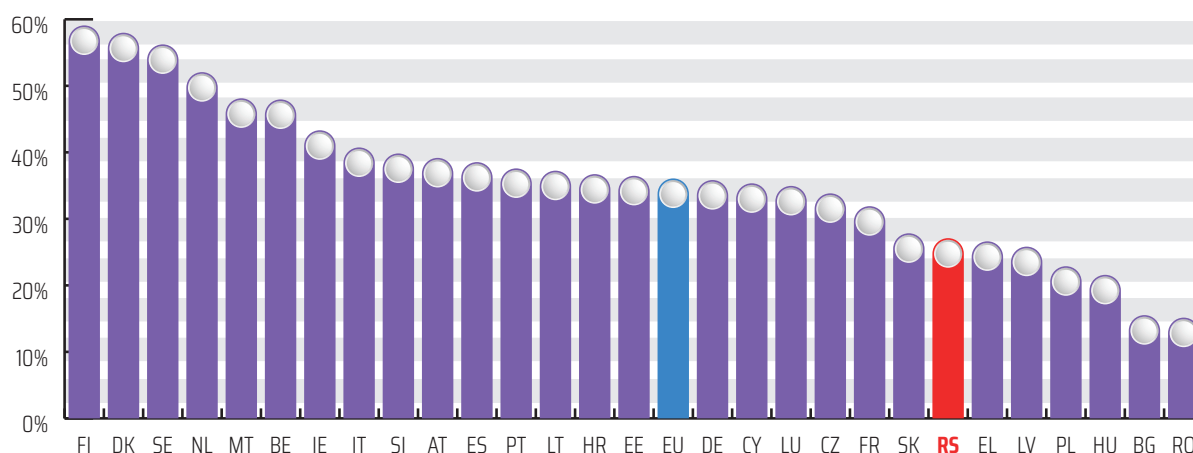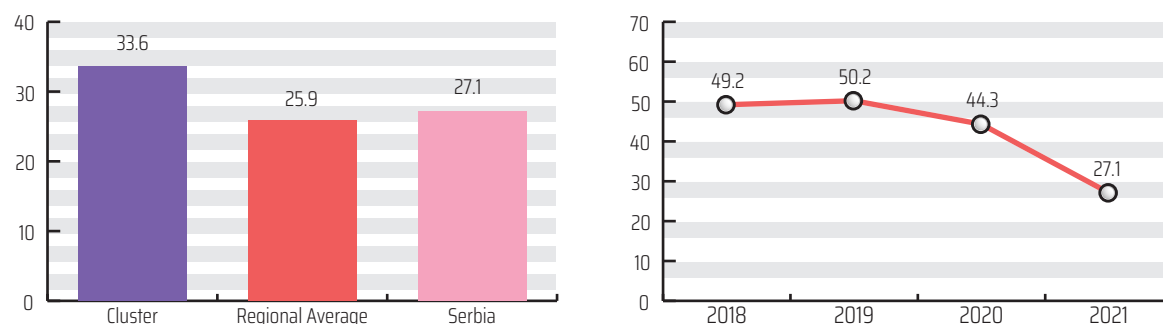
Figure 3.13. **Overview of compared values for the Integration of Digital Technology dimension**

Serbia's score in Integration of Digital Technology dimension is lower than the previous year, yet it's above average mainly due to high indicators for business selling online. It should be noted that comparability with the EU countries is limited due to differences in methodology used for Serbia on the one hand and the EU countries on the other. The values of individual indicators under Digital Technology dimension for Serbia for 2021 are given below.

| Digital Technology dimension – indicators	Serbia	Min	Max
3a1 SMEs with basic level of digital intensity	45.3%	25%	100%
3b1 Electronic Information Sharing (ERP)	22.3%	0%	60%
3b2 Social Media	15.7%	0%	50%
3b3 Big data	3.8%	0%	75%
3b4 Cloud	28.9%	0%	75%
3b5 AI	8.3%	0%	75%
3b6 ICT for sustanability	57.9%	30%	100%
3b7 e-invoicing	19.2%*	0%	100%
3c1 SMEs Selling Online (min 1% turnover)	26.4%	0%	50%
3c2 eCommerce Turnover	19.0%	0%	33%
3c3 Selling Online Cross-border	5.0%	0%	25%

Source: Statistics Office
* 2020 data.

Digital Public Services Dimension

Digital Public Services dimension measures digital technologies which serve to enhance the interaction of citizens and businesses with public administration, focusing on e-Government, as shown in Figure 3.14.

Figure 3.14. Digital Public Services dimension
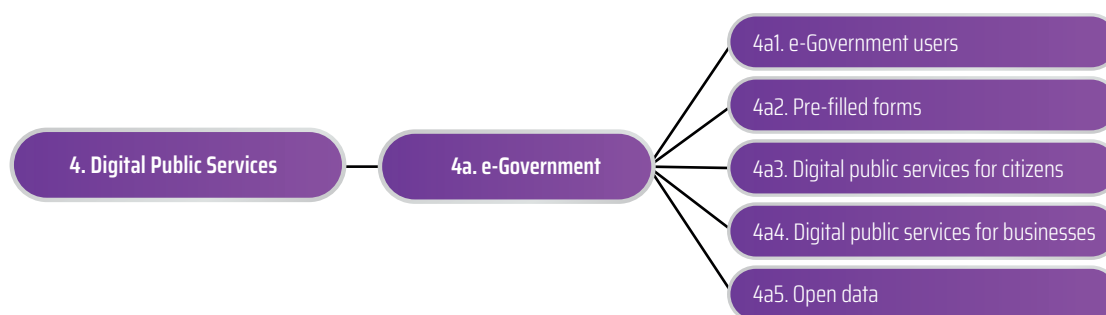
Top performers in this dimension are Estonia, Finland and Malta, whereas the countries with the lowest score in the EU are Romania, Greece and Bulgaria. The values for Digital Public Services dimension in the EU and Serbia are given in Figure 3.15, whereas the comparison with the comparable countries cluster and countries in the region is shown in Figure 3.16.

Figure 3.15. Overview of compared values for the Digital Public Services dimension
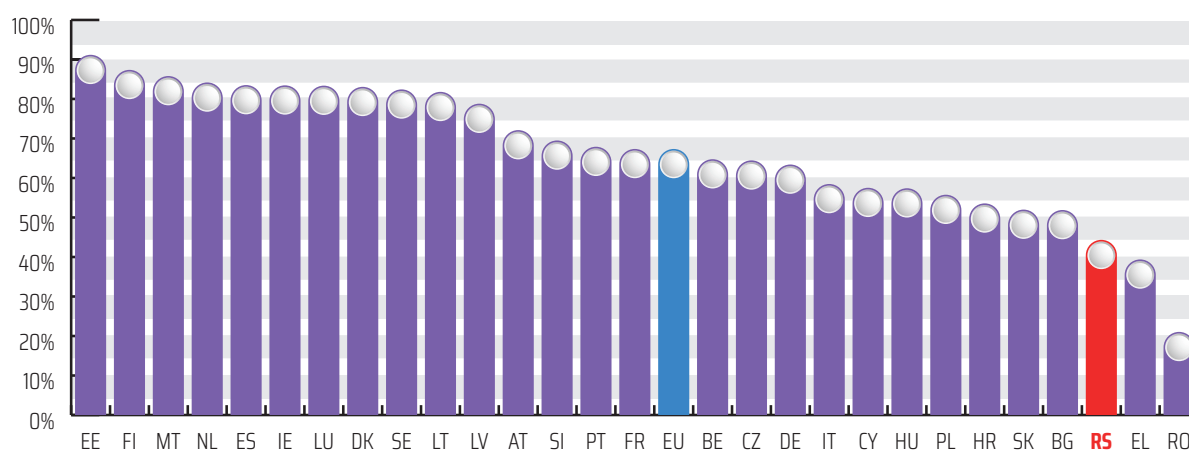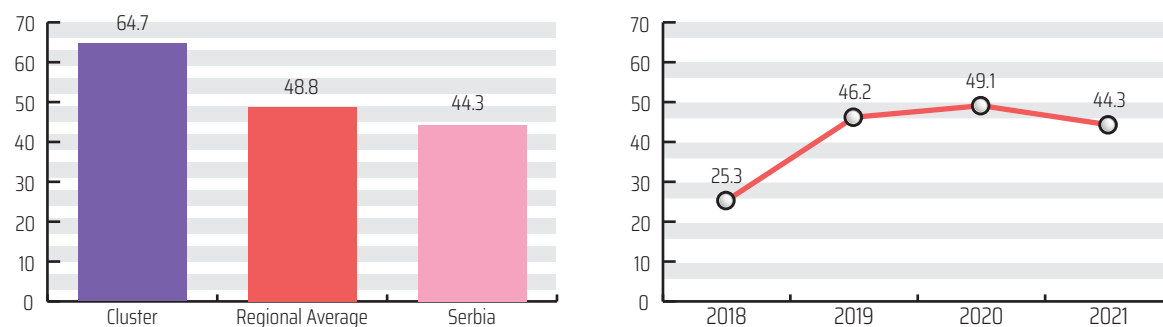
Figure 3.16. **Overview of compared values for the Digital Public Services dimension**

Despite slightly improved results in Digital Public Services dimension, Serbia remains among the least successful countries in tis dimension in Europe. This is mainly due to low values of e-Government-related indicators, indicating the level of sophistication of public administration services available online.

Serbia is below EU average for most indicators in this dimension, except for the Open data indicator where it scored high. Open data indicator is a composite indicator, indicating the degree to which a country applies open data policy, and also political, social and economic impact of open data, along with the characteristics of the national data portals (functionality, availability and usage). The values of individual indicators under Digital Public Services dimension for Serbia are given below.

Digital Public Services Indicators	Serbia	Min	Max
4a1 e-Government users (submitting filled out forms via Internet)	20.6%	0%	100%
4a2 Pre-filled forms	48	0	100
4a3 Digital public services for citizens	57	35	100
4a4 Digital public services for businesse	75	40	100
4a5 Open data	57.1%	0%	100%

Source: RATEL, Statistics Office

# PUBLIC FIXED TELECOMMUNICATIONS NETWORKS AND SERVICES

4

At the end of 2020, there were 24 operators registered for the public telephone service provision over fixed-line network.

In 2021, Telekom Srbija had approximately 2% of subscribers less than in the previous year, but it remained the biggest public fixed telecom network operator and its business activities had the largest impact on the fixed telephony market in 2021. In the region, Telekom Srbija is present in the markets of Republika Srpska and Montenegro. The operator SBB is the second largest fixed-line operator according to the number of subscribers, with 6% more subscribers in respect to the previous year.

Market shares of pubic fixed telecom service operators via fixed network measured in terms of the number of telephone lines is given in figure 4.1.

Figure 4.1. Market shares of pubic fixed telecom service operators via fixed network

Sat-Trakt 2.2%
Other 0.4%
Telenor 0.4%
SBB 20.5%
Orion telekom 0.7%
Telekom Srbija 75.8%
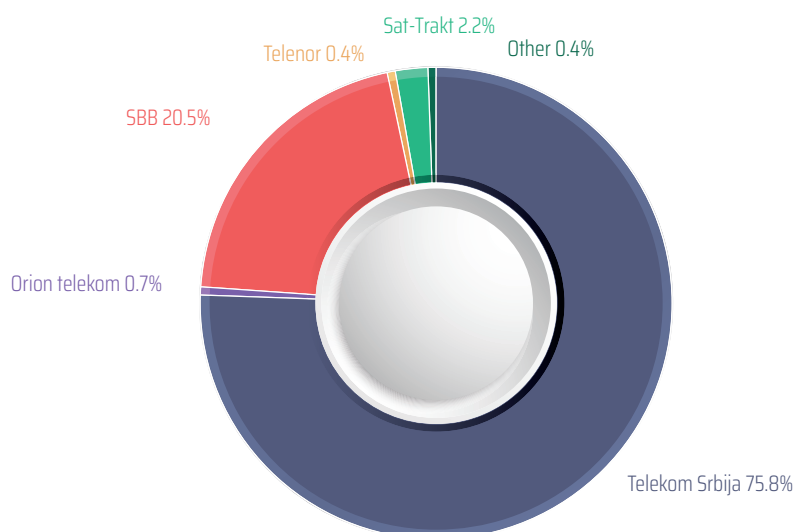
Source: RATEL

The number of fixed line subscribers continued to sightly decrease, amounting to 2.37 million at the end of 2021. The number of subscribers also includes users of electronic communications services provided at a fixed location via public mobile networks (Cellular Local Loop - CLL) by Telekom Srbija and A1 Srbija, which take up 0.4% of the total number of subscribers in 2021. Residential users are still dominant, with 87% share in the total number of users. In 2021, the digitalization rate was 99.99% in Telekom Serbia's network, whereas all other operators have a 100% digitalization rate. The number of payphones continued to decrease, amounting to 2 082 in 2021.

Figure 4.2. Number of fixed network subscribers (million)
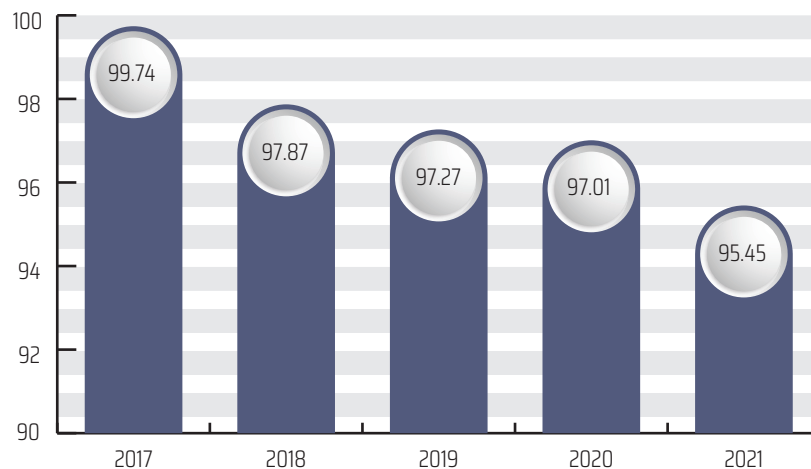

Source: RATEL
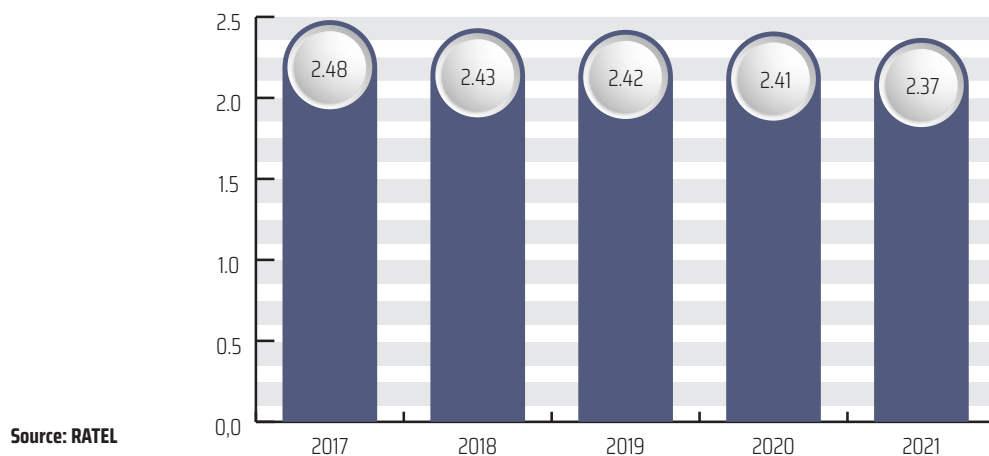
The share of business subscribers in 2021 was approximately 13%. The trend over the past years is shown in Figure 4.3..

Figure 4.3. Number of business subscribers (in thousands)
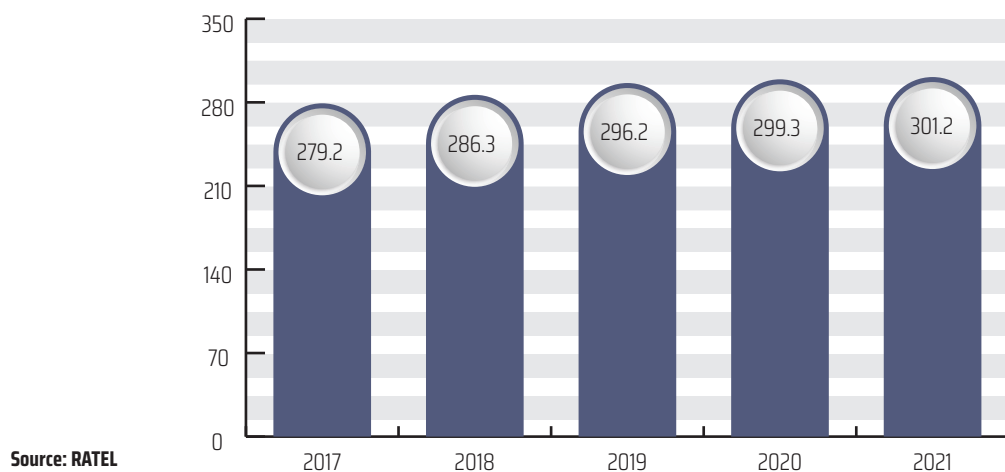
Source: RATEL

Fixed telephony penetration rate, in terms of households, was 95.5% in 2021, as given in Figure 4.4.

**Figure 4.4. Fixed line penetration rate –households**

Source: RATEL

The number of ISDN subscribers in 2021 was approximately 17.5 thousand, which is by 15% less year on year. 8% of ISDN subscribers have primary rate access, whereas other users have a basic rate access. As expected, ISDN connections are following a downtrend, due to technological migration of users to advanced IP-based technologies.

The total traffic over fixed network in 2021 decreased by approximately 18% year on year, the national traffic being estimated to 2.42 billion of minutes and the international traffic to 138 million of minutes. The decrease seen in the total national traffic mainly due to increase in traffic toward other fixed networks, whereas international traffic, with 13% of minutes less than in the previous year, continues to drop due to the increasing trend of using VoIP applications.

Figure 4.5. Total traffic (in hundreds million minutes)
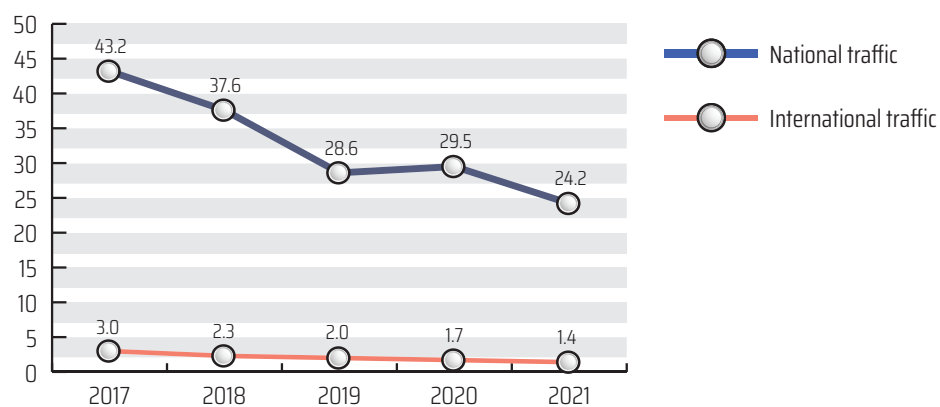
Source: RATEL

The biggest share in the total traffic still goes to the traffic made within the same network (64.9%), whereas the smallest share goes to the traffic made to non-geographic numbers and short codes (1.1%). Fixed network traffic distribution in 2021 is given in figure 4.6. The traffic made to non-geographic numbers and short codes includes both minutes made within the same network and to other networks, whereas international traffic includes outgoing international traffic from fixed network to other fixed and mobile networks and incoming international traffic made to fixed network..

Figure 4.6. Fixed network traffic distribution in 2021

1.2%
To non-geographic and short codes

5.4% International traffic

8.4%
To mobile networks

20.1%
To other fixed networks

NATIONAL TRAFFIC

64.9%
Within the same network
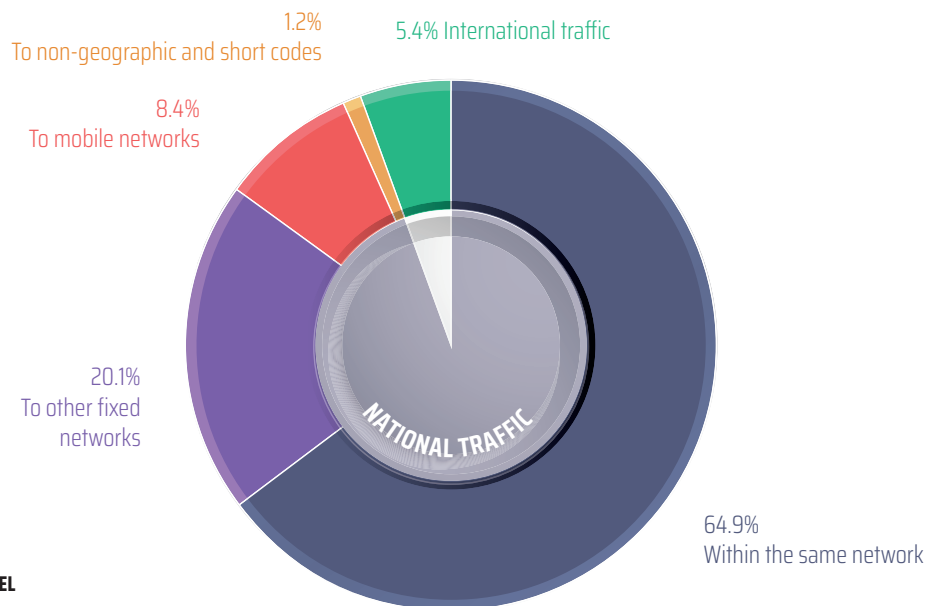
Source: RATEL

The average call duration was 4.43 minutes for a call made within the same network, 1.92 minutes for a call made to mobile network and 5.08 minutes for an international call.

The total number of VoIP operators at the end of 2021 was approximately 19 thousand, which is a 39% decrease year on year. There were 3.6 million of minutes of traffic and there were 185 million minutes of international transit.

Per-minute rates for the local and national calls and for calls to mobile networks of the operators with the biggest number of subscribers are given in Figure 4.7. The rates ranged between 1 and 1.9 dinars per minute for fixed-line calls, and between 8 and 10 dinars per minute for the calls made to mobile networks.

Figure 4.7. Fixed-line calls and fixed-to-mobile telephone service rates in 2021 VAT included (RSD)
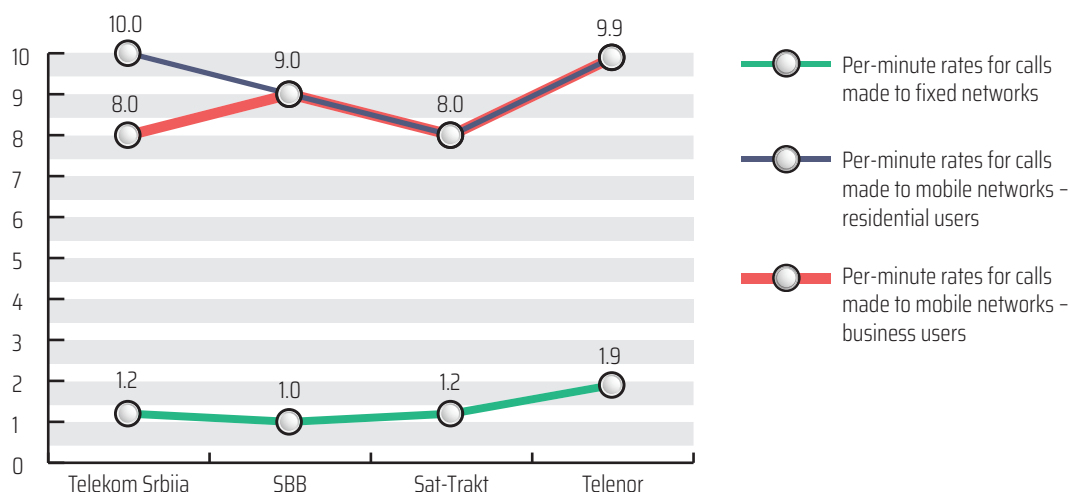
Source: RATEL

The rates for the international calls have not been significantly modified compared with the previous year. The information on the rates is available on the official websites of the operators.

The revenues from fixed telephone services provided by all operators registered for this service in the territory of the Republic of Serbia in 2021 were somewhat lower compared to the previous year, amounting to 27.4 billion dinars, including the revenues made from VoIP services in the amount of 4.2 billion dinars. The investments made in the fixed telephony services in 2021 amounted to approximately 15.8 billion dinars, which is an increase in respect to the previous year.

Figure 4.8. Revenues from fixed telecom networks and services (billion dinars)
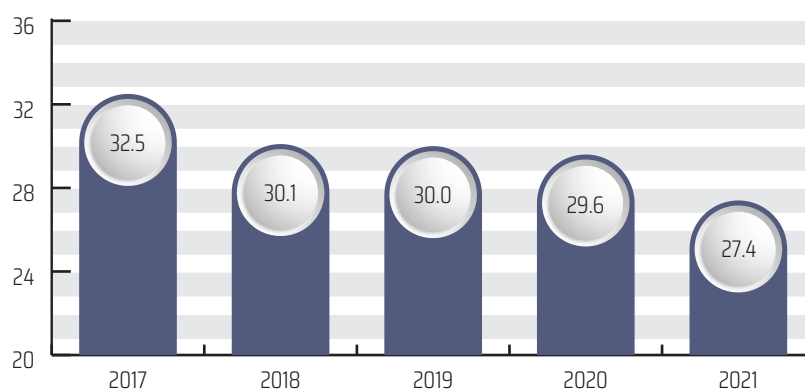
Source: RATEL

Despite being lower that in the previous year, the subscription charges, in the amount of 12 billion dinars, still have the largest share in the total revenues, accounting for almost one half of total fixed network service revenues in 2021, without revenues from VoIP. The revenues made from the national traffic, in the amount of 2.3 billion remained the same, while the revenues made from the international traffic, in the amount of 0.5 billion, are lower compared with the previous year following and have a smaller share in the total revenues. The decrease in the number of minutes of international traffic is the result of the decrease in the number of subscribers and minutes of traffic made. The revenues from interconnection dropped slightly, whereas the revenues from interconnection in the international traffic somewhat increased.

Figure 4.9. Structure of revenues from fixed telecom network in 2021

15%
Income from the use of fixed access networks

3%
Other revenues from public voice service provision

13%
Interconnection in the international traffic

6%
Interconnection in the national traffic

2%
International traffic

10%
National traffic

51%
Subscription charge

Source: RATEL
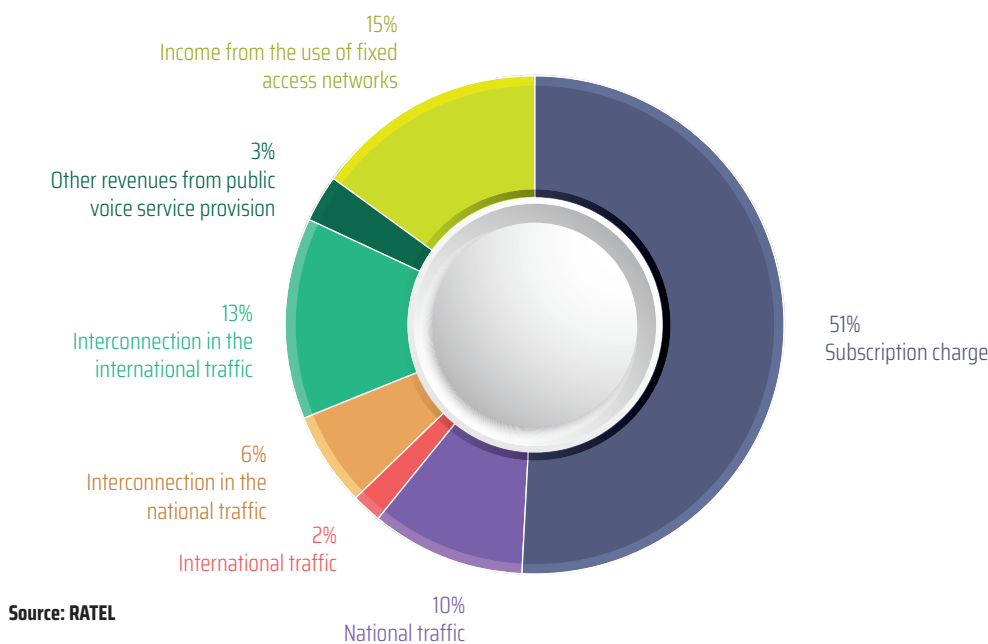
Other revenues from public voice service provision include revenues from special services on fixed network (call identification, call on hold, call diverting, etc), revenues from connection fees, value added services - VAS, public payphones, etc. Revenues from fixed access network include revenues from data transmission, leased capacities on national market, international data transmission and leased capacities, LLU (full or shared), co-location, leased cable ducts, etc.

There are no significant changes in the share of residential and business users in the revenues from subscription charge and traffic made, as shown in Figure 4.10.

Figure 4.10. Share of residential and business users in the revenues made from subscription charge and traffic made
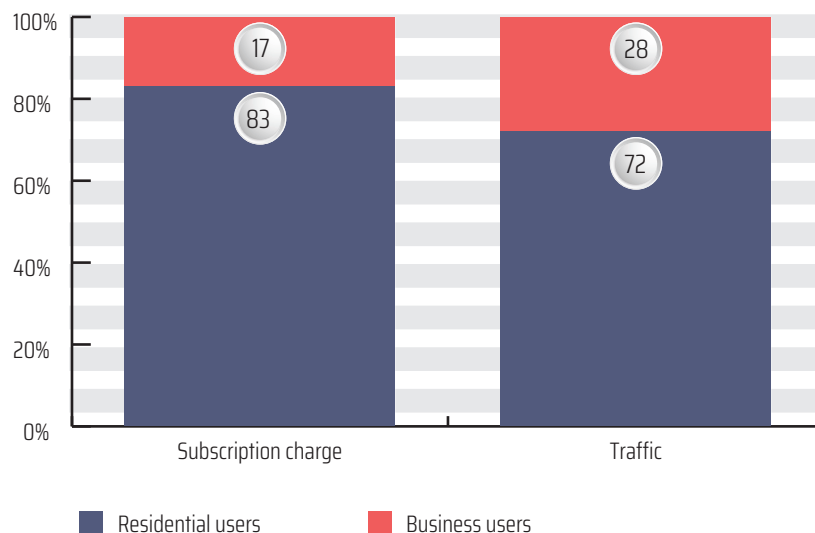
Izvor: RATEL

The interest for the number portability service on public fixed telephone networks is slightly decreasing. In 2021, the monthly average of ported numbers was 1 126.

Figure 4.11. Monthly average of ported numbers each year
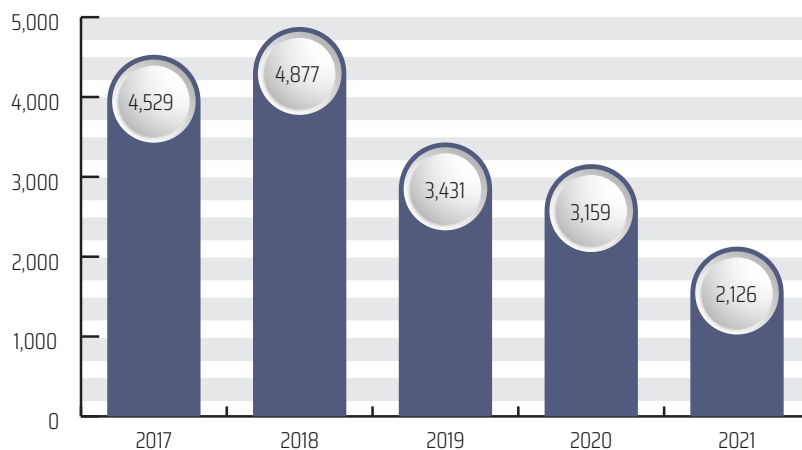
Source: RATEL

During 2021 there were 25 513 fixed line subscribers who changed the operator while keeping the same number, so that the total of ported numbers amounted 401 157 at the end of 2021 (Figure 4.12).

Figure 4.12. Portings made each year and in total
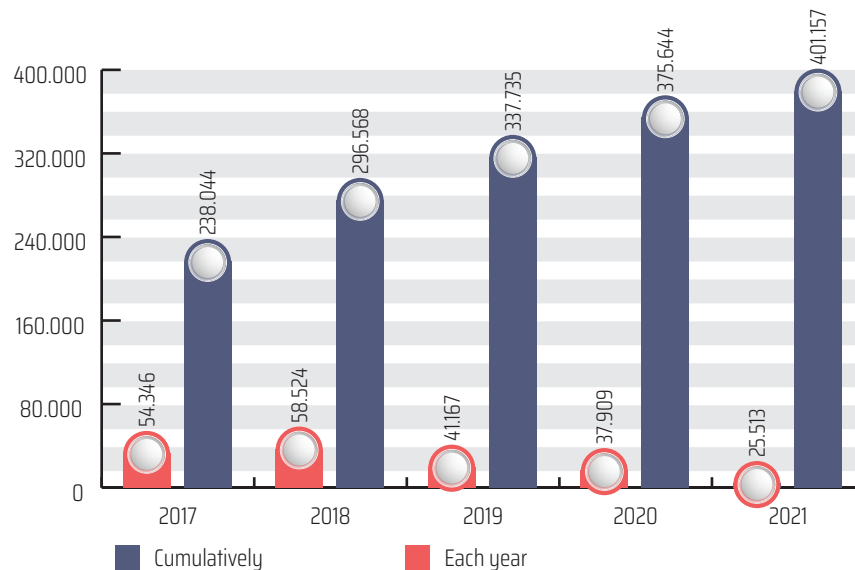
Source: RATEL

Leased Lines

Leased lines are a significant part of the market of electronic communications, being the essential means for service provision for some operators, as transport infrastructure. Also, big business users (as end-users) use leased lines to connect remote branches and to enable various data transmission.

Leased lines are a particular type of closely defined and transparent transmission capacities, which should not require any additional synchronisation to be made by the users (operators) when leasing lines. Leased line may be defined as a fixed "reserved" line, implying a constant guaranteed symmetrical transmission i.e. equal download/upload speeds, regardless of the type of user (operator or end user).

Leased lines can be provided by using different technologies and transmission media, such as: fiber-optic cables, radio links, copper pairs, etc. and can be both analogue and digital. The service satisfies user needs for a reliable high-quality transmission capacity with symmetrical and stable guaranteed speed rates and it is often offered, especially to business users, together with services such as VPN, direct high-speed Internet access, VoIP, connections with data centres and customer support centres, etc.

According to available data, leased lines service was provided by 39 operators in Serbia in 2021 and the total number of national and international leased lines was 3 973, while national lines accounted for 98.5% of the total in 2021.

Figure 4.13. Total number of leased lines over years
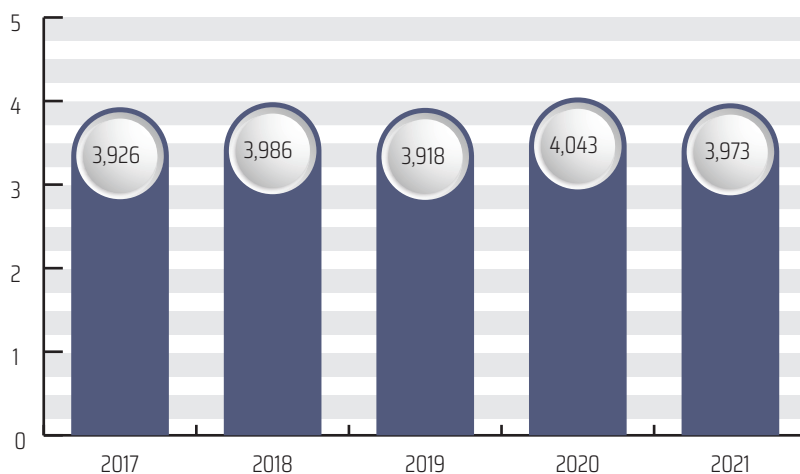
Source: RATEL

As for technologies, most national leased lines are Ethernet based, 32% in 2021. The share of traditional digital lines remained unchanged, whereas the share of analogue lines increased, and the number of lines based on xWDM and VPN increased as well. Since 2018 data are being collected on VPN end-user service, which is an equivalent of the traditional leased lines service in terms of high-quality access provision, and which has a 17% share in the total number of lines.

Analogue leased lines account for almost one quarter of leased national lines. This service is no longer available to new users and its presence is a result of valid contracts on lease closed for a period of 5 to 10 years.

Figure 4.14. Distribution of national leased lines according to access type
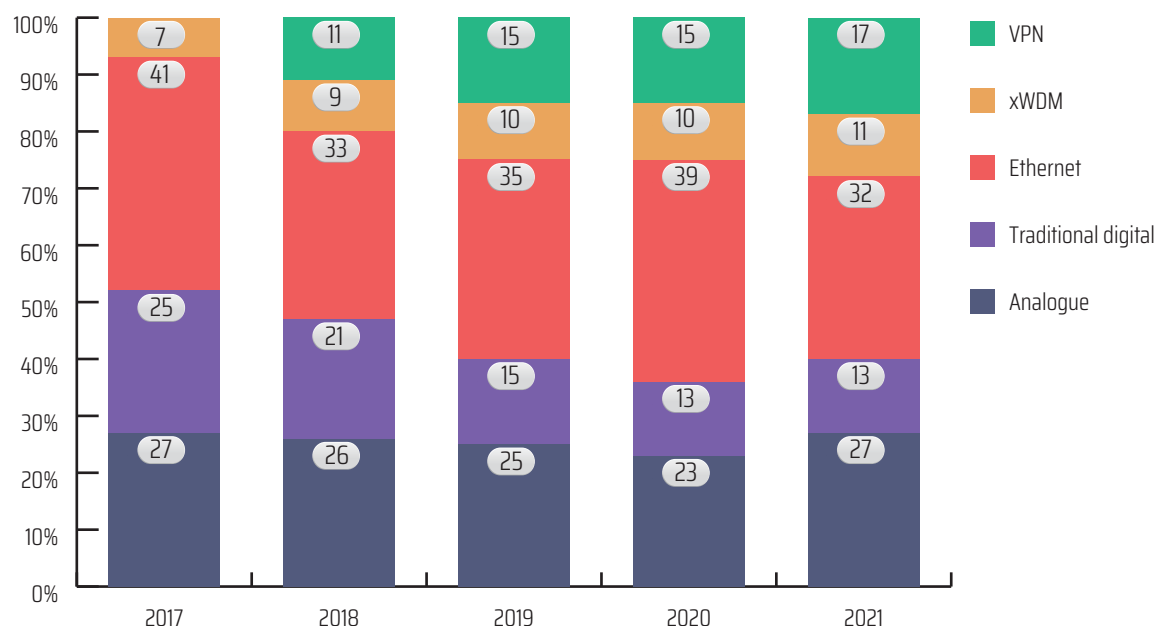
Source: RATEL

In terms of speed, the most common national line transmission technologies in 2021 are Ethernet 100 Mbit/s lines with 48% share (cf. 31% in 2020), followed by Ethernet 10 Mbit/s lines with 35% share. The least common are Ethernet 500 Mbit/s with 6% share and up to 1 Gb/s lines with 4% share, while 10 Gb/s lines have a 7% share.

Figure 4.15. Distribution of Ethernet national leased lines according to speed in 2021
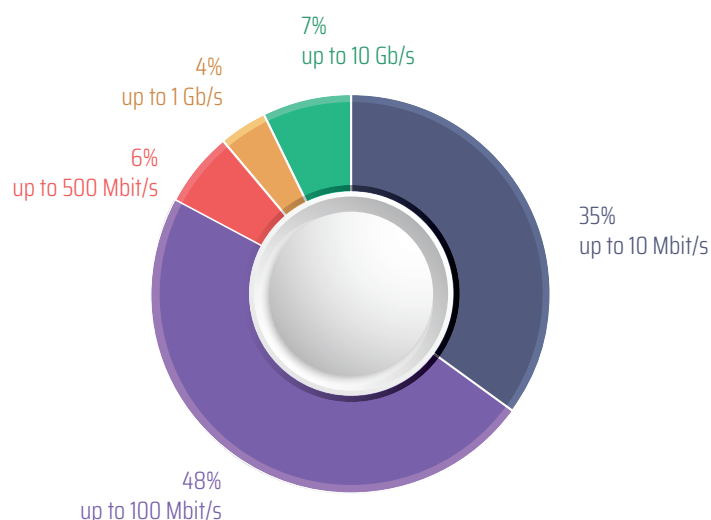
Source: RATEL

Leased lines is a service used by business users (companies, organizations, institutions and public authorities) that need to connect several units at different locations, in order to ensure an uninterrupted data transmission. The service is also used by operator users to build and to connect their own network, to connect it to the networks of other operators and to provide retail service to their own end users.

The total revenues made from the national and international leased lines in 2021 were approximately 1.18 billion dinars, which is a 17% increase compared to the previous year. The share of revenues made from international lines in the total revenues is 16%.

Figure 4.16. Revenues made from leased lines in 2021 (million dinars)
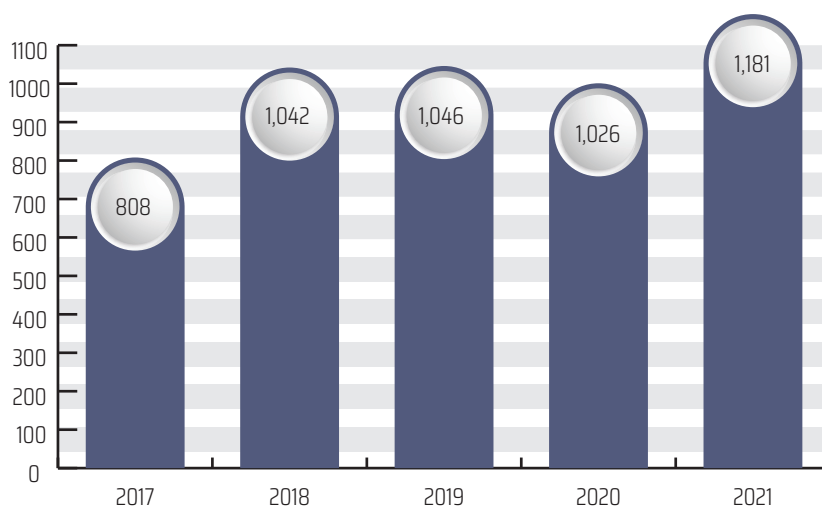
Source: RATEL

PUBLIC MOBILE TELECOMMUNICATIONS NETWORKS AND SERVICES

5

Mobile telephony services in the Republic of Serbia were provided by the following three operators in 2021:

- **Telecommunications Company Telekom Srbija Joint Stock Co. - Mobilna telefonija Srbije MTS**, 58.11% owned by the Republic of Serbia – the Government of the Republic of Serbia, 20% owned by Telekom Srbija, 14.95% owned by the citizens of the Republic of Serbia and 6.94% owned by the current and former employees of Telekom Srbija and its predecessor;
- **Telenor Ltd., Belgrade**, 100% owned by PPF TMT Bidco 1 B.V., the Netherlands;
- **A1 Srbija Ltd.**, 100% in the ownership of Mobilkom CEE Beteiligungsverwaltung GmbH, Austria.

In addition to the network operators, in 2021 there were two registered virtual mobile operators as well: **Mundio Mobile Ltd.** and **Globaltel Ltd.**

The three network operators were using parts of the following RF bands on technologically neutral basis, based on the individual licences for RF usage issued upon public bidding procedure:

- 791-821/832-862 MHz;
- 890-915/935-960 MHz;
- 1710-1780/1805-1875 MHz;
- 1900-1915 MHz (ovaj opseg operatori još uvek ne koriste);
- 1920-1980/2110-2170 MHz.

The operators were using GSM (2G), UMTS (3G) and LTE (4G) technology for commercial use.

The licences for 900 MHz i 2100 MHz RF bands were issued in 2006 for the territory of the Republic of Serbia, for a period of 10 years, and in 2016 they were duly amended and extended for another 10 years.

In early 2015, the public bidding procedure for the issuance of individual licences for the usage of radio frequencies in the 1710-1785/1805-1880 MHz frequency bands, in which all three operators had participated, was completed. In March 2015, individual decisions were awarded to all three operators, granting the usage of two 5 MHz-radio frequency blocks, each, valid until March 2025 with the possibility of a 2-year extension.

In the second half of 2015, public bidding procedure for the issuance of individual licences for the usage of radio frequencies in the 791-821/832-862 MHz frequency bands in the territory of the Republic of Serbia, in which all three operators had participated, was successfully carried out. Upon the completed procedure, in January 2016 individual decisions were awarded to all three operators, granting the usage of two 10 MHz-radio frequency blocks, each, in the 791-821/832-862 MHz frequency bands, valid until 2026 with the possibility of a 5-year extension.

Telekom Srbija Joint Stock Co. has been providing mobile telephony services since 1998. In addition to the Serbian market, Telekom Srbija is also present as a mobile operator in the region, in Bosnia and Herzegovina and Montenegro through associated companies.

Telenor Ltd. has been in the Serbian telecoms market since 2006, when it purchased the company Mobi63 (ex Mobitel) established in 1994. In 2018 the ownership structured changed, since Telenor Group sold to PPF Group its business in Central and Eastern Europe, consisting of subsidiaries in Bulgaria, Hungary, Serbia and Montenegro and Telenor Common Operation Serbia. As part of the regional transaction, PPF Group purchased 100% of shares in Telenor Ltd.

A1 Srbija Ltd. is a member of the Telekom Austria Group, present in 7 European countries, including the following countries in the region: Croatia, Bulgaria and Macedonia. A1 Srbija has been present in the Serbian market since 2006.

Based on the set of entry data on active base stations within the network received from operators Telekom Srbija Joint Stock Co., Telenor Ltd. and A1 Srbija Ltd., by applying RATEL's prediction model, the following data are presented for each operator:

- Qualitative overview of active base radio stations/repeaters/WiFi AP (Table 5.1.);
- Comparative overview of territory and population coverage by technologies, in percentage (Table 5.2.);
- Graphic presentation of mobile telephony signal coverage for GSM technology (Fig. 5.1.);
- Graphic presentation of mobile telephony signal coverage for UMTS technology (Fig. 5.2.);
- Graphic presentation of mobile telephony signal coverage for LTE technology (Fig. 5.3.).

Table 5.1. **Qualitative overview of active base radio stations/repeaters/WiFi AP as on 31.12.2021.**

		Telekom Srbija	Telenor	A1 Srbija
	I			
1.	Total number of active sites with mobile telephony base stations	2895	2279	2311
2.	Raw land sites (RL) (freestanding land polls) with base stations	1715	1294	1327
3.	Rooftop sites (RT) (antenna systems on buildings and masts on buildings) with base stations	1119	927	914
4.	Indoor sites with base stations	51	34	35
5.	RT + indoor sites	10	24	35
	II			
6.	ADAS indoor	5	5	4
7.	DAS indoor	51	52	65
8.	ADAS + DAS indoor	5	1	1
	III			
9.	2G base station sites (all frequency ranges)	2268	2217	2220

10.	2G 1800 network base stations	2	7	156
11.	2G 900 network base stations	2107	2169	1839
12.	2G 900 + 2G 1800	159	41	225
	IV			
13.	3G network base stations	2833	2273	2297
14.	3G 2100 network base stations	2796	59	2290
15.	3G 900 network base stations	18	620	2
16.	3G 900 + 3G 2100 network base stations	19	1594	5
	V			
17.	4G network base stations	2822	2220	2305
18.	4G 800 network base stations	897	642	481
19.	4G 1800 network base stations	73	41	78
20.	4G 2100 network base stations	0	2	0
21.	4G 800 + 4G 1800 network base stations	1334	620	794
22.	4G 800 + 4G 2100 network base stations	2	3	0
23.	4G 1800 + 4G 2100 network base stationsradio-frekvencijski opsezi)	6	21	36

24.	4G 800 + 4G 1800 + 4G 2100 network base stations	510	891	916
	VI			
25.	Indoor repeater sites	734	385	511
26.	Indoor 2G repeater sites	76	2	65
27.	Indoor 3G repeater sites	274	25	124
28.	Indoor dual repeater sites (2G + 3G)	212	221	9
29.	Indoor 4G repeater sites	3	3	0
30.	Indoor dual/triple repeater sites (2G + 3G/4G)	169	134	313
	VII			
31.	Outdoor repeater sites (only remote if different from donor)	14	26	0
	VIII			
32.	WiFi sites	1268	15	0
33.	Indoor WiFi sites	462	0	0
34.	Outdoor WiFi sites	554	14	0
35.	Indoor + outdoor WiFi sites	252	1	0
	IX			
36.	2G 900 base radio stations	2266	2232	2064
37.	2G 1800 base radio stations	161	48	381
38.	3G 900 base radio stations	37	2223	7
39.	3G 2100 base radio stations	2815	1681	2295
40.	4G 800 base radio stations	2743	2161	2191
41.	4G 1800 base radio stations	1923	1595	1824
42.	4G 2100 base radio stations	518	922	952
43.	WiFi AP	2948	15	0
44.	Indoor WiFi AP	1943	1	0
45.	Outdoor WiFi AP	1005	14	0
46.	Indoor repeaters	1125	495	511

47.	Outdoor repeaters	14	35	0
X				
48.	Optic to the base stations	1652	803	845
49.	Single microwave connection to optical transmission point	882	797	654
50.	Multiple microwave connection to optical transmission point	361	679	812

Table 5.2. Comparative overview of territory and population coverage by GSM/UMTS/LTE technologies (%)

Name	Telekom Srbija	Telenor	A1 Srbija
Percentage of territory covered by 2G network signal	91.89 %	87.23 %	89.08 %
Percentage of population covered by 2G network signal	99.26 %	98.77 %	99.02 %
Percentage of territory covered by 3G network signal	77.89 %	88.72 %	75.85 %
Percentage of population covered by 3G network signal	96.92 %	98.99 %	96.72 %
Percentage of territory covered by 4G network signal	84.51 %	74.86 %	73.93 %
Percentage of population covered by 4G network signal	98.19 %	96.43 %	95.97 %

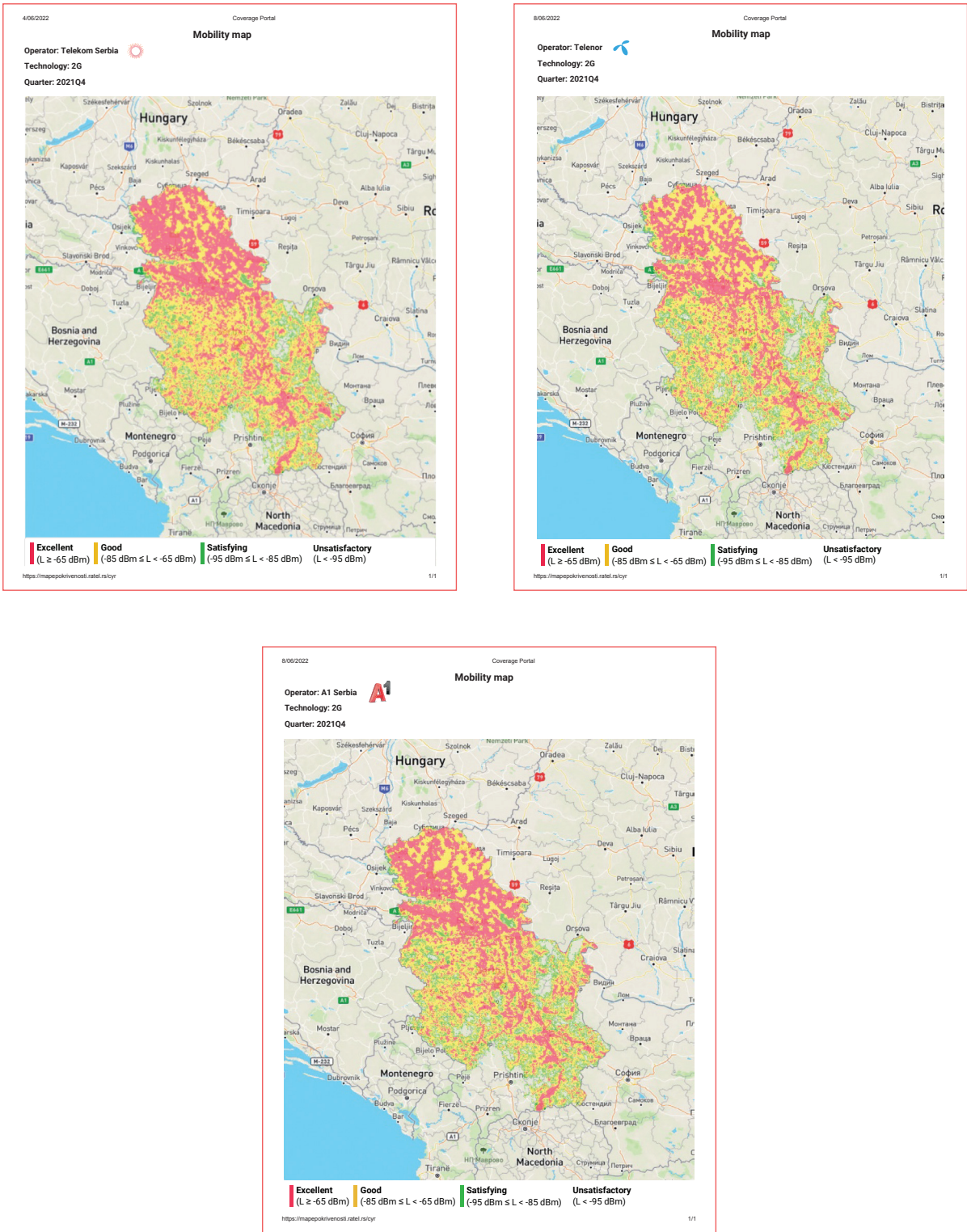**Figure 5.1.** Graphic presentation of mobile telephony signal coverage for GSM technology

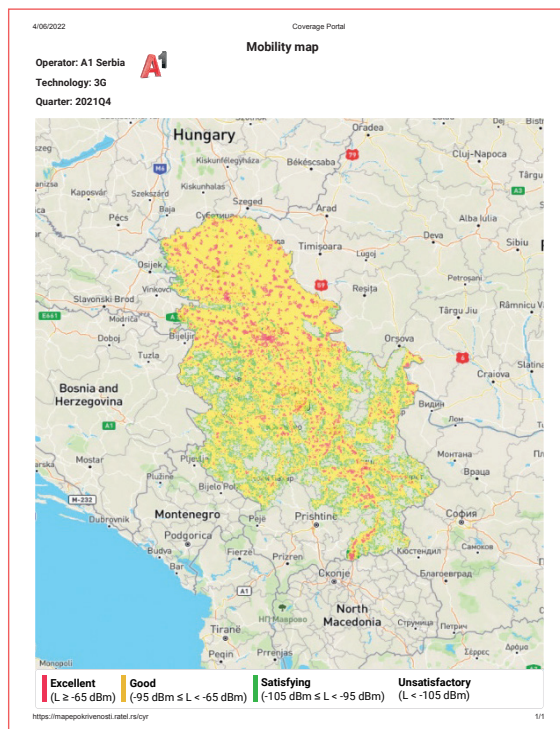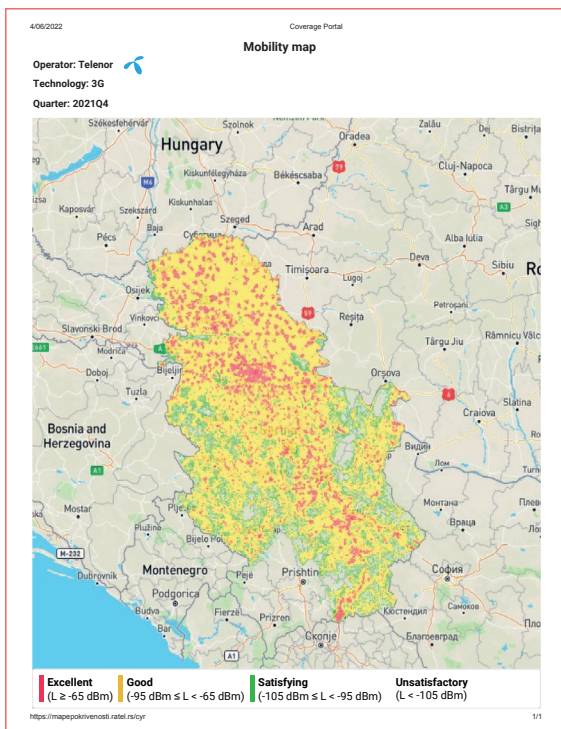**Figure 5.2.** Graphic presentation of mobile telephony signal coverage for UMTS technology
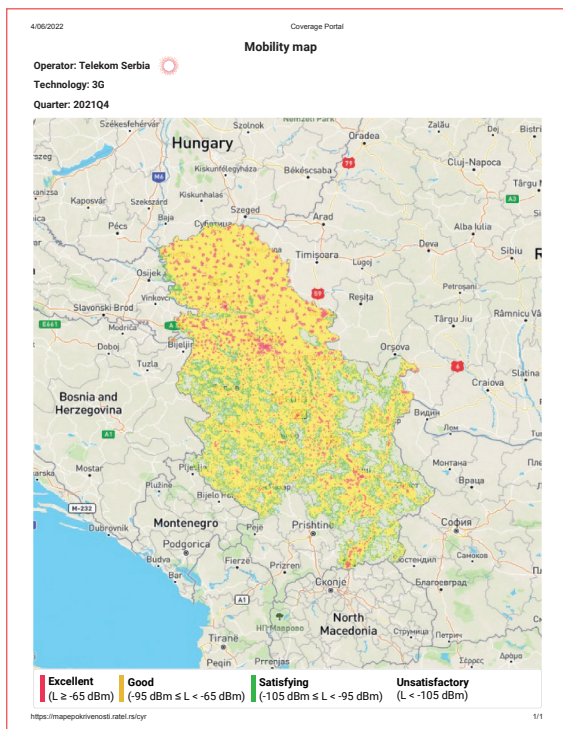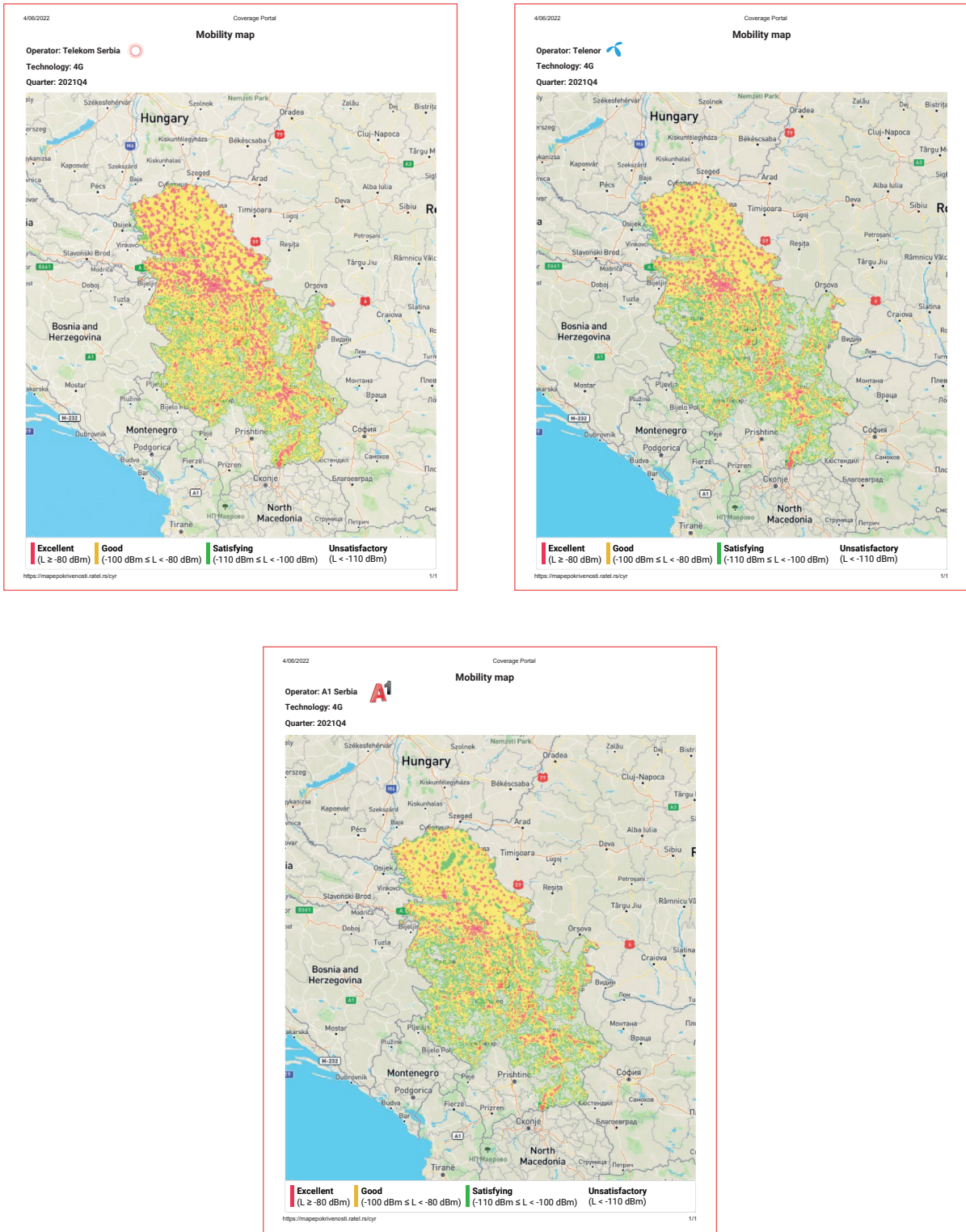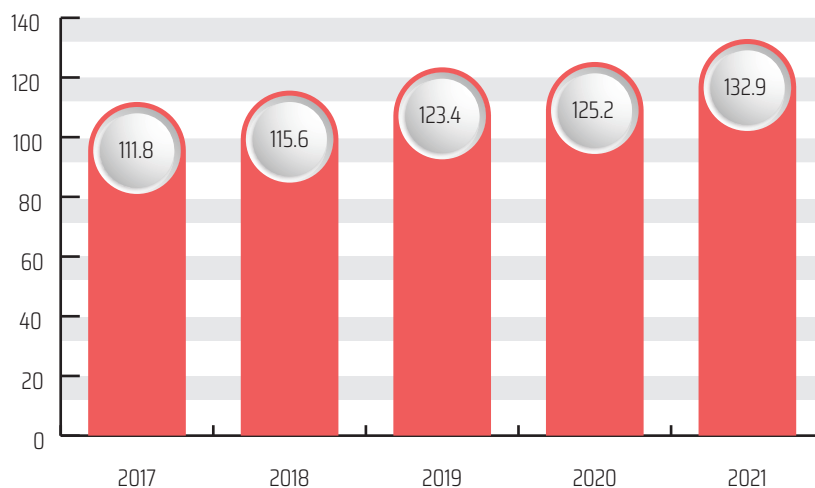
Figure 5.3. **Graphic presentation of mobile telephony signal coverage for LTE technology**

The revenues from mobile networks in 2021 amounted to around 132.9 billion dinars or 1.13 billion euro. Observed in the national currency (RSD) the revenues increased by 6.1% year on year.

Figure 5.4. The total revenues from the mobile telephony (RSD billion)

*Includes revenues from mobile data traffic, amounting to 5.6 billion RSD in 2021
Source: RATEL

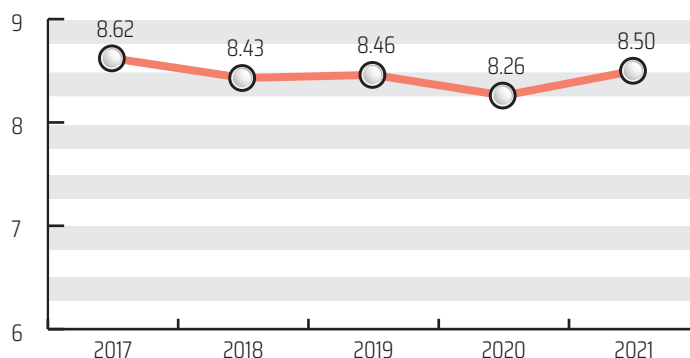Investments in this market segment increased by 35% compared with the previous year, amounting to 16.9 billion dinars.

The total number of mobile users decreased by 2.9% year on year, amounting to 8'501'519 at the end of 2021.

Figure 5.5. shows the trend in the total number of users over the previous period.

Figure 5.5. Total number of active mobile telephony users (million)

Source: RATEL

The total number of users involves postpaid and prepaid users active in the last three months of particular year. Distribution between prepaid and postpaid users is given in Figure 5.6. After a growth trend that lasted for years, in 2021 the postpaid user take-up dropped by 0.8%, amounting to 60.6%.

Figure 5.6. **Prepaid/postpaid user ratio**

Source: RATEL
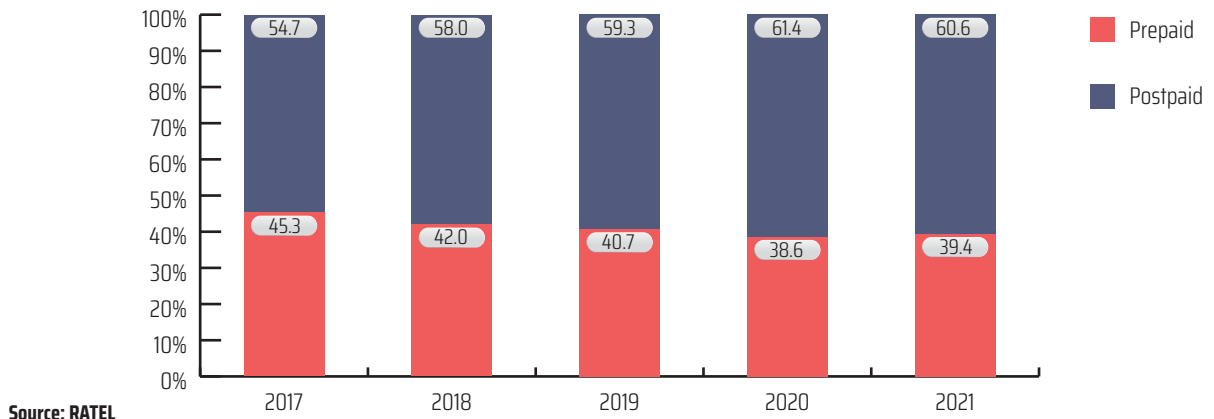
Residential and business ratio is given in Figure 5.7. Residential users are dominant in user structure over the years. In 2021 the share of residential users in the total number of users remained unchanged, with 83.8%.

Figure 5.7. **Residential/business user ratio**
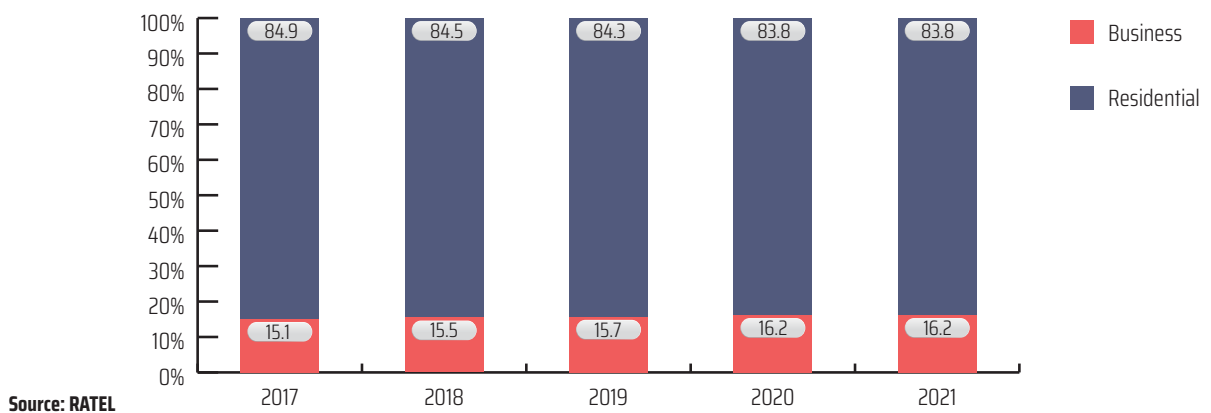
Source: RATEL

Figure 5.8. **Share of operators in the total revenues made from mobile telephony (%)**

0.07% Globaltel

27.78%
A1 Srbija

35.30%
Telekom Srbija

36.85%
Telenor
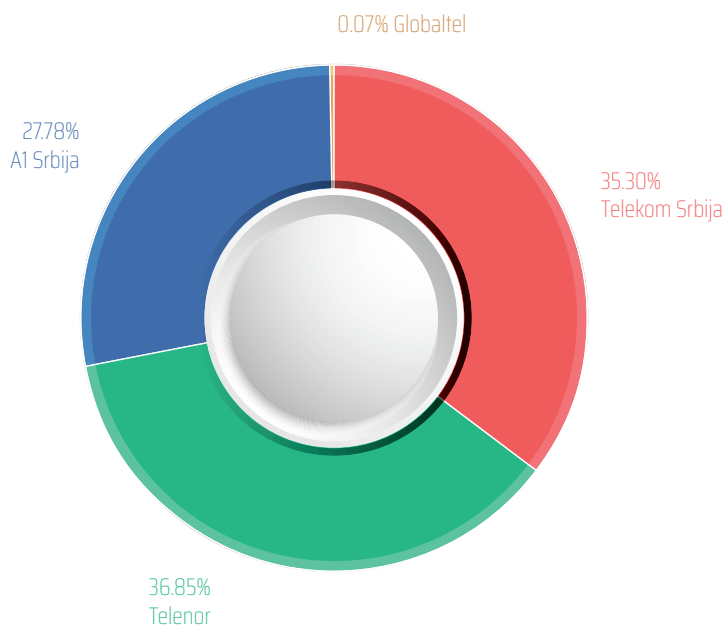
Source: RATEL

The number of mobile network users is again higher than the number of inhabitants in 2021, the mobile penetration rate being 123.72%, which means that some users are using more than one SIM card (Figure 5.9).

Figure 5.9. **Mobile penetration rate**
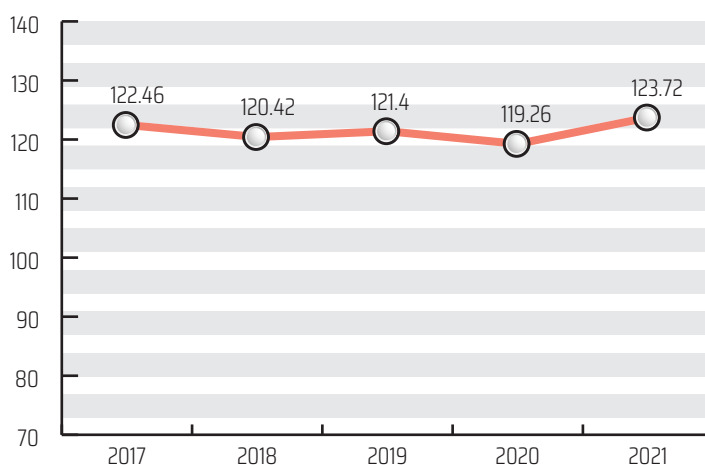
Source: RATEL

The minutes of calls made from mobile networks have been constantly increasing year after year. In 2021, the total outgoing traffic on the mobile network amounted to 21.03 billion minutes, which is an increase of 1.8% compared with the previous year when it amounted to 20.65 billion minutes.

The annual average of traffic per user in 2021 was 2473 minutes or approximately 6 minutes and 46 seconds a day.

Figure 5.10. Total outgoing traffic (billion minutes)
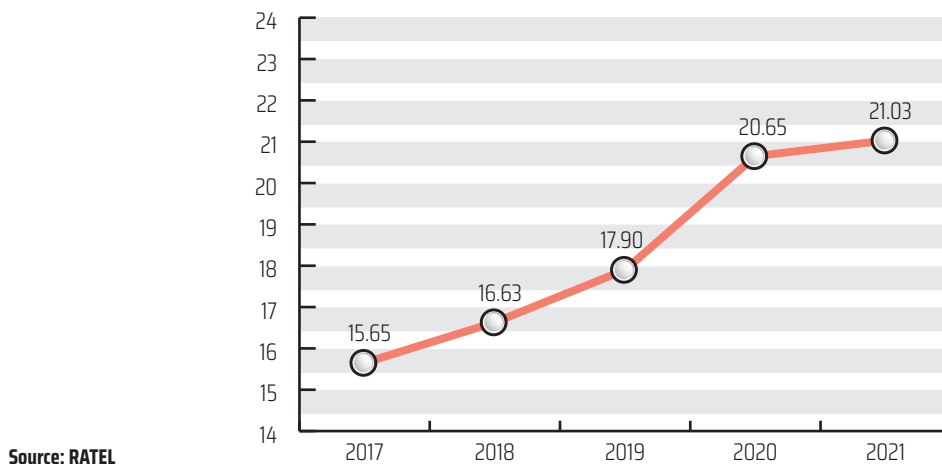
The number of sent text messages continued to decrease. In 2021, the total of 5.54 billion SMS messages were sent, which is a decrease by 5.1% compared with 2020 when 5.52 billion SMS messages were sent. The average number of text messages sent in 2021 per user was 616, or 1.7 SMS messages a day. In 2021, residential users accounted for 87% of SMS messages.

Figure 5.11. Number of sent text (SMS) messages (billion)
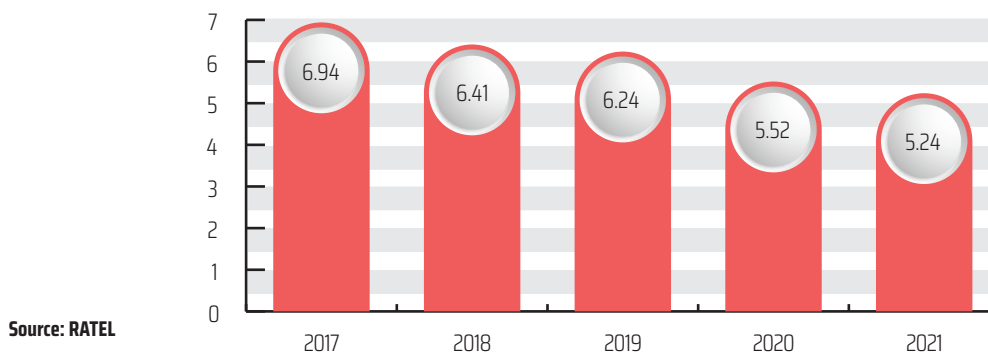
The number of MMS messages showed an increase for a fourth year in a row. In 2021, 14.56 million MMS messages were sent, which is a 12.6% increase in respect to 2020. In 2021, residential users accounted for 84.5% of MMS messages

Figure 5.12. **Number of MMS messages sent (million)**

Source: RATEL
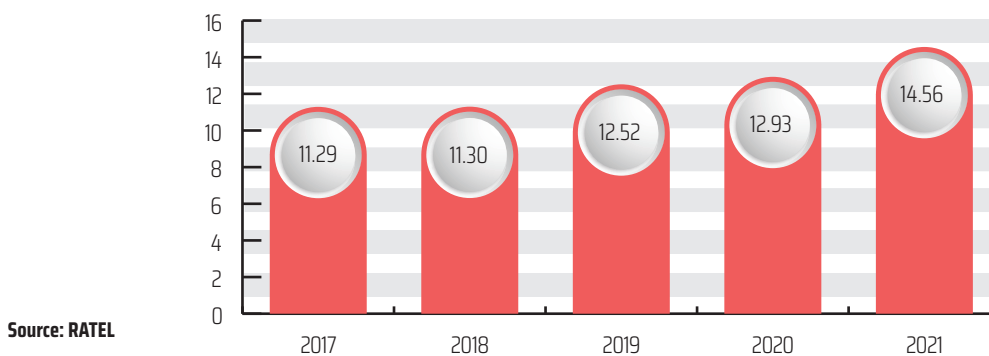
Data traffic has been constantly growing during the observed period (Figure 5.13). In 2021, the volume of the transmitted data increased by around 32%.

Figure 5.13. **Data traffic in TB (GPRS+UMTS+LTE)**
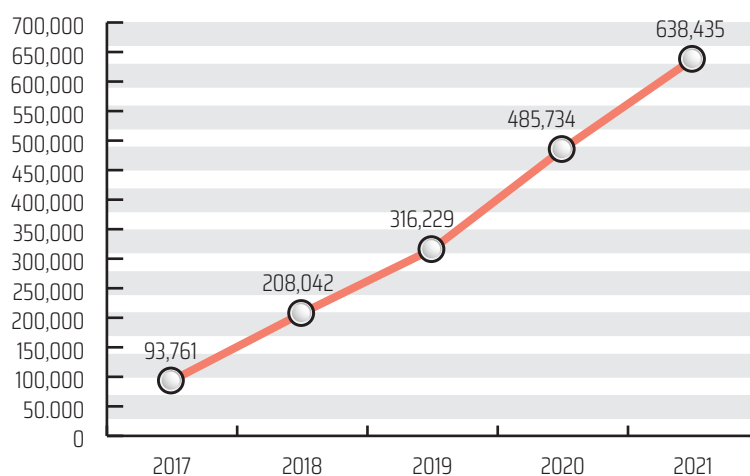
*As of 2016 data traffic over LTE network is also included.

Source: RATEL

Figures 5.14– 5.18 show market share of the mobile operators and MVOs in terms of total number of users, outgoing traffic, number of text and multimedia messages (SMS and MMS) sent and the volume of data traffic made.

Figure 5.14. **Share in terms of the number of users (%)**

0.8%
Globaltel

24.3%
A1 Srbija

43.4%
Telekom Srbija

31.5%
Telenor
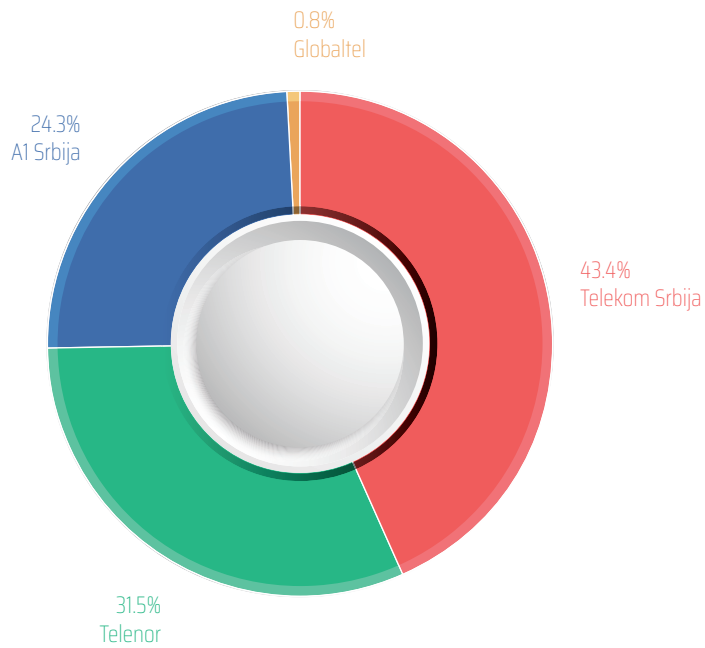
Source: RATEL

Figure 5.15. **Share in the total outgoing voice traffic (%)**

0.2%
Globaltel

28.2%
A1 Srbija

40.8%
Telekom Srbija

30.8%
Telenor
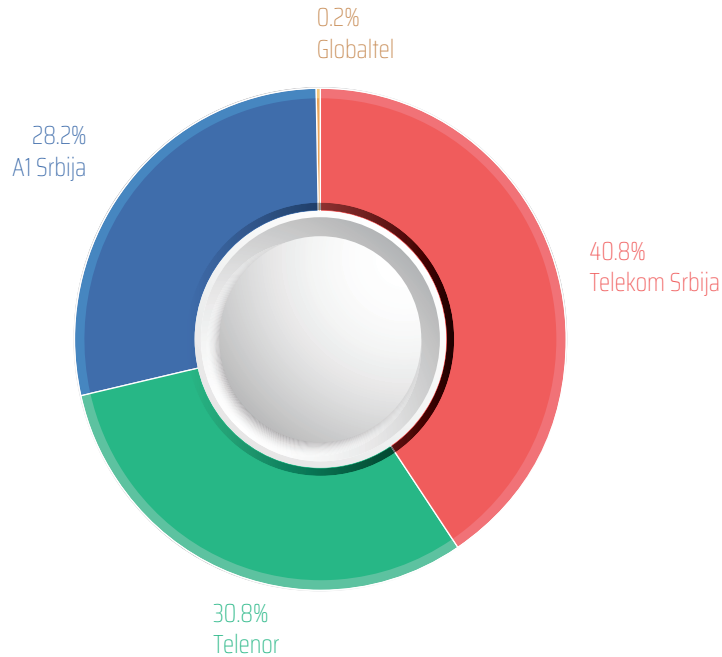
Source: RATEL

Figure 5.16. Share in the total number of sent SMS messages (%)

0.2%
Globaltel

27.9%
A1 Srbija

38.5%
Telekom Srbija

33.4%
Telenor
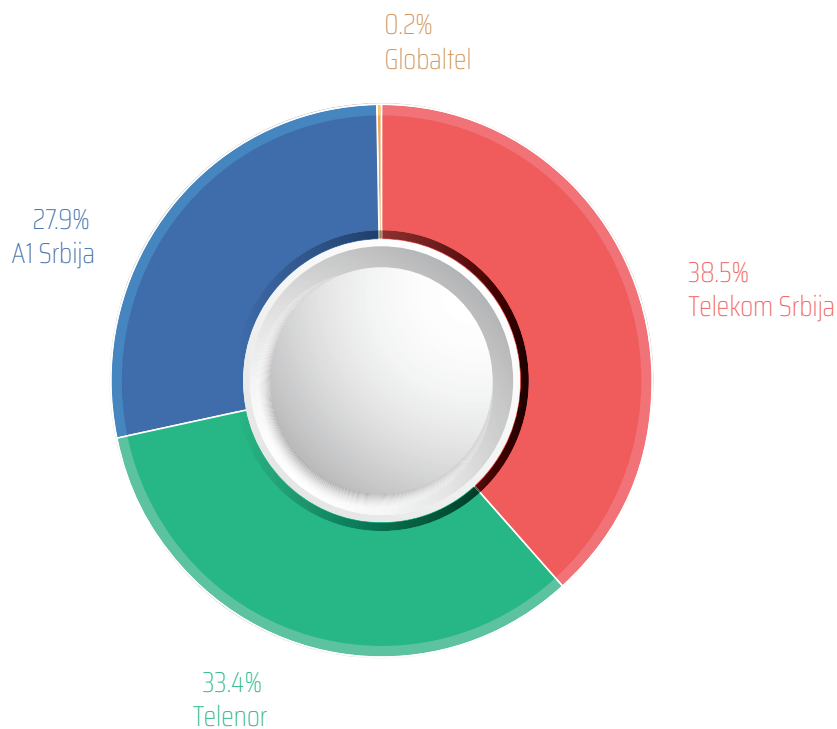
Source: RATEL

Figure 5.17. Share in the total number of sent MMS messages (%)

35.0%
A1 Srbija

34.5%
Telekom Srbija

30.5%
Telenor
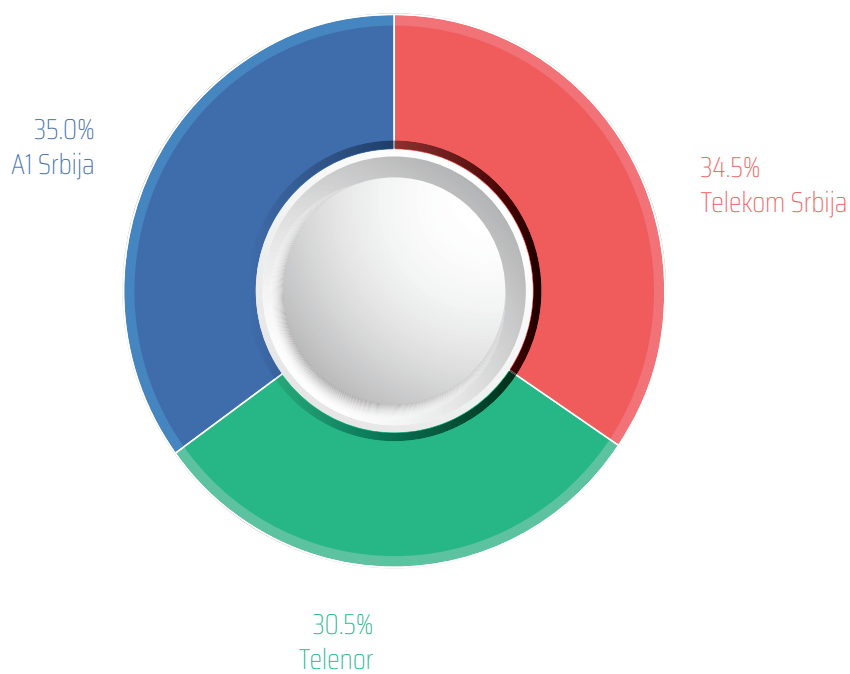
Source: RATEL

Figure 5.18. Share in data traffic (GPRS+UMTS+LTE) (%)

0.3%
Globaltel

25.9%
Telekom Srbija

38.9%
A1 Srbija

35.0%
Telenor
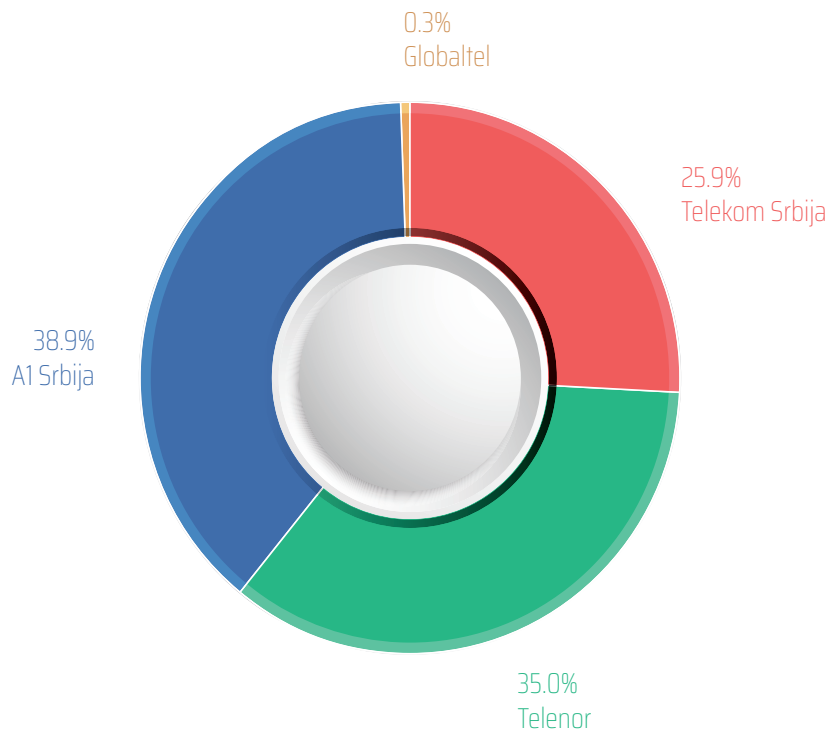
Source: RATEL

The competition in the mobile market can be estimated using the Herfindahl Hirschman Index (HHI). HHI is an indicator used for determining the degree of concentration of a given market and it is defined as the sum of the squares of the market shares of each individual market share. The market share was identified by the number of users.

Figure 5.19. HHI values
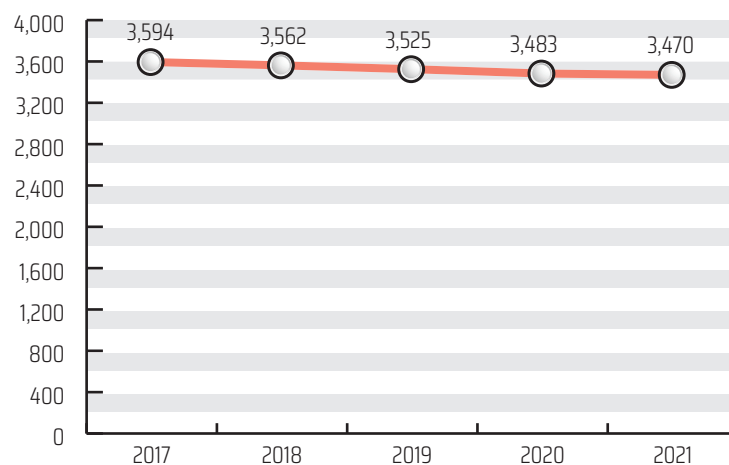
Source: RATEL

The value of HHI for 2021 was the lowest in the last six years, indicating a lower market concentration and increase in the level competition.

The average number of ported mobile numbers increased by 13% in respect to the previous year, with an average number of 9'045 ported numbers per month in 2021).

Figure 5.20. Average number of portings on mobile network a month for each year

Source: RATEL
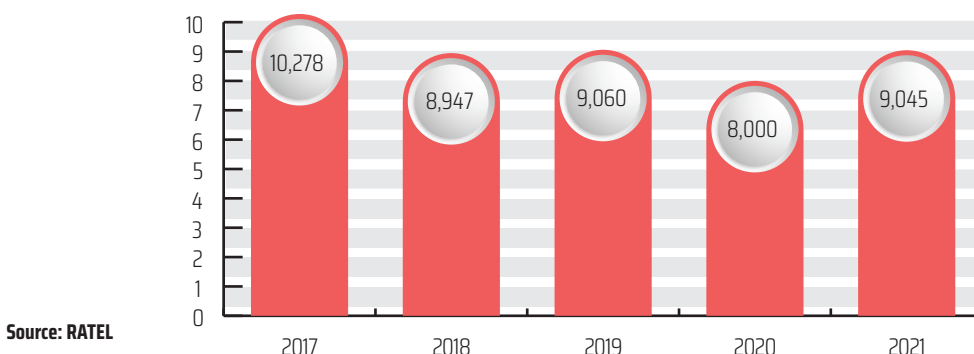
In 2021 there were around 108'550 portings on mobile networks, reaching the total of 1'084'514 portings made since the beginning of number portability service.

Figure 5.21. Number of portings on mobile network each year and in total

Source: RATEL
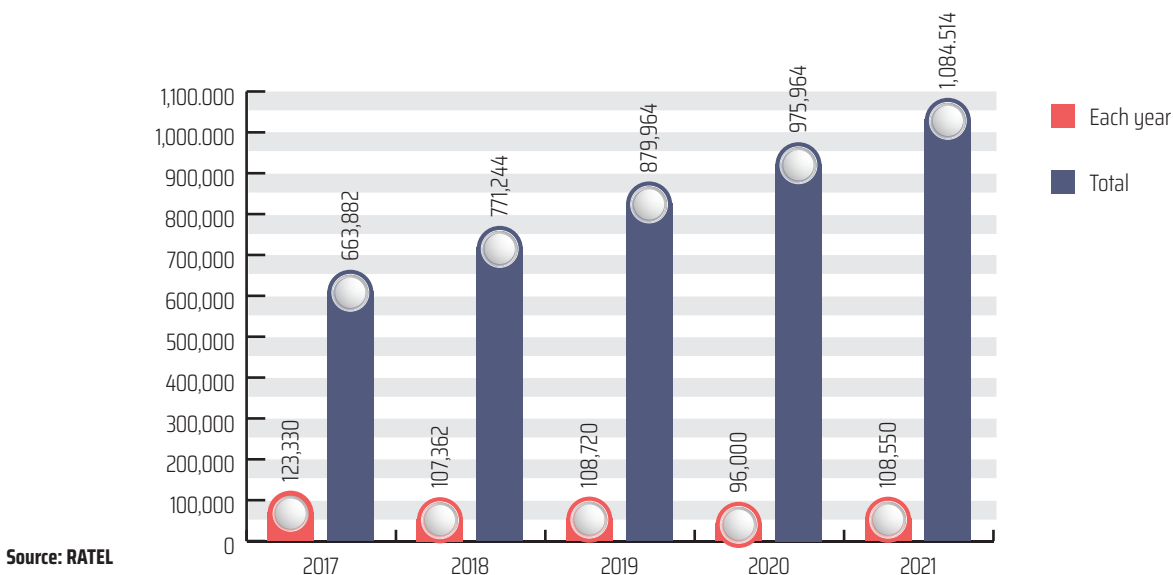
In addition to national traffic, users also generate roaming traffic abroad. Voice traffic abroad was following a downtrend over the previous four years, mainly due to use of VoIP applications.

Another reason for the significant drop in 2020 was the COVID-19 pandemic which led to a decrease in the volume of roaming service usage. However, in 2021 roaming traffic has increased significantly mainly as a result of the "roam like at home" principle applied in the Western Balkan region as of 1 July 2022, whereby all surcharges have been abolished, so that the regulated voice, SMS and data traffic in roaming are charged in accordance with the domestic retail pricelists.

Figure 5.22. Number of roaming minutes (million)

Source: RATEL
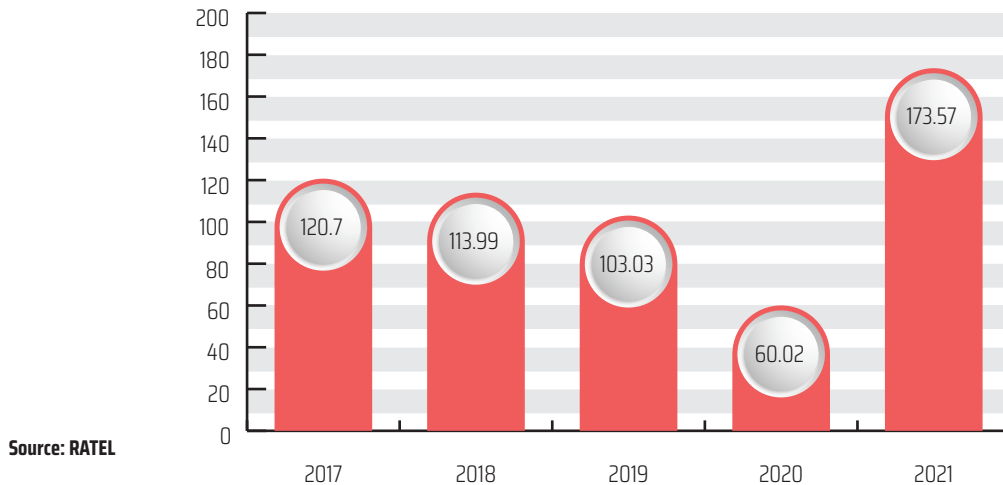
In addition to voice traffic, the users also use mobile internet abroad and according to the available data for 2021, there were 1780 TB of roaming mobile internet traffic made. In addition, 40 million text (SMS) messages were sent.

In the territory of Serbia, in addition to the users of the national networks, foreign network subscribers also generate voice traffic, which varies in terms of volume over the years: while 2020 was marked by a drop, during 2021 there was an increase.

Figure 5.23. Number of roaming minutes made by foreign subscribers (million)

Source: RATEL
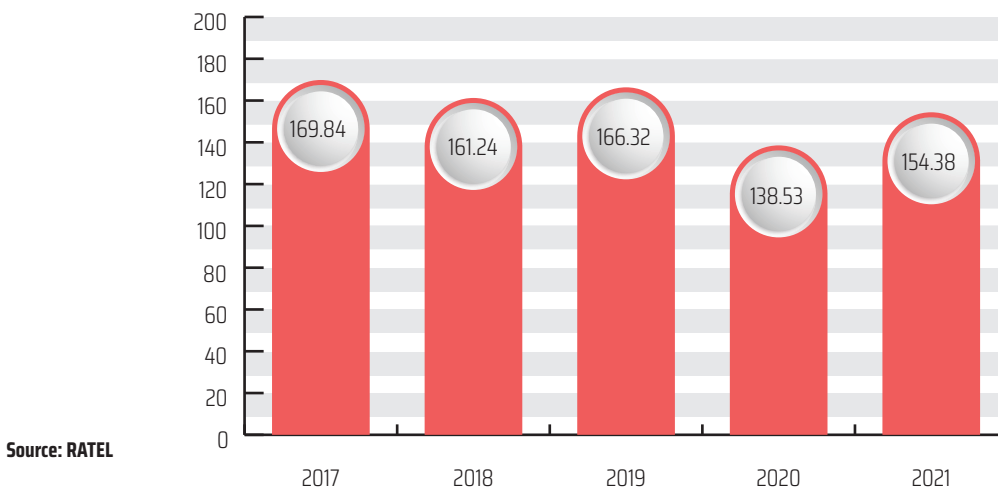
The revenues made from roaming, which include revenues made from outbound roaming and revenues made from inbound roaming, that have followed a slight downward trend for several years. In 2021, there was a significant increase, by 31%.

Figure 5.24. Roaming revenues (mil. EUR)

Source: RATEL
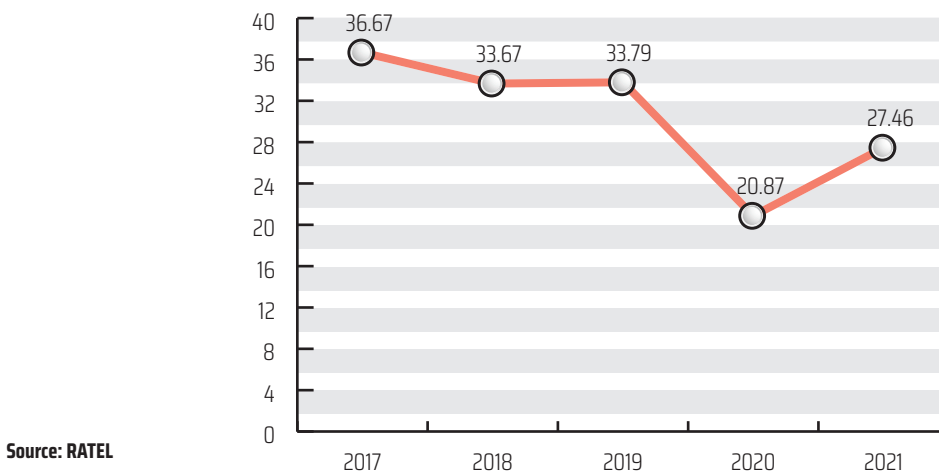
REGIONAL ROAMING

6

In April 2019, the Agreement on the price reduction of the roaming services in public mobile communication networks in the Western Balkans region was signed, aiming to achieve a high level of consumer, competition and transparency protection on the electronic communication market. To that end, RATEL carried out a procedure and passed a decision setting the obligations on reduction of rates for regulated roaming services and roaming termination rates in public mobile networks in the Western Balkans region, implemented as of 1 July 2019. Following a transitory period, which lasted until 30 June 2021, as of 1 July 2021 all surcharges will be abolished and regulated calls, SMS and data transfer in roaming will be charged in accordance with the domestic retail pricelists bringing the roaming prices in the Western Balkans region to the price level in line with the "roam like at home" rule applied in the European Union.

The data on the number of users show a significant increase in the visitors from the region using roaming, which outnumbers the users of national networks using roaming in the region (with the exception of Q3). It should be noted that the COVID-19 pandemic made impact on the roaming trend indicators in 2021.

Figure 6.1. **The number of users using roaming in the region and the number of users from the region that made traffic at least once (thousand)**

Legend:
- The number of users who used roaming traffic in the region at least once
- The number of the users from the region who used roaming traffic at least once
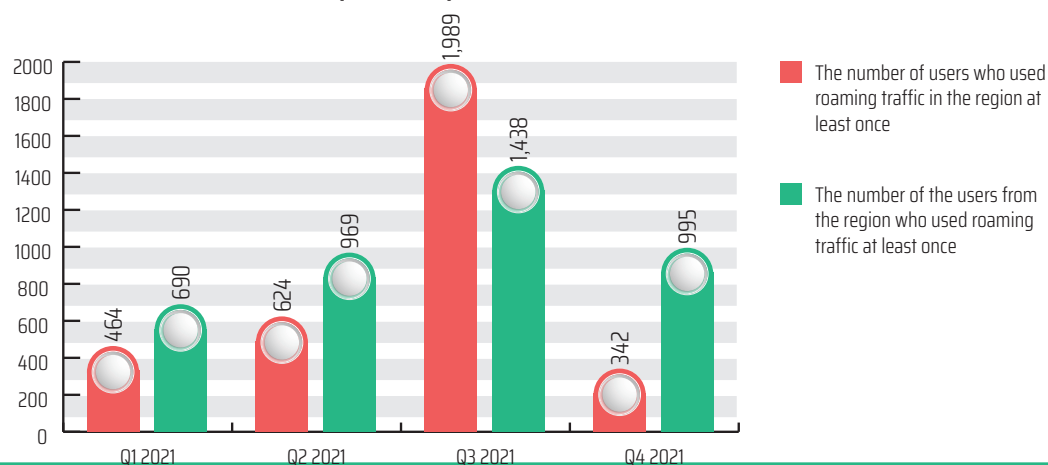
Comparative data for all four quarters of 2021 are given below.

The overview shows the trend of the traffic made from the regulated retail roaming services by mobile users while travelling to the region.

The data include the entire traffic, i.e. the total of the traffic made without any tariff add-ons and the traffic made using tariff add-ons which are available to the end users.

Absolute values of traffic for observed retail services show that the most roaming traffic was made during the third quarter, followed by the fourth quarter.

The data on voice service show that prepaid users generate more outgoing calls minutes compared to incoming calls, which indicates active usage of roaming voice services in 2021 (Figures 6.2 and 6.3).

Figure 6.2. Roaming outgoing calls made by prepaid users in the region (million minutes)
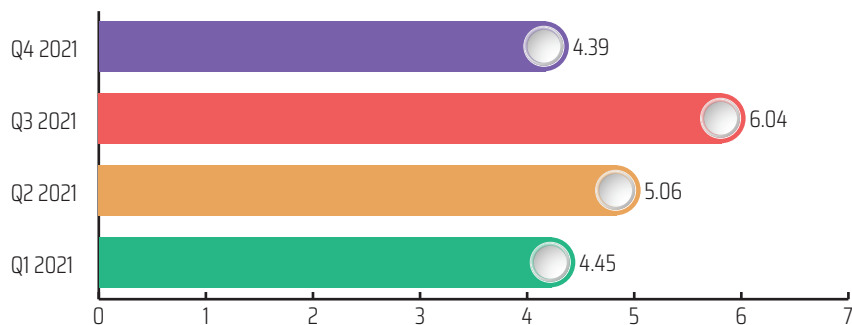
Figure 6.3. Roaming incoming calls made by prepaid users in the region (million minutes)
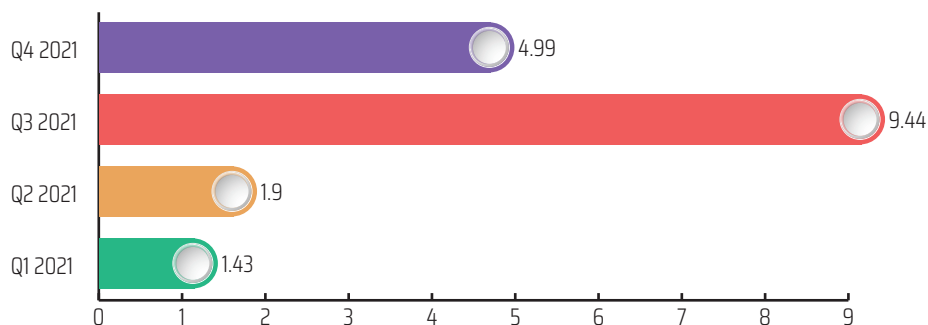
Comparable quarterly data show that postpaid users are actively using roaming voice services, meaning that they generate more outgoing calls minutes compared to incoming calls during all four quarters of 2021 (Figures 6.4 and 6.5).

Figure 6.4. Roaming outgoing calls made by postpaid users in the region (million minutes)
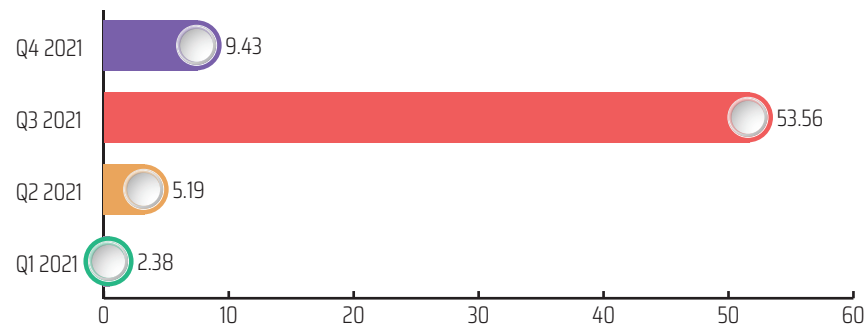
Figure 6.5. Roaming incoming calls made by postpaid users in the region (million minutes)
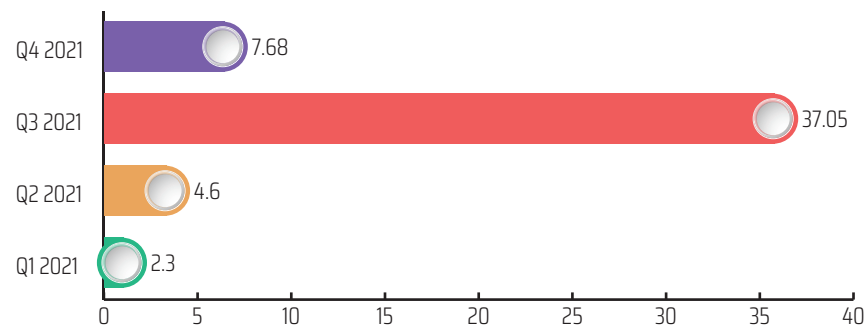
The data show that postpaid users send more text messages (SMS) in roaming than the prepaid users, which is not surprising since there are more postpaid than prepaid users using roaming (Figure 6.6).

Figure 6.6. Number of roaming SMS messages in the region (million)
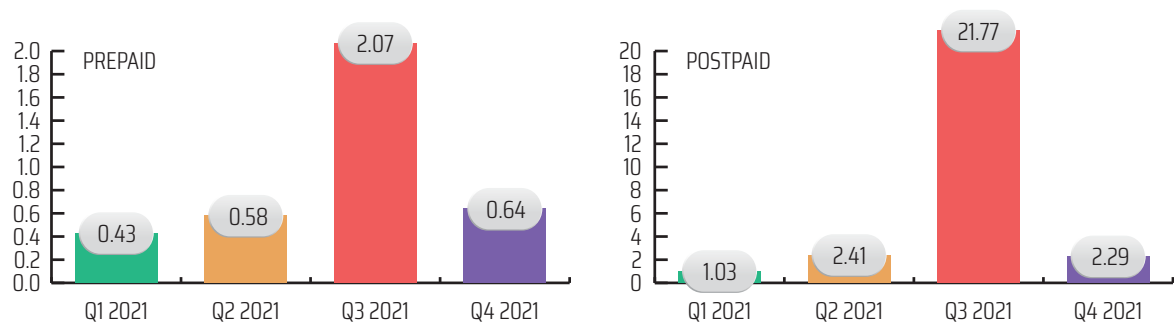
Both prepaid and postpaid users used roaming data transmission the most during the third quarter of 2021 (Figures 6.7. and 6.8).

Figure 6.7. Roaming data traffic made in the region - prepaid (TB)
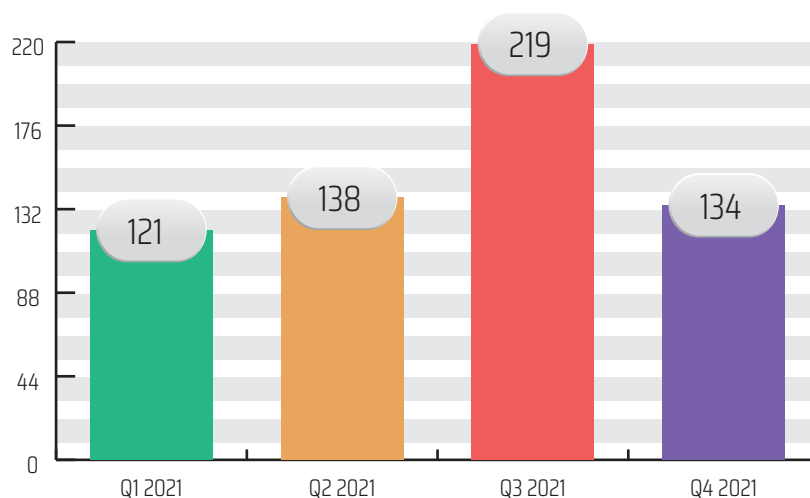
Figure 6.8. Roaming data traffic made in the region - postpaid (TB)
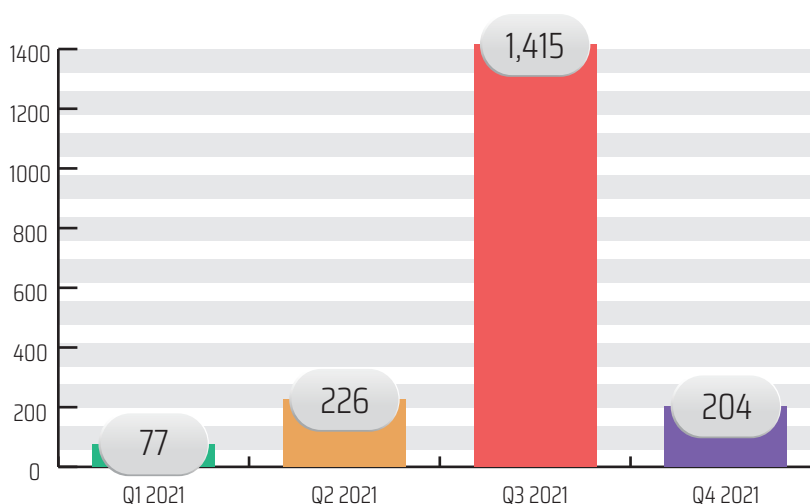
The data illustrating the trend of revenues made from roaming do not include the revenues made from tariff add-ons.

The revenues made from outgoing roaming calls provided to prepaid users in the region are higher than the revenues made from incoming roaming calls, as given in Figures 6.9. and 6.10. The lowest revenues from outgoing were made in Q1 2021, while lowest revenues from incoming calls were made in Q4 2021.

Figure 6.9. Revenues made from outgoing roaming calls provided to prepaid users in the region (mil. RSD)
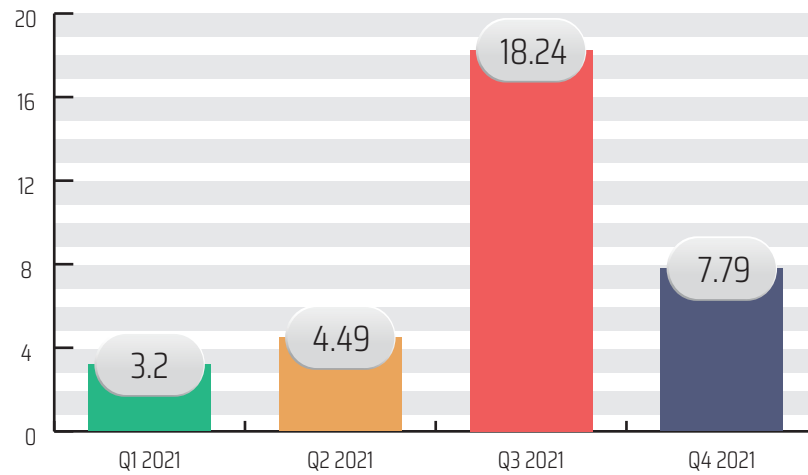
Figure 6.10. Revenues made from incoming roaming calls provided to prepaid users in the region (mil. RSD)
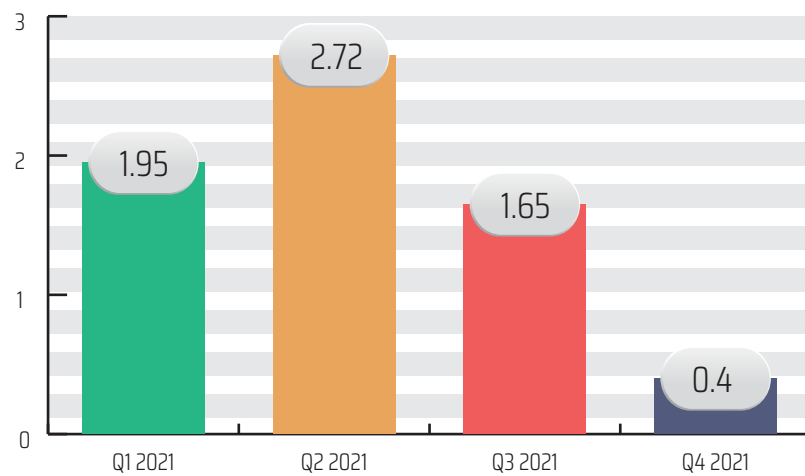
The revenues made from outgoing roaming calls provided to postpaid users in the region are much higher than the revenues made from the incoming roaming calls in all four quarters of 2021, as given in Figures 6.11. and 6.12.

Figure 6.11. Revenues made from outgoing roaming calls provided to postpaid users in the region (mil. RSD)
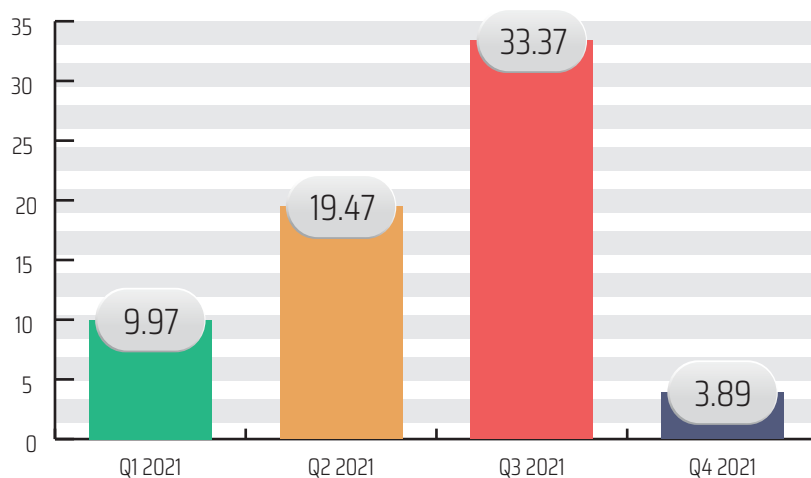
Figure 6.12. Revenues made from incoming roaming calls provided to postpaid users in the region (mil. RSD)
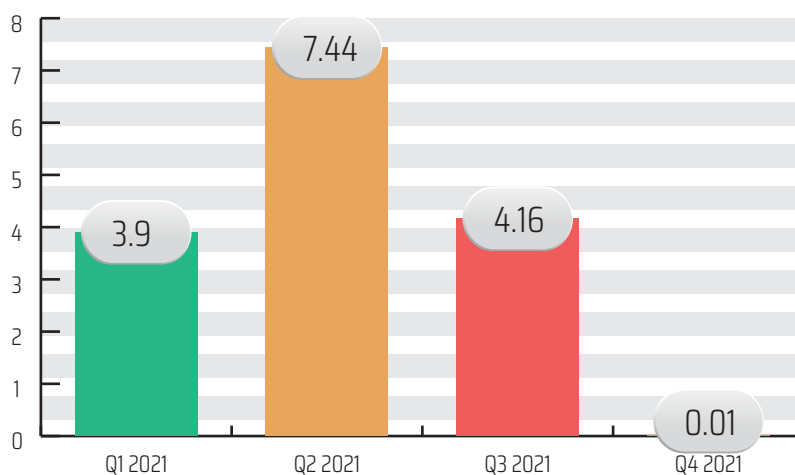
Revenues made from SMS roaming were highest in Q3 2021, during the holiday season when people travel more to the region (Figure 6.13).

Figure 6.13. **Revenues made from SMS roaming in the region (mil. RSD)**
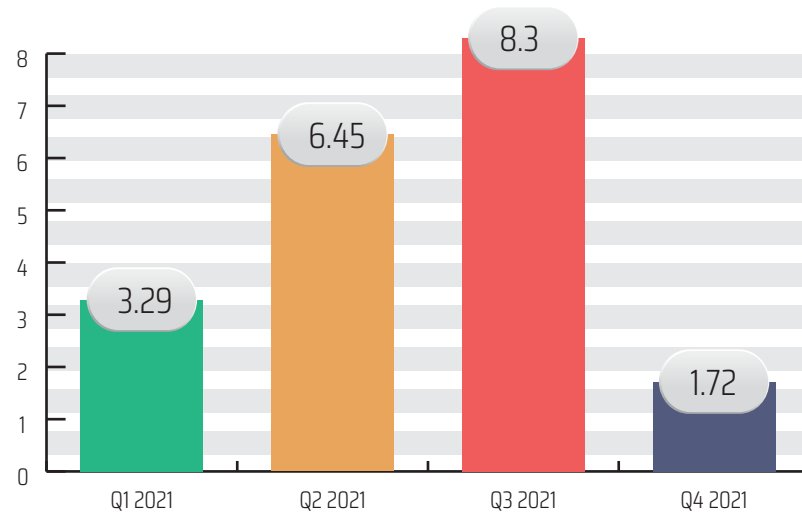
The revenues made from data roaming made by postpaid users in the region are significantly higher in all four quarters of 2021, compared to the revenues made from data roaming provided to prepaid users. Data roaming was most used during Q3 2021 and the revenues made from providing the service to postpaid users were much higher than the revenues made from prepaid users (Figures 6.14. and 6.15).

Figure 6.14. **Revenues made from the roaming data in the region – prepaid (mil. RSD)**
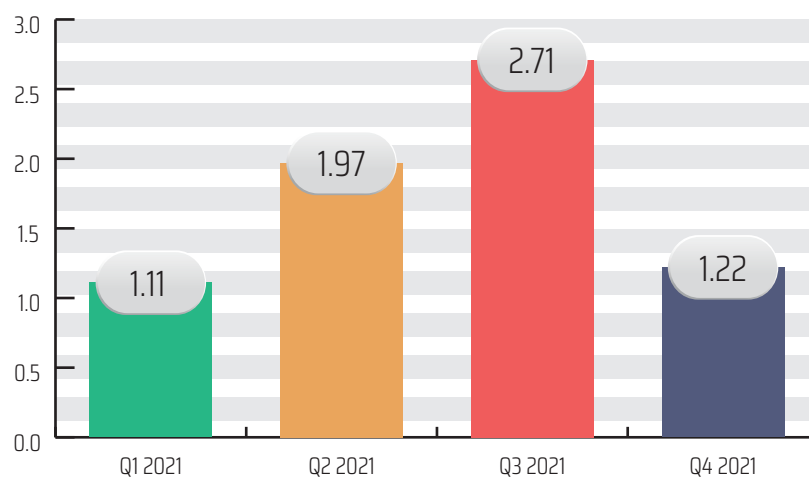
Figure 6.15. Revenues made from the roaming data in the region – postpaid (mil. RSD)
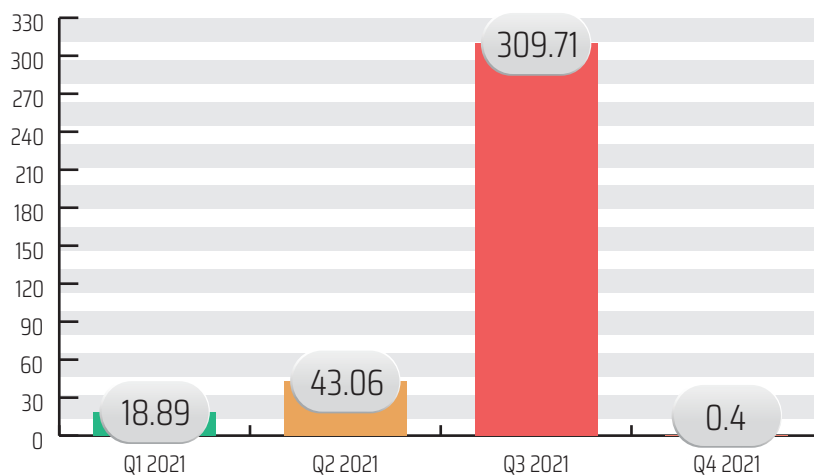
The absolute values concerning the revenues made from the observed retail services show that the biggest revenue was made in the third quarter, during the summer holiday season, when people travel more frequently to the region.

BROADBAND INTERNET SERVICES

7

The broadband market in Serbia has been experiencing a significant growth for years, which continued in 2021. In addition to the rise in the total number of users, a change occurred in the structure of the service packages offered, in terms of increase of the number of high-rate packages. Since the usage of OTT video streaming services is growing and the number of connected devices at home is increasing, the users show a greater demand for higher speed, in order to upgrade their experience with digital service usage. The Internet has become increasingly important as means that provides access to information and serves as an important link in the promotion of development in the area of science, technology and innovation and in the enhancement of regional and international cooperation. The increasing demand for broadband access produces the need for faster and more reliable networks, which results in the changes in infrastructure used to provide services to the users, so that optical infrastructure is increasingly used to provide broadband access to users.

According to the survey on ICT usage by individuals, households and business, carried out in 2021 by the national Statistical Office on the sample of 2,800 households and 2,800 individuals, the number of Internet users increased compared to the previous year by 7%, eight out of ten persons in Serbia have used the Internet in first quarter of 2021.

The Internet was used most by the youngest population (16 – 24 years) and it is equally used by male and female population. In 2021, the share of respondents from younger population who have an account on the social networks, such as Facebook and Twitter, was 96.1%.

1 Data taken from the publication "Usage of information and communication technologies in the Republic of Serbia, 2021", Statistical Office of the Republic of Serbia, based on research from February 2021.

.The survey showed that the older age group (25-54 years) used the Internet less than the youngest population. The smallest share of Internet users is in the oldest group, comprising individuals between the age of 55 and 74 years (Figure 7.1). This group also displays the greatest discrepancy between genders regarding the usage of the Internet.

Figure 7.1. Internet users by gender and age
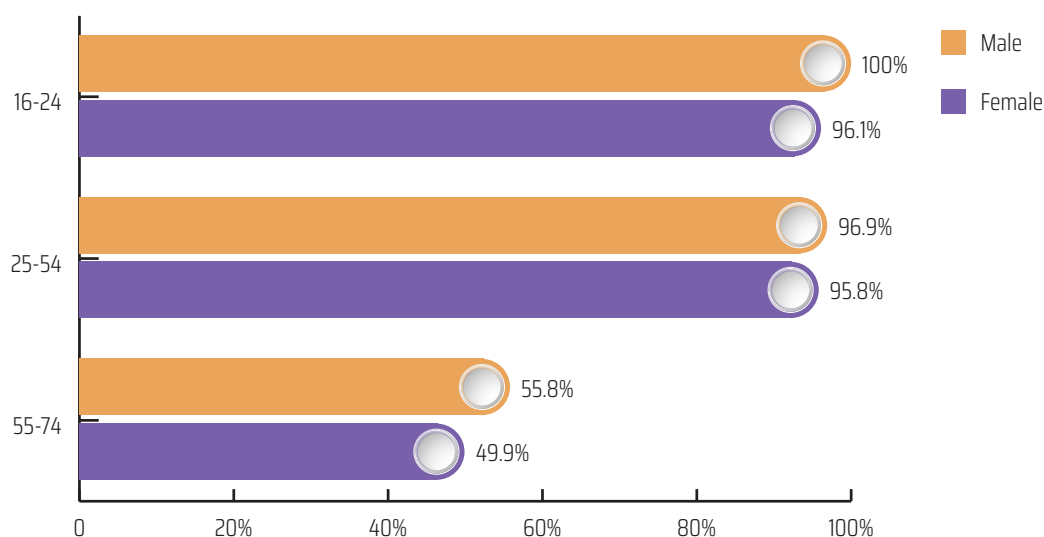
Source: Statistical Office of the Republic of Serbia

It would be hard to imagine life without telecom systems and the Internet and it seems that this is just the beginning of the technological advantages of modern digital era. Internet access has become a constant in our everyday life, and its importance the development of economy and society in general is immense. Broadband access is necessary everywhere, either for work or for social networking. This is reflected both in the user habits and in the devices used for this purpose.

The Internet of Things, (IoT) is a new are developing fast. IoT technology enables connecting large number of users, devices, services and applications to the Internet. End users are able to access data via Internet and mobile apps and to manage device configurations and maintain IoT systems. The analysis showed that 8.8% of the respondents accesses the Internet via smart TV sets, smart speakers, video game consoles, e-readers and smartwatches. This is particularly common for the younger population (16-24) where more than 12.6% used this access mode. However, mobile phones and smartphones remain the most commonly used devices for Internet access, with 95.9% of users (Figure 7.2).

Figure 7.2. **Mobile devices used for Internet access**
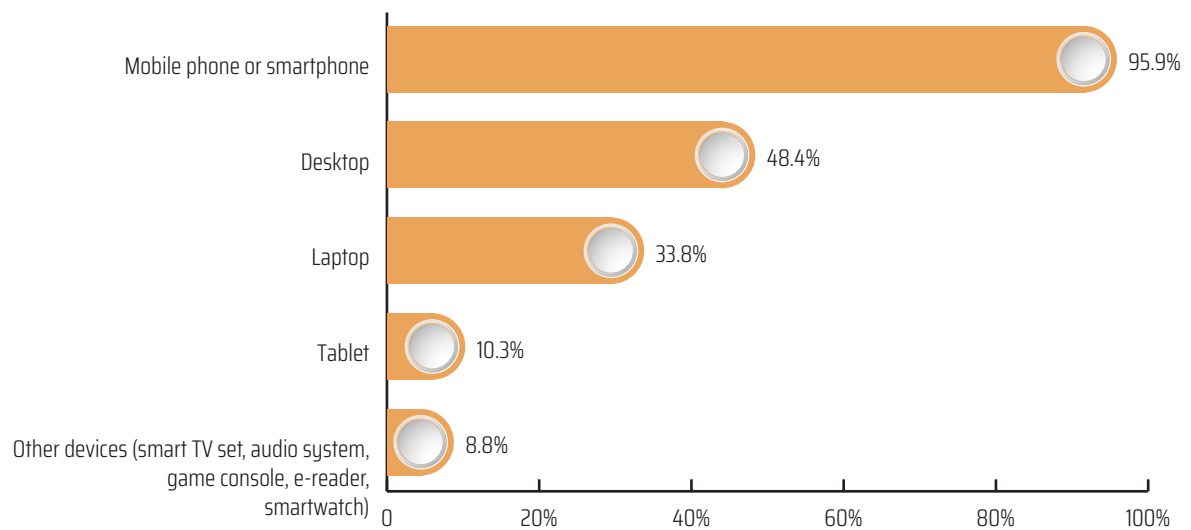
Source: Statistical Office of the Republic of Serbia

The growing usage of mobile phones for the Internet access is reflected in the constant rise in the mobile Internet service users provided in 2021 by three mobile operators: Telekom Srbija, Telenor and A1, and one virtual mobile network operator - Globaltel.

Figure 7.3. **Mobile broadband user structure**
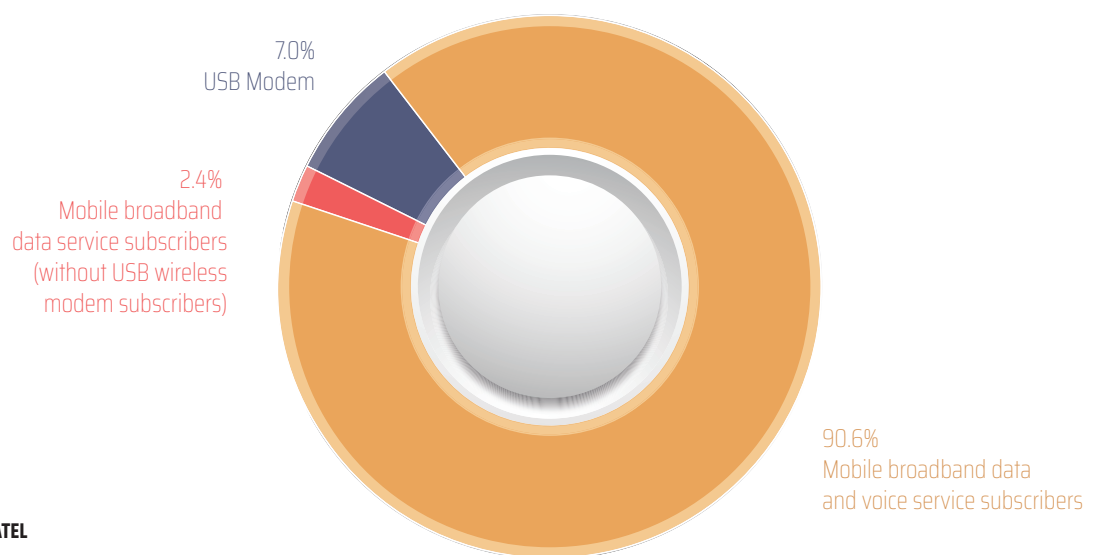
Source: RATEL

The total number of active mobile broadband users in 2021 was 7.1 million, including the subscribers of mobile broadband data and voice service, data service only and subscribers using USB wireless modem for the Internet access, which is a significant increase compared to 2020. This is an 8.5% increase compared to 2020, when the number of active broadband users was around 6.6 million. Data show that the number of subscribers who purchased mobile broadband Internet services independently of voice services increased by 13.3% compared to the previous year.

The number of M2M subscriptions increased as well, amounting to 316 thousand in 2021, which is 0.8% more than in the previous year.

Figure 7.4. Number of M2M subscriptions (thousand)
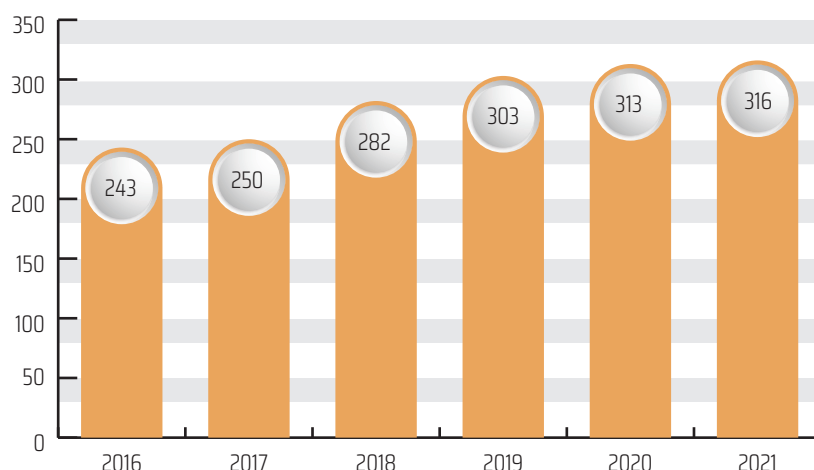
Source: RATEL

The increase in the number of users resulted in the increase in the traffic volume, which is 1.4 times bigger compared with the previous year, amounting to 647 million GB on an annual level for entire UMTS and LTE traffic (the traffic includes mobile Internet users, via cell phones and modems), where, as expected, the biggest increase is seen in LTE traffic which doubled compared with the previous year.

The bestselling mobile Internet package for private postpaid users offered 150 GB of data transmission at the price of 1,499 dinars.

Figure 7.5. The number of fixed broadband internet subscribers per 100 households

Source: RATEL
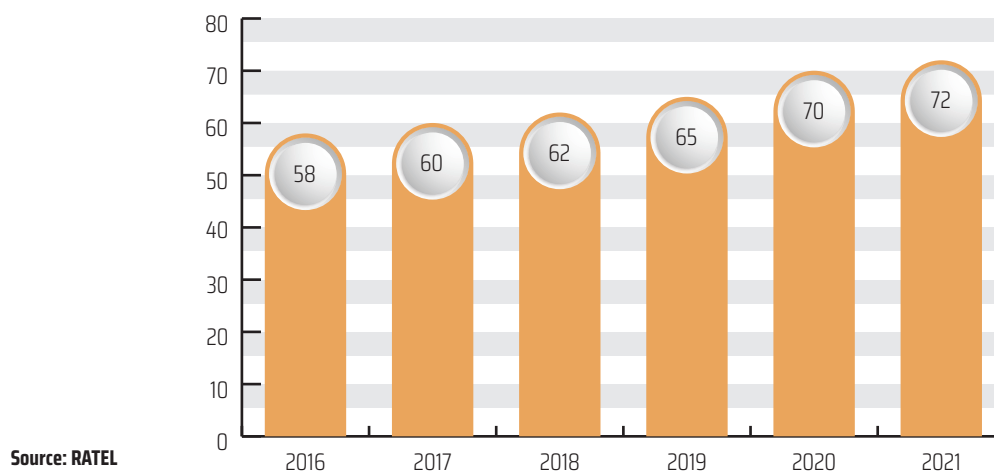
In 2021, seventy-two out of one hundred households (72.3%) had fixed broadband access.

The total number of fixed broadband subscribers in 2021 was 1.8 million, which is a 4% increase compared with the previous year (Figure 7.6).

Figure 7.6. The total number of subscribers of fixed broadband Internet access (million)

Source: RATEL
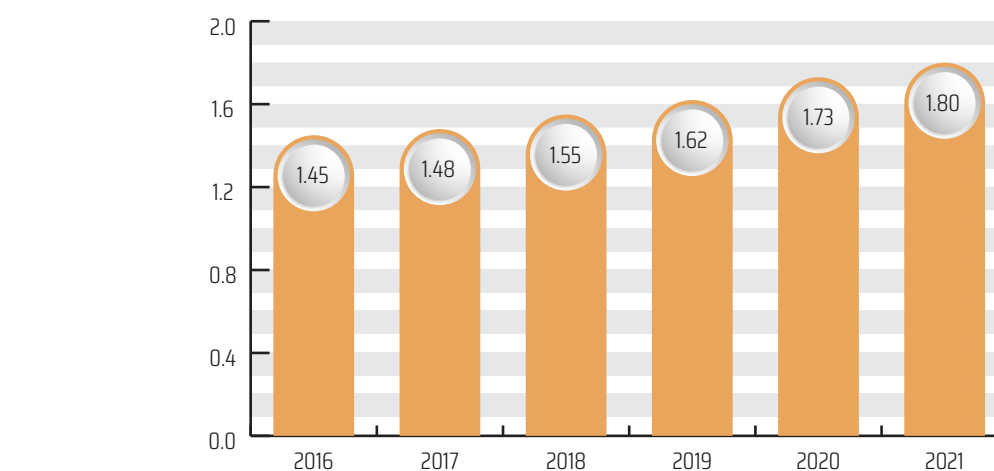
In terms of technology used, based on the available data, the biggest percentage increase of 48% was seen in the number of broadband users with FTTH (Fiber to the Home) or FTTB (Fiber to the Building) fibre-optics Internet access, corresponding to 20% of the total number of users. Moreover, fast development of cable networks, which are usually composed of both fiber optic and coaxial cables, and upgrade of coaxial cable networks to DOCSIS 3.0 standard leads to high-speed internet

packages being offered to end users. This resulted in a 0.5% rise in the number of users accessing the Internet over coaxial cable network. The number of users of xDSL decreased by 9%, following a downtrend five years in a row. xDSL subscriber structure changed significantly with a significant increase of the number of users of VDSL technology that account for 59% of the total number of xDSL users. However, in 2021 for the first time there was a decrease in the number of VDSL users, of 1.8%.

The increase in the number of users is reflected in the increase in the revenues from fixed broadband Internet, which rose by 3% compared to 2020 (Figure 7.7.).

Figure 7.7. **Revenues from fixed broadband (billion)**

Source: RATEL
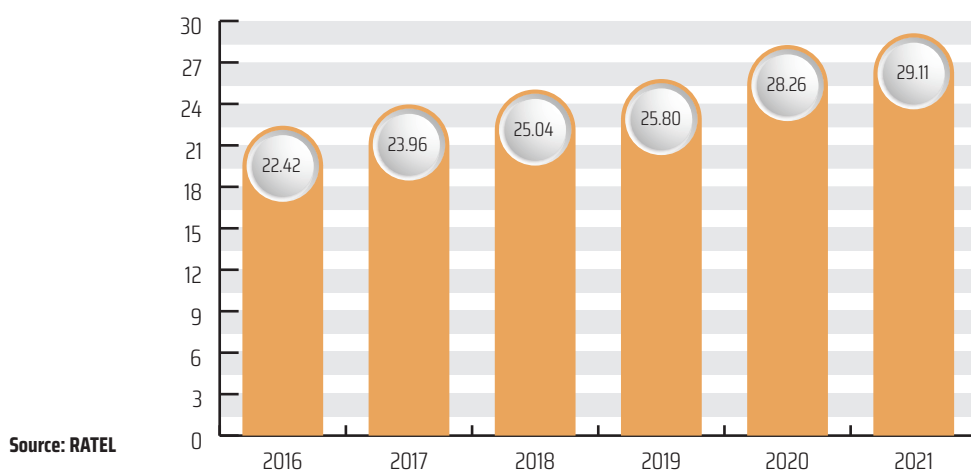
The coaxial cable infrastructure is, for the fourth year in a row, the most widely used access technology with 45% of the total number subscribers, followed by xDSL infrastructure with 30% of users (Figure 7.8).

Figure 7.8. The share of the broadband subscribers by access technology (thousand)
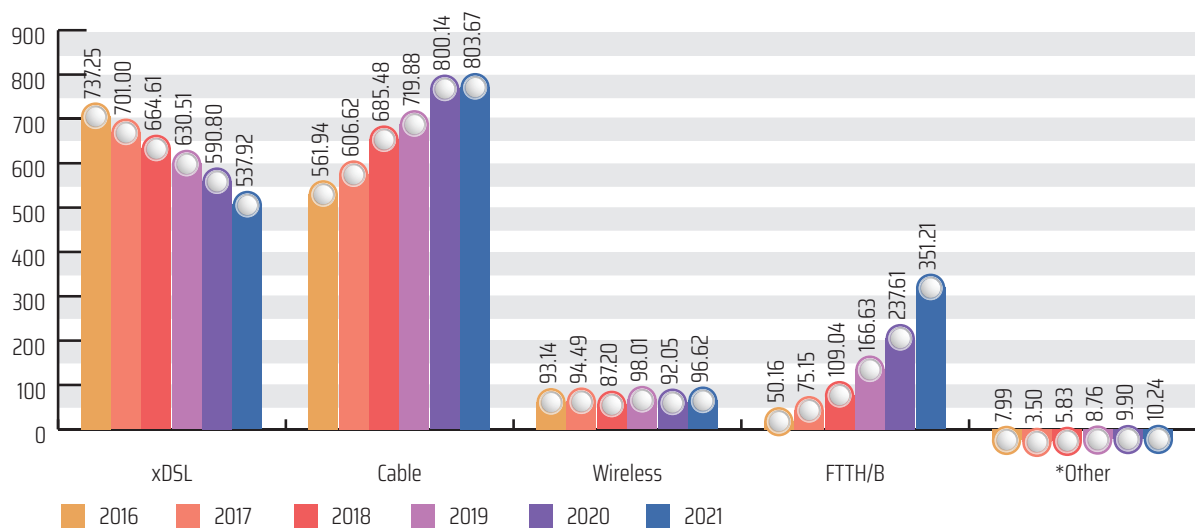
* Ethernet, LAN
Source: RATEL

The availability of high-speed Internet is important to ensure a high-quality access to Internet content, including the content generated by end users (various services and information). The Internet was most used for voice/video calls (93.7%), online messaging using Skype, Messenger, WhatsApp and Viber (84.7%), and reading online newspapers and magazines (76.8%).

In 2021, the revenue made via coaxial cable infrastructure equalled 44.01% of the total revenue made from broadband access, showing a slight decrease compared with the previous year.

A significant drop in the revenue share is seen in the services provided via xDSL. In terms of the number of users, this access comes right after the coaxial cable access which means that it remains widely used, however the drop in the revenue share is a result of the low speed provided using this technology, at lower prices. The share in the revenue from services provided via xDSL technology in 2021 was 23.55%.

In line with the subscriber structure, where preference is given to technologies enabling higher speeds, revenue structure reveals a growth trend in services provided over FTTH/B infrastructure, with a 26.40% share in 2021 (Figure 7.9).

Figure 7.9. **The structure of revenues made from fixed broadband, by access technologies**

6.04%
Wireless

26.40%
FTTH/B

44.01%
Cable

23.55%
xDSL
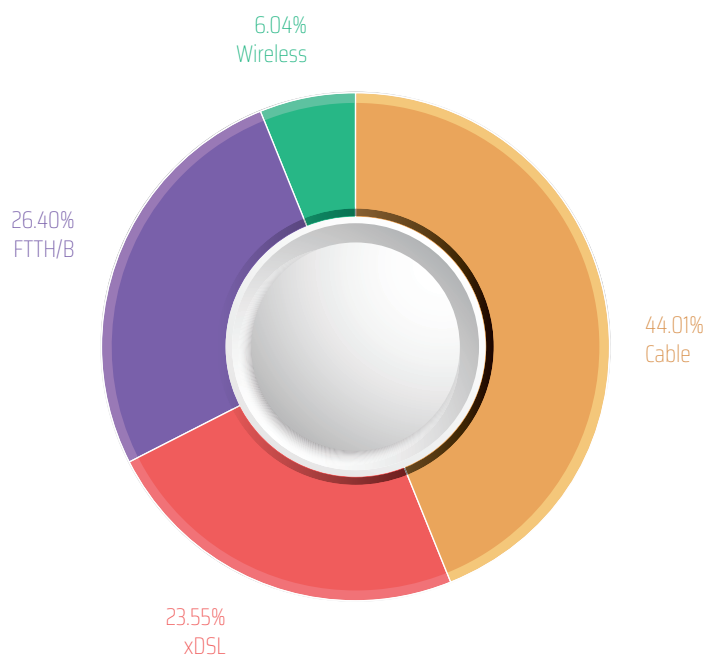
Source: RATEL

The revenues from fixed broadband access provision to business users had a similar distribution as in the previous years, corresponding to 16% in 2021. The share of private and business users in the total revenues made in the past six years is illustrated in Figure 7.10.

Figure 7.10. **Share of private and business users in the total revenues made from fixed broadband Internet service**

Year	Private users	Business users
2021	84	16
2020	84	16
2019	83	17
2018	84	16
2017	85	15
2016	83	17
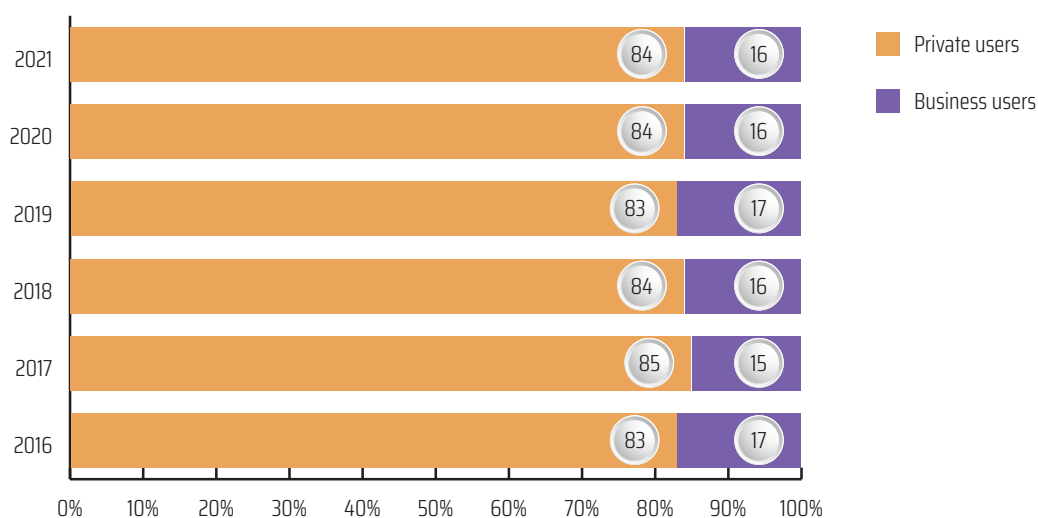
Source: RATEL

Figure 7.11. Types of Internet usage for private purposes

Type of usage	Percentage
VoIP/video calls	93.7%
Online messaging via Skype, Messenger, WhatsApp and Viber	84.7%
Reading online newspapers and magazines	76.8%
Social networks (Facebook, Twitter)	74.3%
Searching for information on goods and services	73.5%
Searching for information on health	69.0%
E-mail communication	56.4%
E-banking	25.6%
Job search	14.1%
Selling goods or services online (eBay, Facebook, Marketplace)	7.5%
Posting opinions on civil or political issues on websites or social media	5%
Participating in online consultations or voting related to shaping civil or political issues	4.4%

Source: Statistical Office of the Republic of Serbia

The technological developments are changing user habits. Online purchase of goods and/or services has been growing over the past years. The growth trend continued in 2021 and the changes in the habits of individuals regarding online purchases over the last 5 years can be seen in Figure 7.12.

Figure 7.12. Ordering/purchasing goods or services online
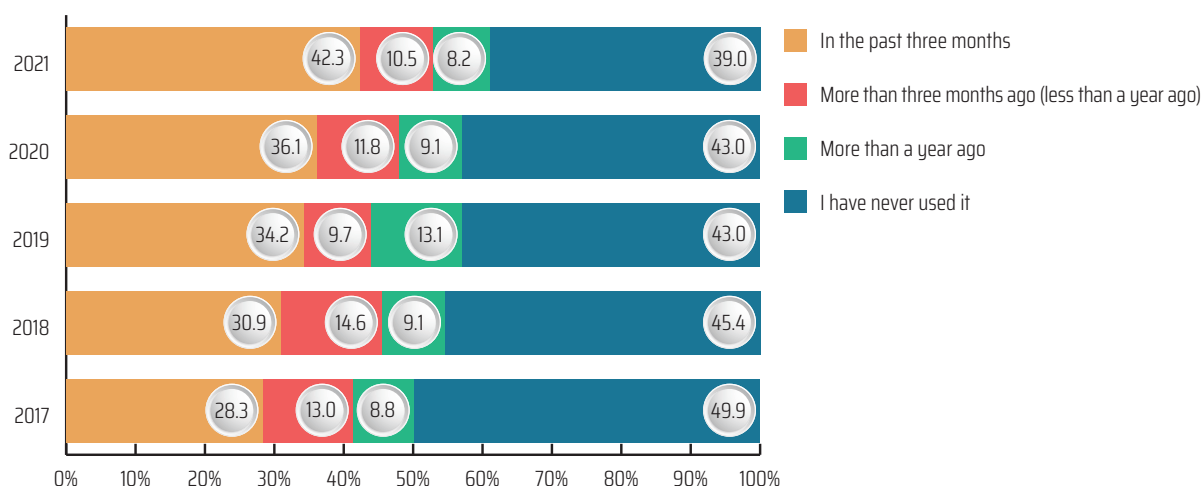
Source: Statistical Office of the Republic of Serbia

Although the number of fixed broadband users has been significantly increasing over the past years, fixed broadband can considerably differ in terms of speed, which affects the quality and the functionality if the Internet access. Changes in user habits, increased number of users accessing video streaming services, along with the increase in the number of devices used to access the Internet at the same time have resulted in the change of the package structure and the increase in the traffic volume.

As for fixed broadband access, in 2021 the Internet packages offering 20 Mbps were the most sold, at the price ranging between 890 and 2,050 dinars. The distinction between broadband speeds offered and the overview of this indicator helps understand the digital divide, and the data on the number of users, depending on the available speed, helps create and introduce regulatory measures targeted at bridging the digital gap.

According to available data there is an increasing demand for high-speed packages on fixed broadband market. The share there of users who used the packages of at least 50 Mbps but less than 100 Mbps remained the same as in the previous year (26%). However, there was a significant increase in the share of users for packages of at least 100 Mbps but less than 1 Gbps, which grew from 27% in 2021 to 36% in 2021.

Figure 7.13. Share of business fixed broadband subscribers, according to access rate

0.17%
256 kbps - less than 2 Mbps

0,04%
More than 1Gbps

2.71%
2 Mbps - less than 10 Mbps

15.90%
10 Mbps - less than 20 Mbps

36.36%
100 Mbps - less than 1 Gbp

16.02%
20 Mbps - less than 30 Mbps

3.35%
30 Mbps - less than 50 Mbps

25.45%
50 Mbps – less than 100 Mbps
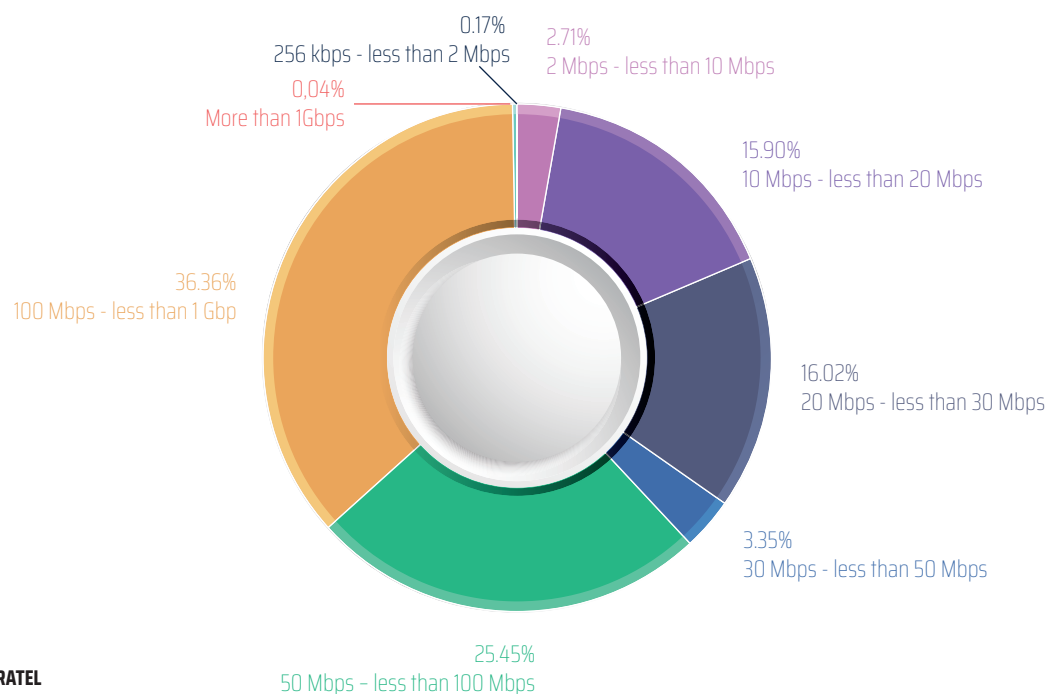
Source: RATEL

The share of the fixed broadband subscribers according to access rate also had impact on the average bill for fixed broadband Internet, which amounted to 1361 dinars for private users and 3848 dinars for business users in 2021, compared to 1549 dinars for private users and 4452 dinars for business users in 2020.

As for business users, the Internet connection speed defined under the contract closed between a company and an ISP is given in Figure 7.14.

Out of the total number of companies with Internet connection, 84.5% have their own website, mainly with the purpose of providing description of goods and services and price list (85.3%), giving the possibility to regular customers to view content in customized mode (62.6%) and the possibility for consumers to get acquainted with the products (54.6%).

Social networks are becoming increasingly important for the businesses. During 2021, nearly 41.3% of the companies used social networks, such as Facebook or Twitter.

Figure 7.14. Share of business fixed broadband subscribers, according to access rate

0.21%
256 kbps - less than 2 Mbps

4.63%
2 Mbps - less than 10 Mbps

0.45%
More than 1 Gbps

29.17%
100 Mbps - less than 1 Gbps

27.93%
10 Mbps - less than 20 Mbps

15.72%
50 Mbps – less than 100 Mbps

16.59%
20 Mbps - less than 30 Mbps

5.30%
30 Mbps - less than 50 Mbps
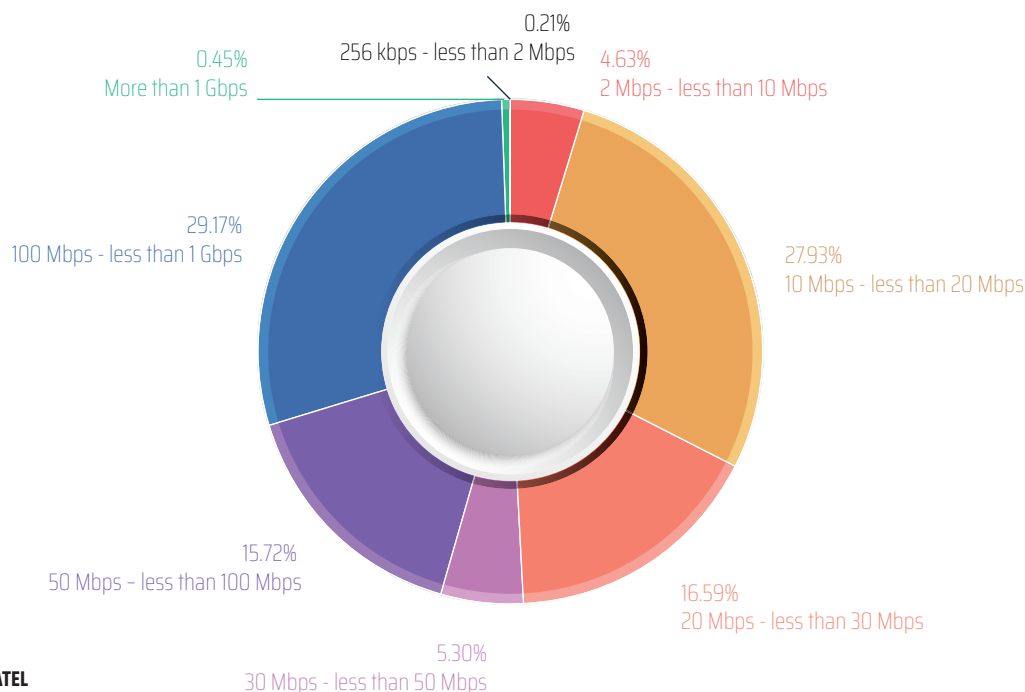
Source: RATEL

The percentage of companies paying for cloud service, accessed via Internet for the purpose of software usage and data storage was 28.9% in 2021. The cloud service, located on the server of the service provider, can be used on demand and are charged based on used capacity or the way the service is used.

The change in the package structure in favour of higher access rates and the increased number of devices used for the Internet access within the same household, resulted in the increased traffic volume. Based on the available data, the assessed total traffic made by fixed broadband in 2021 was around 3.52 billion GB (3.28 EB). The assessed international link capacity usage was approximately 1.26 million Mb/s and the leased international link capacity (lit/equipped) was around 5.8 million Mb/s.

Telecommunications Company "Telekom Srbija" remains to be the largest operator of fixed broadband in the Republic of Serbia in 2021, with a market share of 54.62% in terms of the number of subscribers, showing a significant increase compared with 39.67% in the previous year, as a result of merger and acquisition of Moja Supernova in 2021. Other leading ISPs in the market are: SBB with 31.55% market share, followed by Orion telekom, Sat-Trakt Astra telekom, Jotel BeotelNet-ISP, Yunet International, PE „Pošta Srbije" Beograd and Orion Telekom Tim", each of them holding a significantly smaller share compared to Telekom Srbija and SBB. Together these 10 operators hold 96.49% of the Serbian ISP market in terms of the number of subscribers.

Figure 7.15. **Market share of the leading ISPs in 2019**

31.55% SBB

2.68% ORION TELEKOM

2.57% SAT-TRAKT

1.32% ASTRA TELEKOM

1.22% JOTEL

0.75% BEOTELNET-ISP

0.61% YUNET INTERNATIONAL

0.59% POŠTA SRBIJE

0.58% ORION TELEKOM TIM

3.51% OTHER

54.62% TELEKOM SRBIJA
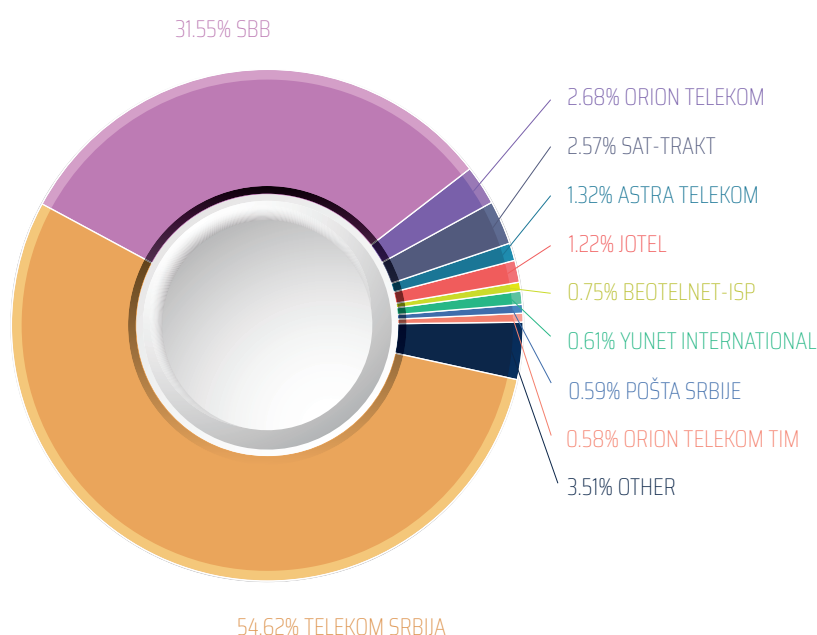
Source: RATEL

Information on the number of users and penetration rate for the Internet access by districts and the data for 10 municipalities with the highest penetration rates is based on the questionnaires submitted by ISPs. The data on municipalities were provide by 86 ISPs. Data on penetration rates for Kosovo and Metohija have not been presented in the table due to unavailability of information on the number of households. Table 7.1 shows data on broadband penetration rate for households, by districts.

Table 7.1. Internet penetration rate by districts

District	Penetration rate (%)
Belgrade	95.23
South Bačka	85.08
Srem	70.63
South Banat	67.90
Raška	63.86
Šumadija	62.89
Central Banat	62.85
Podunavlje	62.08
Braničevo	61.88
Nišava	61.79
North Bačka	61.78
West Bačka	58.38
Morava	56.64
Mačva	55.78
Rasina	55.49
Kolubara	54.55
Pomoravlje	53.94
Pčinja	53.88
Bor	52.53
Zlatibor	49.94
North Banat	48.65
Jablanica	47.03
Pirot	45.64
Toplica	43.17
Zaječar	39.87

Figure 7.16. Graphic image on the map of Serbia

Districts according to household penetration rate:

- Over 70%
- 50%-70%
- Under 50%
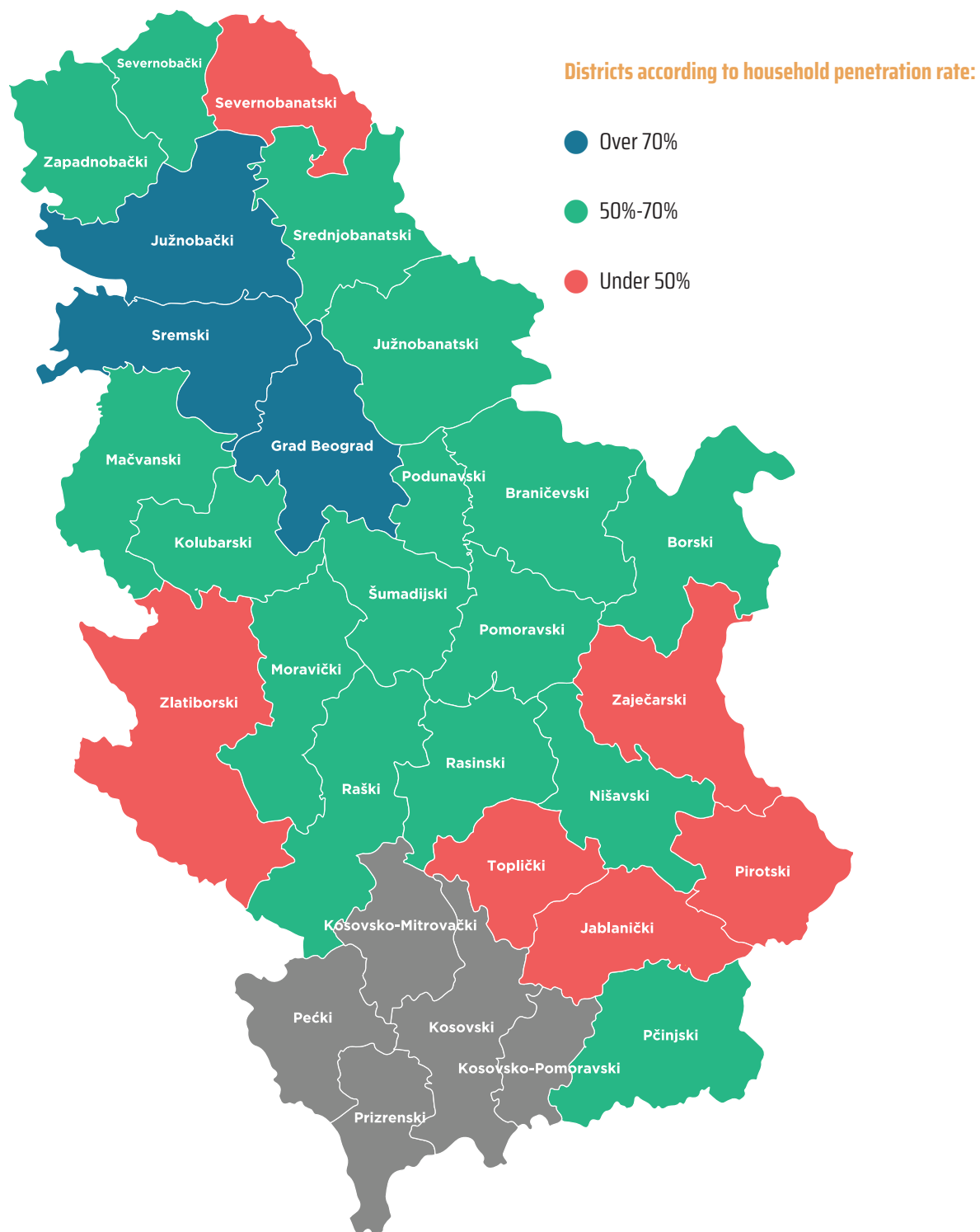
The list of 10 municipalities/cities with the biggest number of Internet service subscribers, considering the number of households, is given in Table 7.2 below, while Table 7.3 lists municipalities where the Internet penetration is below 20%.

Table 7.2. **List of 10 municipalities/cities with the biggest number of subscribers**

Municipality	Penetration (%)
Čajetina	12.49
Novi Sad	106.58
Beograd	95.23
Pančevo	86.19
Požarevac	77.08
Stara Pazova	76.73
Veliko Gradište	74.80
Sremska Mitrovica	74.47
Niš	73.85
Inđija	73.66

Table 7.3. **Municipalities with Internet penetration is below 20%**

Municipality	Penetration (%)
Gadžin Han	14.93
Kučevo	12.09
Bosilegrad	10.47
Crna Trava	8.94
Trgovište	8.38

MEDIA CONTENT DISTRIBUTION

In 2021, there were 39 registered media content distribution operators providing the service via cable distribution network (coaxial, hybrid and optical), copper pair network, satellite distribution network and wireless network. Since 2016, another media content distribution service has been available on the market – paid terrestrial television, broadcast via the network of terrestrial transmitters in the DVB-T2 standard, which requires an indoor antenna and a set-top box. The company registered since 2016 for the provision of this service in the Serbian market mts Antena TV Ltd. was merged with Telekom Srbija in 2021.

The total number of subscribers of the media content distribution service in 2021 was 2.14 million, which represents an increase by 1.7% compared to the previous year, mostly due to the increase of IPTV and DTH subscribers. Approximately 1.45 million subscribers used the service of media content distribution within a package (bundled service), usually combined with broadband access and/or fixed telephony.

Figure 8.1. Total number of subscribers (in million)
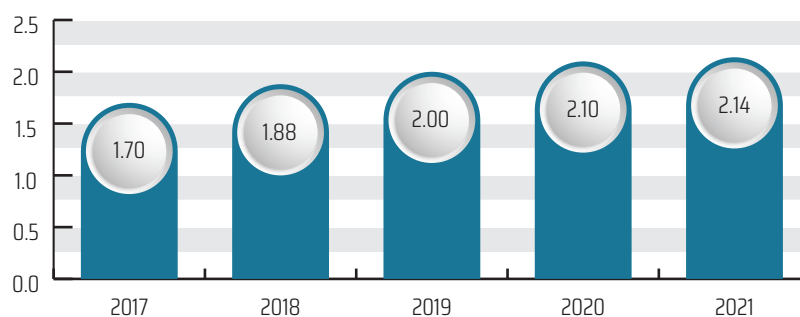
Source: RATEL

The penetration was 31.12% in terms of population and 85.94% in terms of the total number of households..

Figure 8.2. Household penetration (in %)
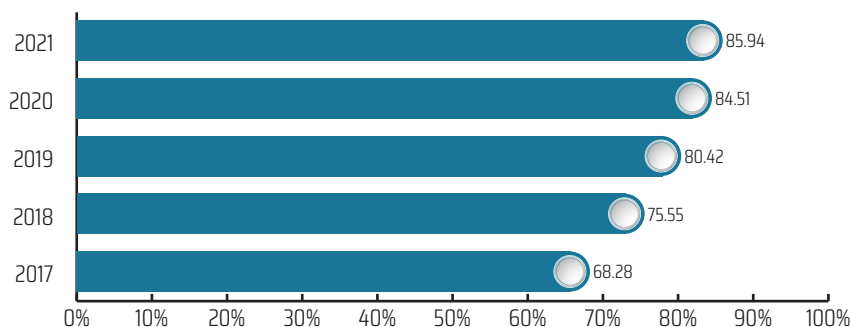
Source: RATEL

The largest media content distribution operator in the Republic of Serbia in 2021 was Telekom Srbija, Joint Stock Co., with a market share of 49%, in terms of number of subscribers. Serbia Broadband – Srpske kablovske mreže Ltd. (SBB Ltd.), accounted for around 45% of the market share in 2021. Together with the Public Enterprise "Pošta Srbije" and Sat-Trakt Ltd, they accounted for a market share of 97% pertaining to media content distribution, in terms of number of subscribers.

Figure 8.3. Market share of leading operators in 2021
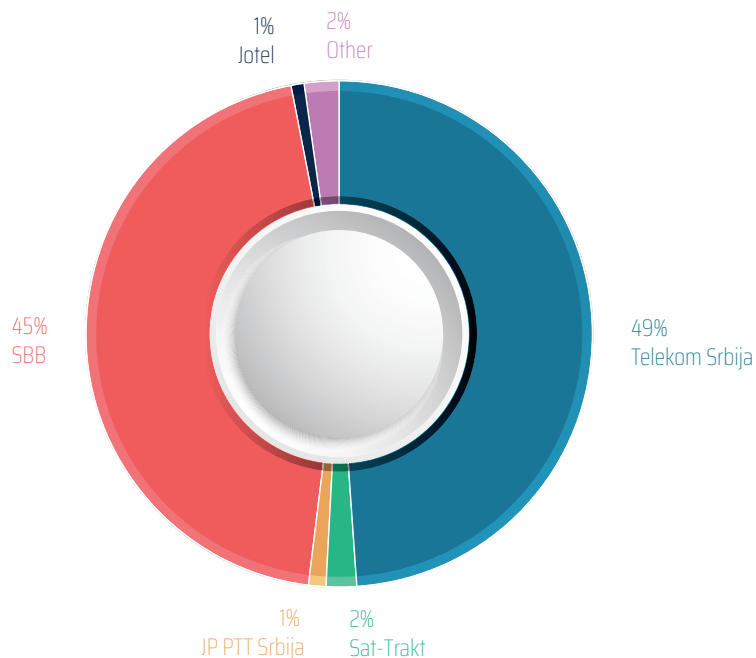
Source: RATEL

Media content distribution via cable distribution systems (CATV) remained dominant in 2021, with around 1.18 million subscribers, which is a decrease by 1.7% compared to the previous year. The number of IPTV subscribers via copper pair network increased by approximately 7% compared to the previous year, whereas the number of DTH subscribers via satellite network rose by approximately 8.4%. The number of media content distribution subscribers via wireless network decreased in 2021, amounting to approximately 23 thousand, whereas the number of media content distribution subscribers via Internet amounted to approximately 30 thousand.

Figure 8.4. Distribution of media content distribution service by type (in thousand)
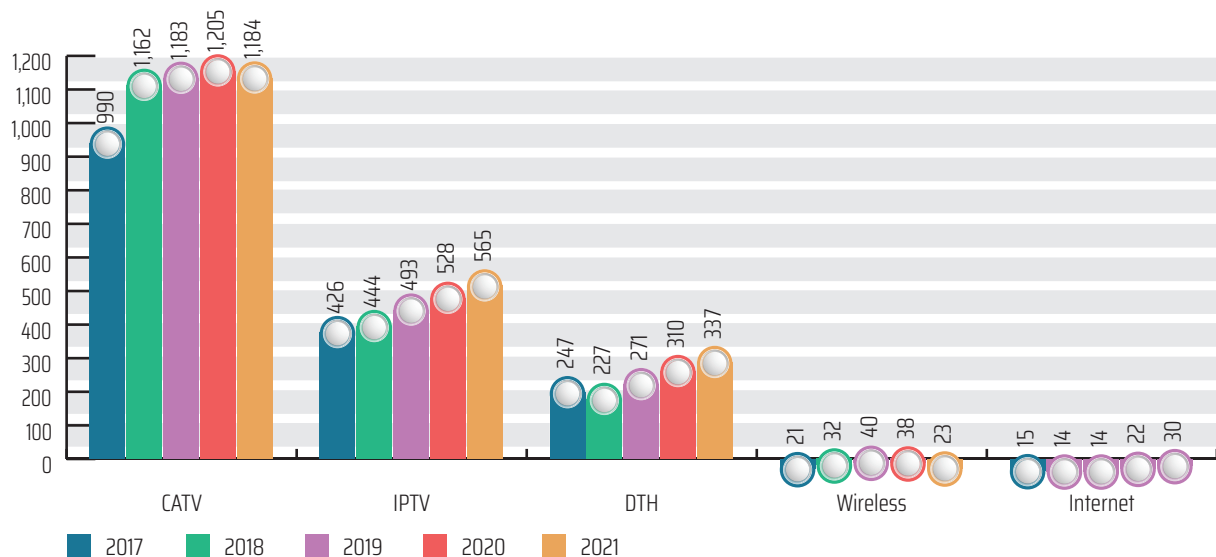
Source: RATEL

The share of subscribers by type of distribution has not changed substantively during 2021 for the most widely used technologies, while the shares of other types of distribution decreased slightly, from 2.8% to 2.5%. In particular, these are the subscribers using the distribution via Internet which increased from 0.7% to 1%. Pay TV, present on the market since 2016, had around 14 thousand subscribers in 2021.

In 2021, as much as 90% of the total number of CATV subscribers followed the media content in digital format, which means that the users' preferences have changed, and that the digitalization of cable networks is in its full development. Digital cable distribution enables users to watch the content in high resolution (HD), and to have many additional services available. In addition, analogue to digital distribution switchover is encouraged by diverse promotional activities offered by the operators.

Figure 8.5. Distribution of CATV subscribers
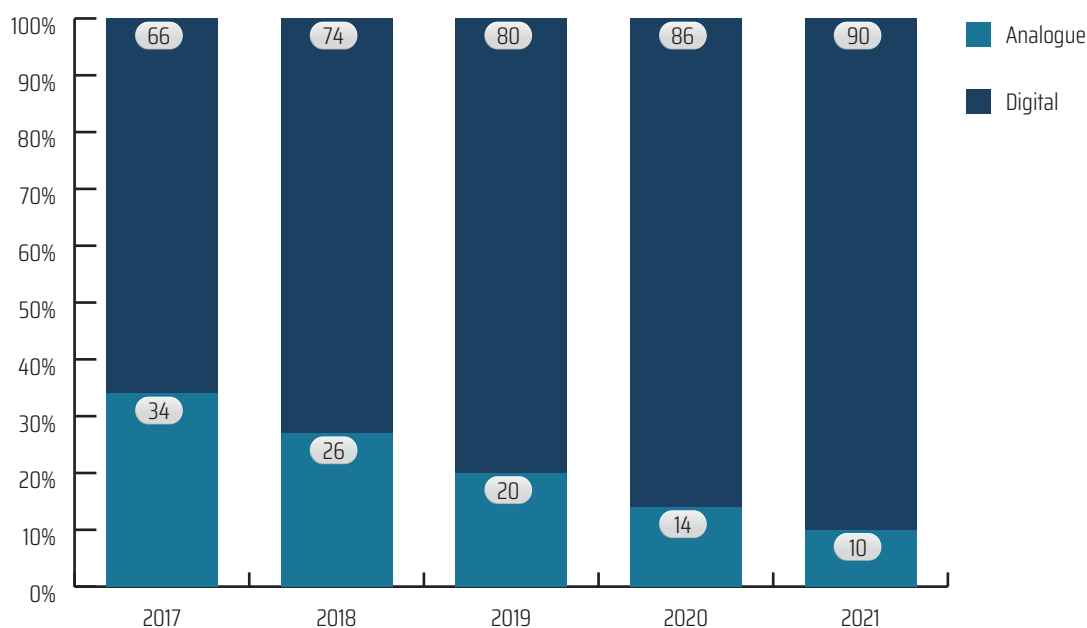
The total income of media content distribution operators in 2021 reached 27.99 billion dinars, which is by 9% higher compared to the previous year.

Figure 8.6. Revenue trends on media content distribution market (in billion dinars)
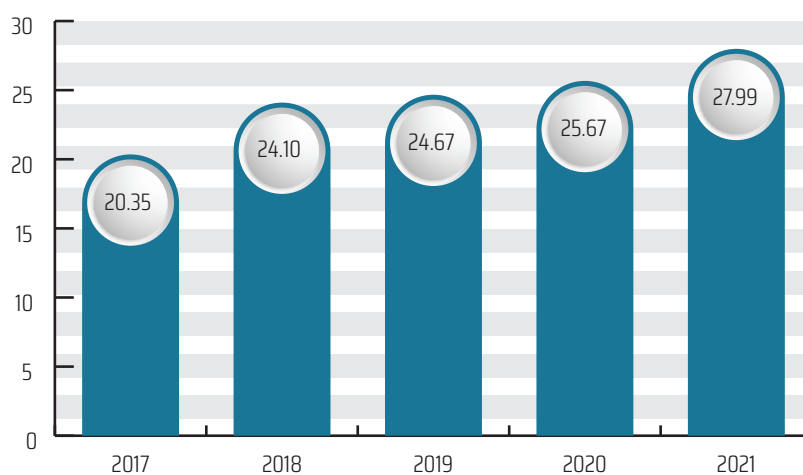
The share of revenues by the type of distribution has not changed in 2021 compared to the previous year. CATV accounts for the biggest share in the revenues from the media content distribution (54%), with IPTV (30%) and DTH (15%) at the same level as in the previous year. Other revenues in

the observed market (revenues from distribution via Internet and from distribution via wireless network including revenues from paid terrestrial television) participate with approximately 1%.

Figure 8.7. Structure of revenues from media content distribution in 2021
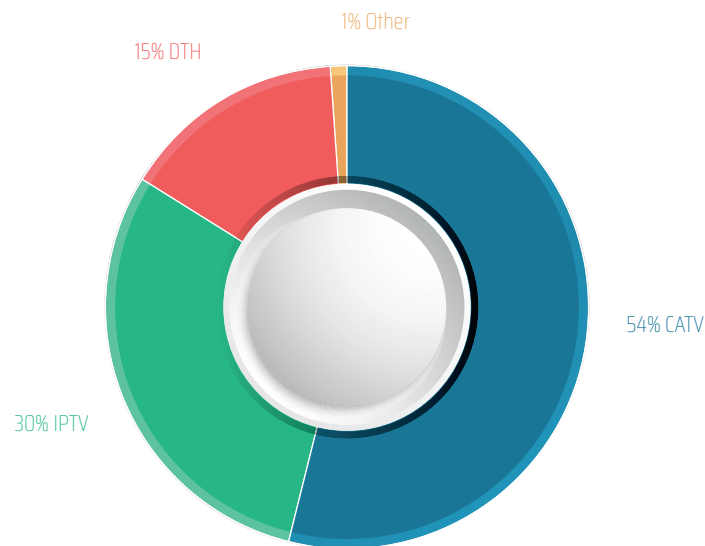
The revenues from the network maintenance and revenues from programme channels sales, which is the income made by selling own programme channels to other operators, account for 90% of the total income, as shown in Figure 8.8. Revenues made from additional PAY TV service make up almost 9% of the total revenues. Network connection charges account for approximately 0.32% of the total revenues in 2021. The reason for such a low share is the fact that most operators do not charge this service to new users during promotional offers or in case of a 12-month/24-month contract. Additional service income includes revenues from services such as video on demand, rewind service, programme recordings service etc, which altogether account for 0.63% of the total revenues in 2021. Revenues pertaining to the sale of TV watching app refer to the application that is sold independently from the distribution service without a user agreement, account for 0.08%, a rather negligible portion of the total income.

Figure 8.8. Share of revenues from media content distribution in 2021

- 9.10% PAY TV
- 0.32% Network connection
- 0.08% Application sales
- 29.39% Programme channel sales
- 60.48% Network maintenance
- 0.63% Additional services
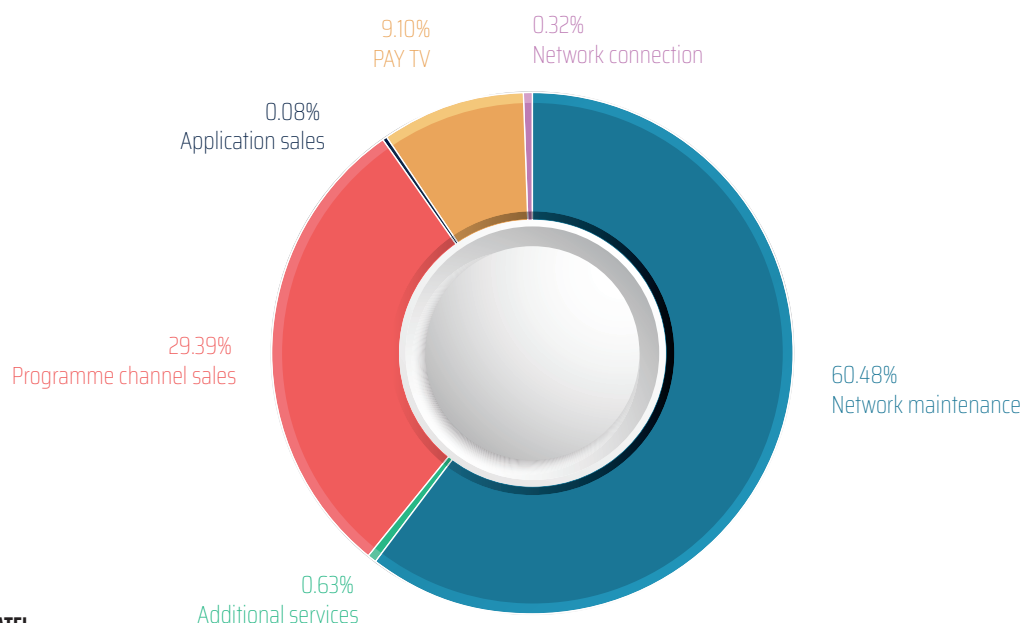
In 2021, the average monthly subscription was 1042 dinars for basic analogue CATV package, and it 1511 dinars for digital CATV. The average subscription for basic IPTV package has marked a slight rise compared to the previous year, amounting to 1395 dinars, whereas the average monthly subscription for DTH is 972 dinars.

Figure 8.9. Average monthly subscription for basic package of the most popular types of distribution (in dinars)

Legend: 2017, 2018, 2019, 2020, 2021
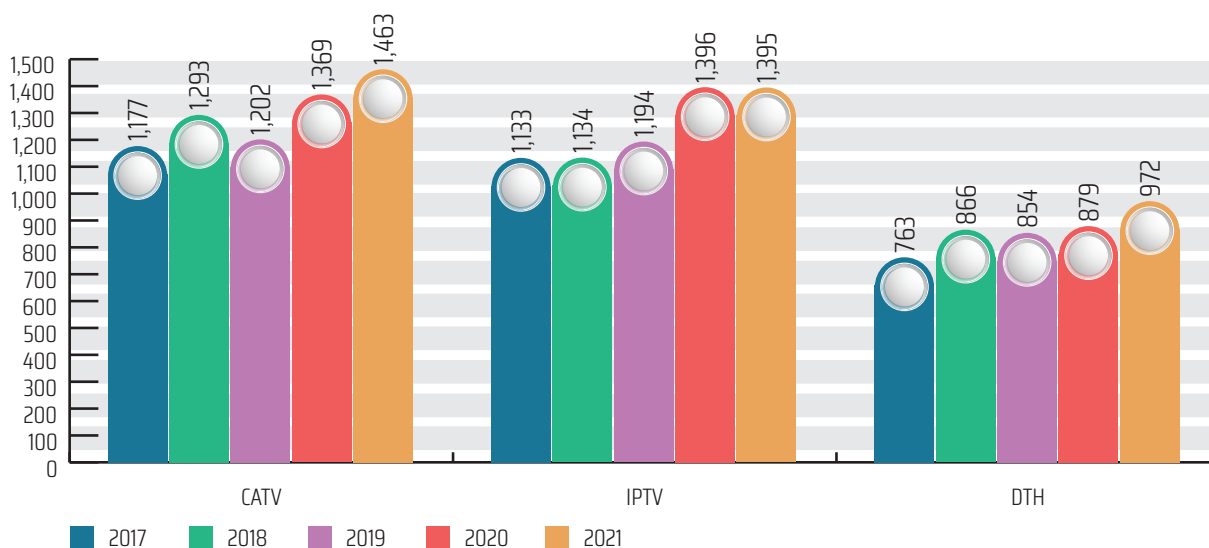
The average number of TV programmes in the basic package in 2021, for different types of distribution, ranged from 43 in case of analogue CATV to 210 in case of digital CATV. There is still a big disproportion between the number of basic package programmes for the analogue and those for the digital CATV, which is one of the means operators use to encourage subscribers to switch to the digital distribution of media content.

Figure 8.10. Average number of TV programs in basic package of the most popular types of distribution
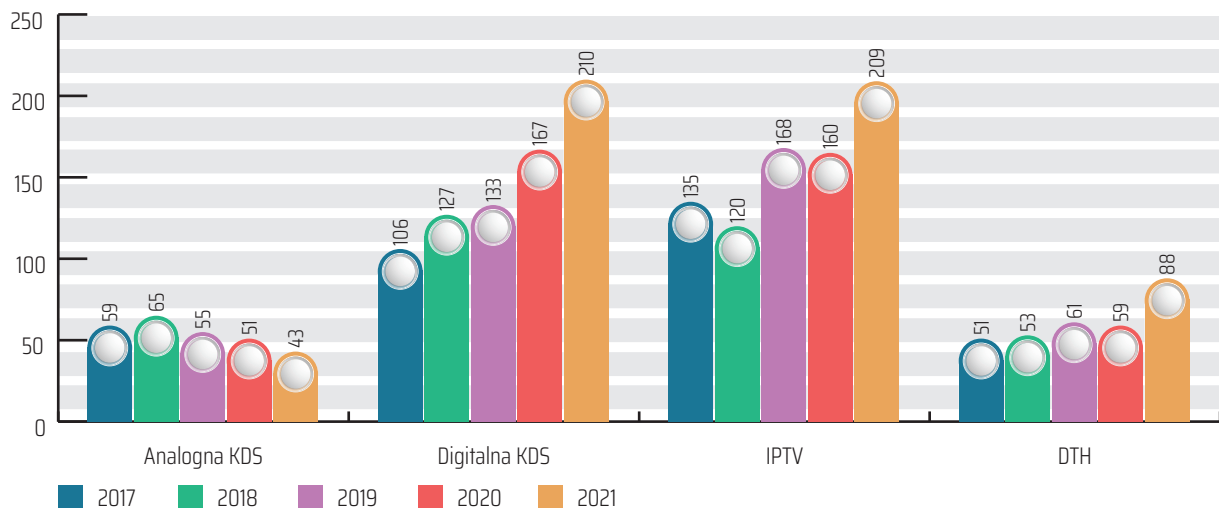
Source: RATEL

In addition to basic package programs included in monthly subscriptions, users can opt for extra, usually thematic, channels subject to additional subscription. These programme packages, in addition to the standard programme plan included in the subscription, contain additional educational, sports, film and other additional HD programmes. According to the available data, in 2021, these programmes were followed by more than 671 thousand subscribers.

Beside the extra channels, additional services available to the subscribers of digital CATV and IPTV include VoD (video on demand), rewind service, recording of the content, interactive TV guide, parental control, watching content on mobile devices and other. According to the available data, in 2021, 1.6 million subscribers used additional services and with over 1.9 billion requests for an additional service (more than 1100 requests annually per subscriber), where more than 55 million requests involved Video on Demand, i.e., 36 requests per subscriber annually.

Regardless of the type of distribution service network (cable, telephony, wireless), watching media content in digital format on more than one TV device requires an additional set-top box for each

device which is charged extra. During 2021, more than 498 thousand subscribers rented additional receivers.

Beside the distribution service, some TV content is available on mobile devices through different apps, without having to connect to the distribution network or to close a subscriber contract with an operator. The user of the app does not pay for a monthly subscription, instead, the app is usually activated by an SMS charged at a predefined rate. This rate is, in fact, the fee for the usage of the application during a specific, usually shorter, period.

Table 8.1. **Penetration of media content distribution service by districts**

District	Penetration
Belgrade	110.80
South Bačka	96.86
Srem	86.09
Braničevo	82.87
Šumadija	80.61
Kolubara	79.37
Central Banat	79.36
South Bačka	78.62
Raška	77.62
Morava	75.88
Podunavlje	75.02
Rasina	72.47
Mačva	72.32
Zlatibor	71.90
Nišava	68.13
West Bačka	67.69
Pomoravlje	67.64
Bor	62.76
Pčinja	62.73
Jablanica	62.31
Pirot	60.37
Zaječar	54.15
Toplica	53.05
North Bačka	51.71
North Banat	51.18

Table 8.1. shows the data on the penetration of media content distribution service per household on a district level, while Figure 8.11. presents a graphical overview on the map of Serbia. Media content distribution penetration rate per district and per municipality is calculated based on the data provided by operators for inhabited localities. Data for Kosovo and Metohija have not been included in the table, due to lack of data on the number of households.

Figure 8.11. **Penetration of media content distribution service by districts**
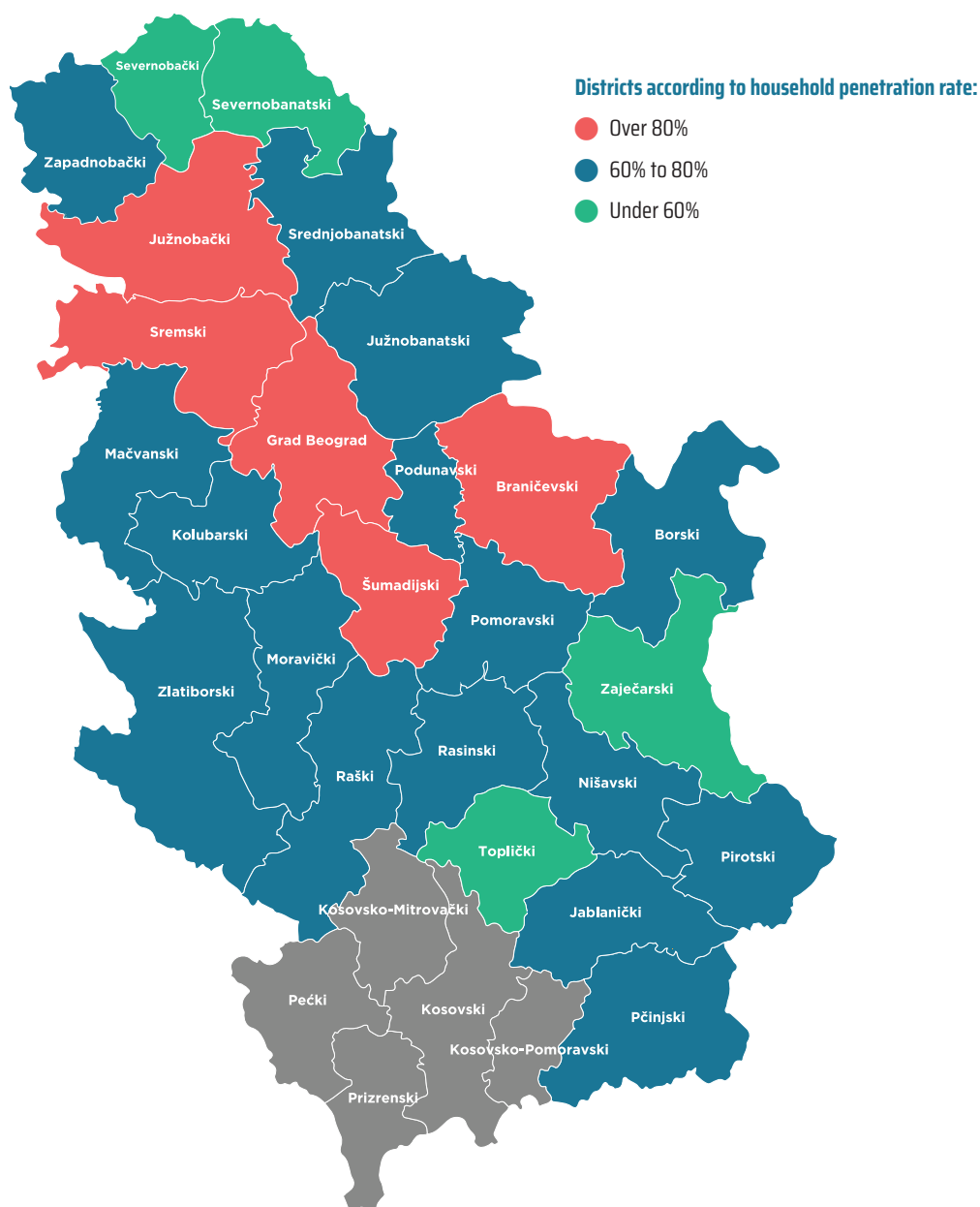
Table 8.2 lists 10 municipalities with the highest penetration rate, whereas Table 8.3 lists the municipalities where media distribution penetration rate is below 30%.

Table 8.2. List of 10 municipalities/cities with the highest media content distribution service penetration rate

Municipality	Subscriber take-up in terms of the number of households per municipality (%)
Čajetina	177.88
Novi Sad	119.15
Beograd	110.80
Veliko Gradište	103.52
Požarevac	98.36
Raška	94.84
Stara Pazova	93.96
Vršac	92.52
Beočin	91.75
Irig	90.77

Table 8.3. Municipalities with penetration of media content distribution service per household under 30%

Municipality	Subscriber take-up in terms of the number of households (%)
Čoka	27.77
Gadžin Han	26.42
Ada	26.31
Senta	20.26
Crna Trava	16.75
Bosilegrad	14.09

z

BUNDLED SERVICES

Bundled services are commercial offers of two or more services at a flat rate, which is lower than the sum of individual prices for each of the services. In the electronic communications market, service packages (bundled services) are the result of the horizontal integration, enabling the operators to use the same network and thus provide more different services on the retail market (horizontally integrated operators), such as fixed telephony, fixed broadband Internet access, media content distribution, mobile telephony and mobile broadband Internet access. In that way, the operators are able to reduce certain costs and attract new subscribers, regardless of the operator's network chosen for the provision of retail services. Bundling services into packages also makes it possible for the operators to offer their services together, in a unique package containing services otherwise non-existent individually in their standard offer.

During last several years, the sale of bundled electronic communications services has marked constant growth, thanks to the benefits they provide to end-users, such as lower prices and simpler purchase and payment procedures for a whole set of services, through a single registration and single account.

In the Republic of Serbia, beside 2-service (double-play) or 3-service (triple-play) packages made up of different combinations of fixed telephony services, broadband Internet and media content distribution, there are also 4-service (quadruple-play) packages that include mobile telephony service as well, while in the EU there are 5-service packages including mobile broadband Internet, sold separately from the voice service via mobile network.

Based on the available data, in the market of the Republic of Serbia, bundled services are offered by 29 operators, out of which 11 operators offer 3-service packages, whereas 4-service packages are offered by one operator. The total number of bundled service subscribers in 2021 was around 1.63

million, marking a growth by 5% compared to the previous year. The triple-play package subscribers account for the growth by 10%, while the number of double-play service packages fell by 2% compared to 2020. The number of 4-service subscribers grew by 9% in 2021..

Figure 9.1. Number of bundled service subscribers (in thousand)
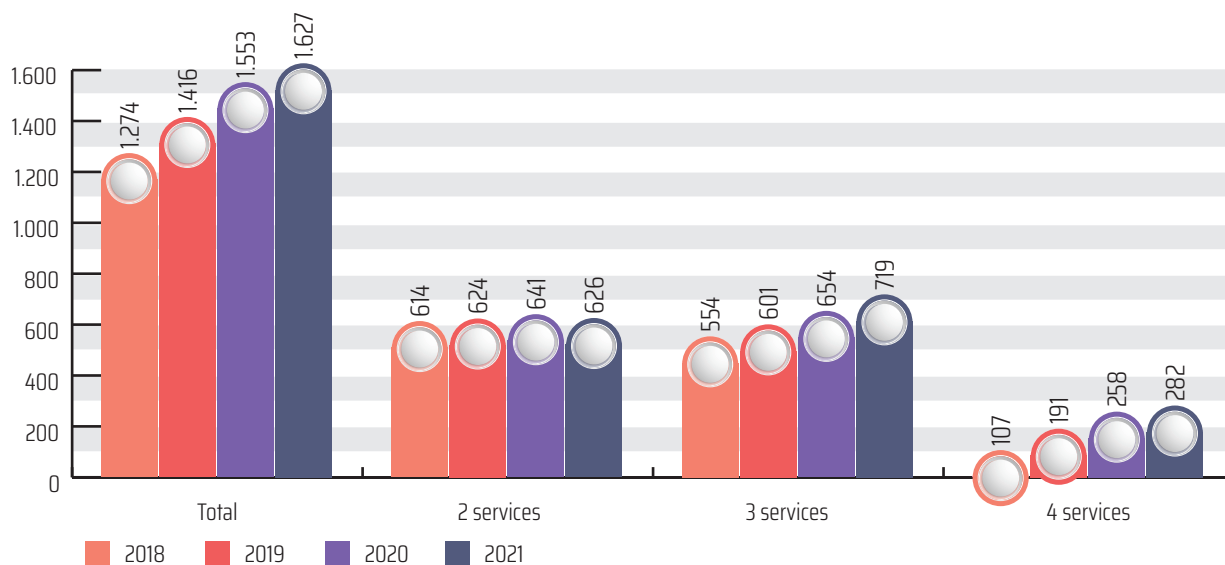
Source: RATEL

In 2021, the penetration of bundled services by the number of households was around 65%.

Figure 9.2. Bundled service penetration by the number of households (%)
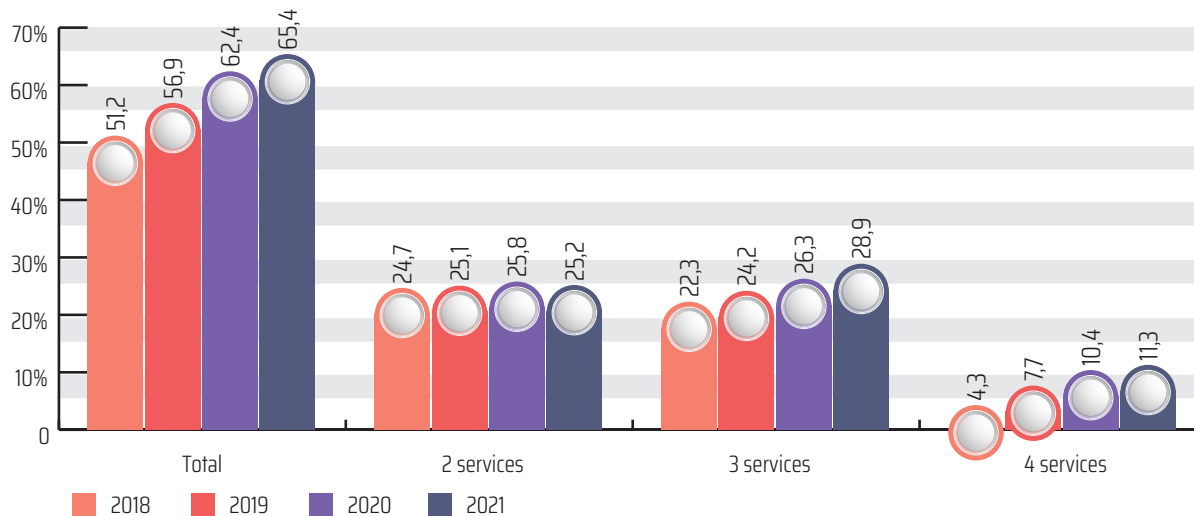
The majority of 2-service package subscribers used bundled service offering broadband Internet access and media content distribution. Figure 9.3, showing the number of double-play service subscribers by types of included services, indicates that in 2021 the number of subscribers of broadband Internet access and media content distribution fell (by 2%), like the number of subscribers of packages including fixed telephony and media content distribution which is down by 9%, as well as subscribers of the broadband Internet and fixed telephony package (a drop by 2%), while the number of subscribers of packages with mobile telephony remained low.

Figure 9.3. **Number of 2-service package subscribers (in thousand)**
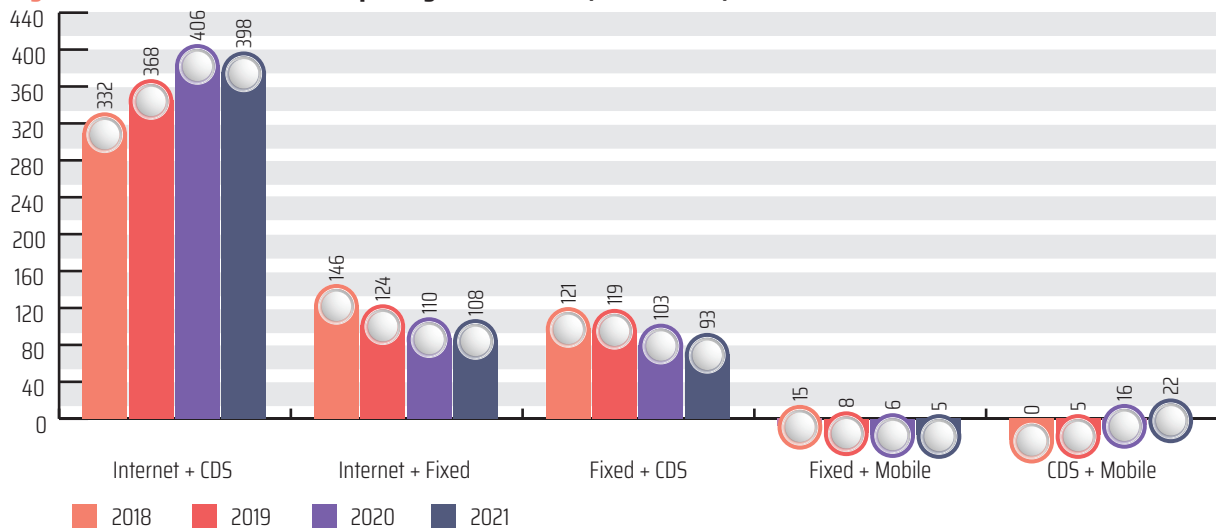
The best selling 3-service package is a bundled service including broadband Internet access, fixed telephony and media content distribution. This package has seen an increase of subscribers by 11%. A slight fall in the number of subscribers was however present in the package containing broadband Intrenet access, fixed telephony and mobile, while the 3-service package offering fixed telephony, media content distribution and mobile telephony and has been on the market since 2016, marked a modest growth, with the number of subscribers still being low, around 15 thousand in 2021.

Figure 9.4. **Number of 3-service package subscribers (in thousand)**
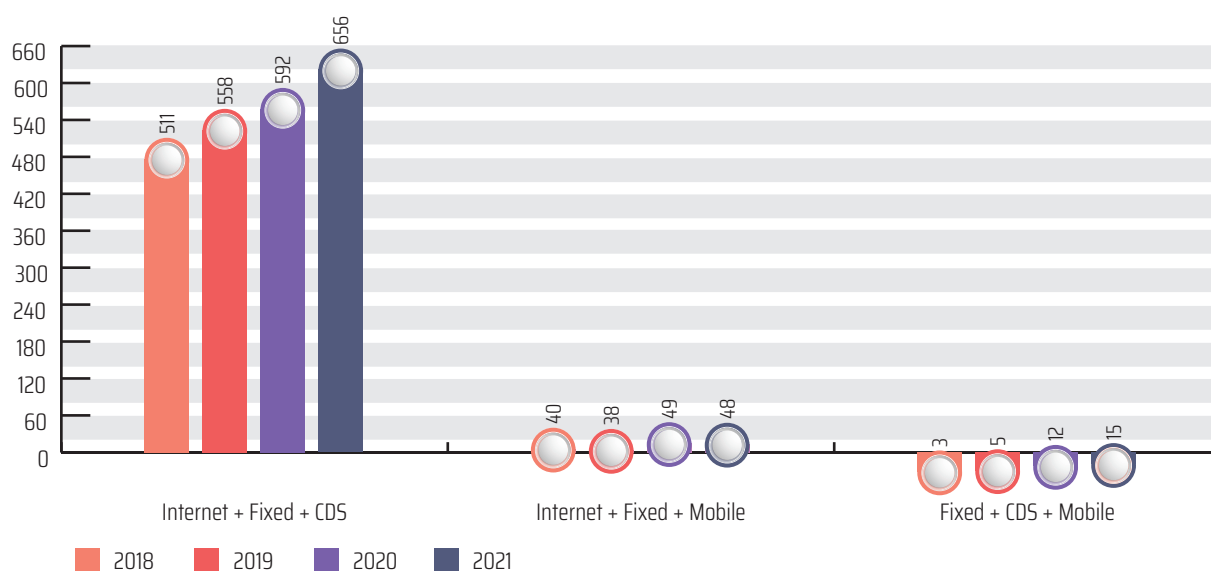
Source: RATEL

Compared to the previous year, the number of subscribers purchasing broadband Internet access, media content distribution and fixed telephony as bundled service, has marked a remarkable increase, while the situation regarding the mobile telephony service has not changed significantly. The best selling service within the package is still that of broadband Internet access, used in bundled mode by over 1.5 million subscribers in 2021. It is followed by the service of media content distribution, used in package by more than half of its subscribers (around 1.4 million), while the least popular service is that of mobile telephony.

Figure 9.5. **Share of stand-alone and bundled services subscribers in 2021**
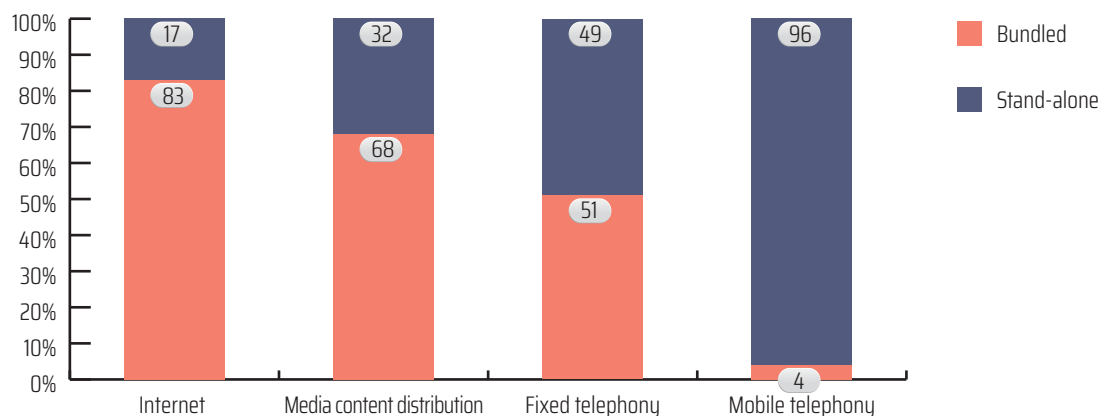
Source: RATEL

In the majority of cases, subscribers purchase the service of broadband Internet access from the same operator whose service of media content distribution or service of fixed telephony they are already using. For that reason, the service of broadband Internet access is most usually purchased in package, since thus the subscribers have the opportunity to pay less and have simpler procedures regarding registering and bill payment (for example, instead of several subscriber agreements for each individual service they purchase, only one package contract is signed with the operator, instead of various separate bills for each individual service, only one package bill is received etc).

Within the best selling 2-service and 3-service packages in 2021, containing broadband Internet access service, as much as 45% of the subscribers opted for an Internet speed from 30 Mbps to less than 100 Mbps. Within the package containing broadband Internet access and media content distribution services, 62% of the subscribers opted for the above rate, whereas 46% of the subscribers using package containing broadband Internet access and fixed telephony services opted for a slower Internet rate (from 2 Mbps to less than 30 Mbps). As for the triple-play packages containing broadband Internet access, media content distribution and fixed telephony services, 38% of the subscribers used the fastest Internet rate (more than 100 Mbps).

Figure 9.6. **Subscribers of best selling service packages by Internet speed in 2021**

21% from 2 Mbps to less than 30 Mbps

34% more than 100 Mbps

45% from 30 Mbps to less than 100 Mbps
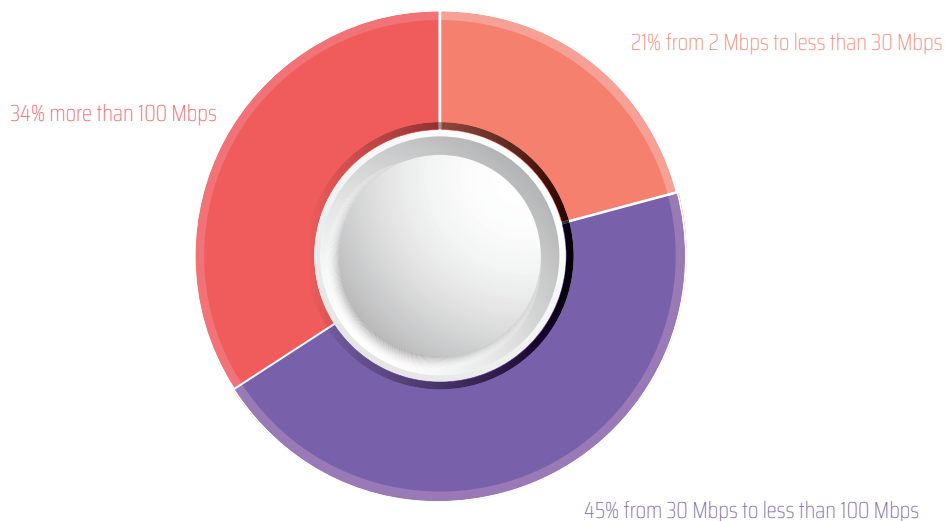
Source: RATEL

The majority of the operators on the market act individually, offering in their packages the services they already provide to their subscribers. There are certain forms of joint offers on the market of the Republic of Serbia, designed to offer services otherwise absent from regular operators' offers, but those include separate subscriber agreements and separate bills for end-users, so they cannot be considered bundled services. The share of operators measured by the number of

bundled service subscribers is shown in Figure 9.7

Figure 9.7. Share of operators by the number of bundled service subscribers in 2021
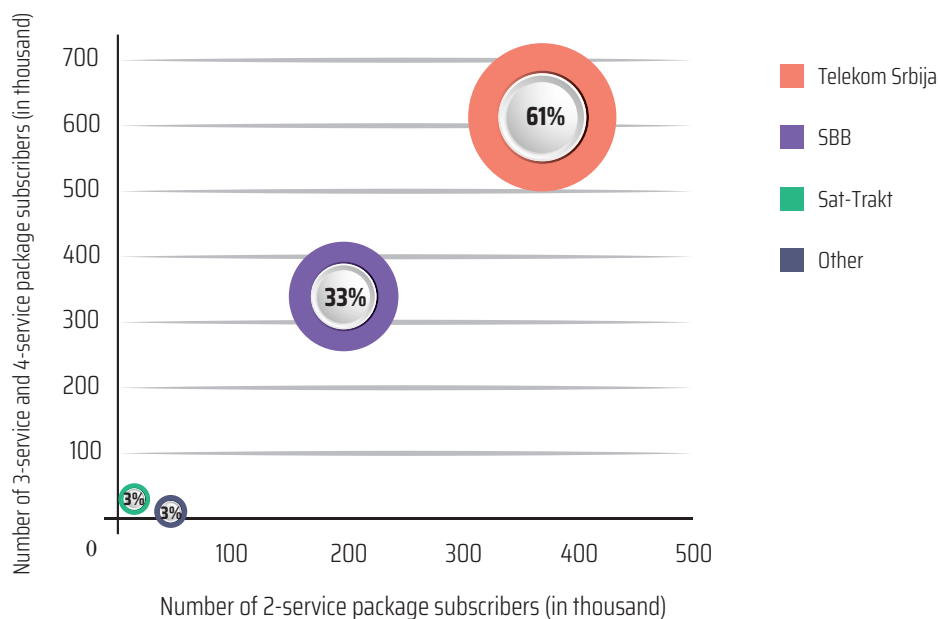
From the sale of bundled services in 2021, the operators earned more than 47.8 billion dinars, the most of which (around 23 billion dinars) was generated from the sale of triple-play bundles, while the sale of quad-play packages accounted for the smallest income share (around 10.4 billion dinars).

Figure 9.8. Earned income from bundled service sales in 2021 (in billion dinars)
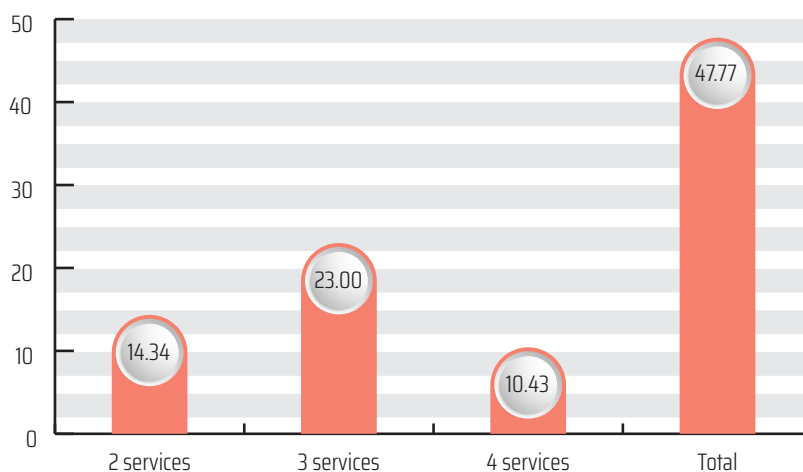
Monthly subscriptions for the best selling packages in 2021 range between 850 dinars for the cheapest package up to 5,299 dinars for the most expensive one, depending on the operator and the package content, and are more or less similar to those of the previous year. Operators often offer bundled services at promotional prices, which are considerably lower than the regular ones, for a limited time period, with a 12 or 24-month contract. Monthly subscriptions differ depending on the program package (basic channel package, additional services, additional media content), Internet speed, free minutes in fixed telephony and a mobile telephony package included in the bundled service. The average best selling bundled services subscription amounts in the Republic of Serbia are shown in Figure 9.9.

Figure 9.9. **Average amounts of monthly subscription for the best selling bundled services (in RSD)**

Source: RATEL
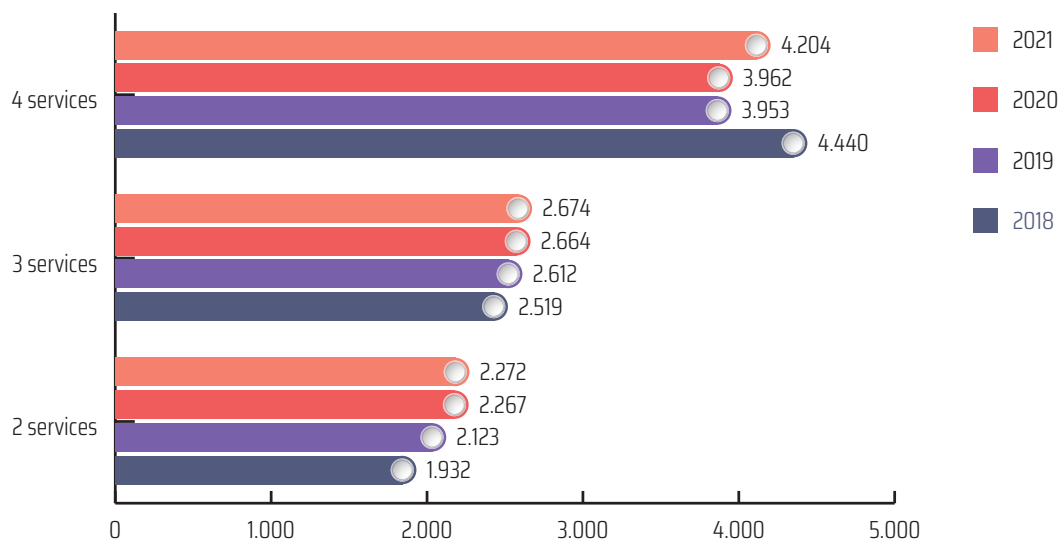
VALUE ADDED SERVICES AND MESSAGING SERVICES

10

The Law on Electronic Communications and Rulebook on general terms and conditions for electronic communication activity ("Official Gazette of RS", No. 38/11) have created administrative possibility for messaging and value added service (VAS) providers to be registered in the register of operators managed and updated by RATEL, in line with its legal competences.

In 2021, there were 41 operators in the register of public communication networks and services registered for value added service provision, most of them also being registered for message transmission service. These operators provide services through fixed and mobile network operators, the users of these networks being able to access value added services by means of public numbering (090Xabcdef and 0780abcdef) for value added voice transmission and internal numbering of mobile operators for value added messaging (SMS, MMS).

Messaging and value added service provided by the operators may be divided, according to purpose, into: televoting, advertising, entertainment, children entertainment, humanitarian aid, adult entertainment, lottery, SMS notifications, marketing bulk messages, goods and services payment and other.

Annual revenues for the period 2018-2021 pertaining to the above services are given in Figure 10.1. The service provision accounts for the total income of 1.005 to 1.174 billion dinars annually. In 2021, the revenues in this market, according to the data collected by RATEL, amounted to approximately 1.619 billion dinars, which means that the operators' income has increased by approximately 46% compared to the previous year. It should be noted that part of the revenues, generated from network usage, traffic billing and collecting, go to network operators, based on commercial contracts between network operators and messaging and value added service providers.

Figure 10.1. Annual revenues 2018-2021
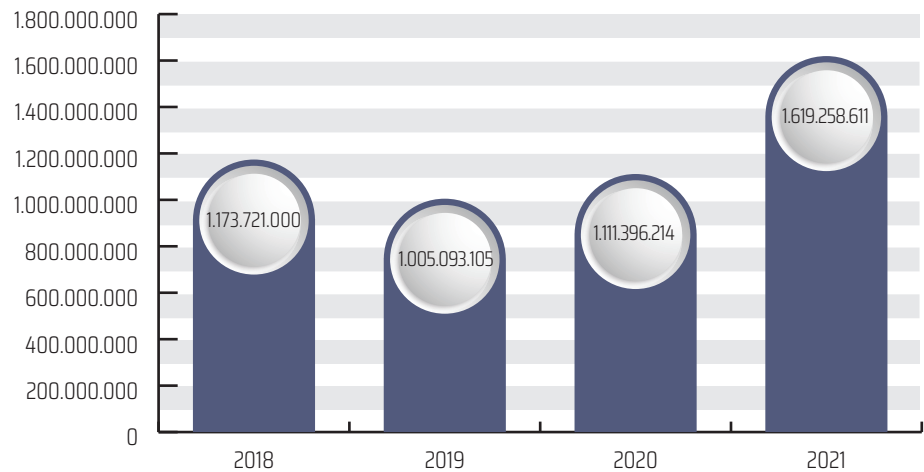
According to the available data provided by the operators to RATEL, there were three providers with the largest revenues from the messaging and value added service provision in 2021: NTH Media, DOPLER and COMTRADE, taking up totally 46% of the VAS market share.

Figure 10.2. Market share of messaging and value added service operators by revenues made from these services
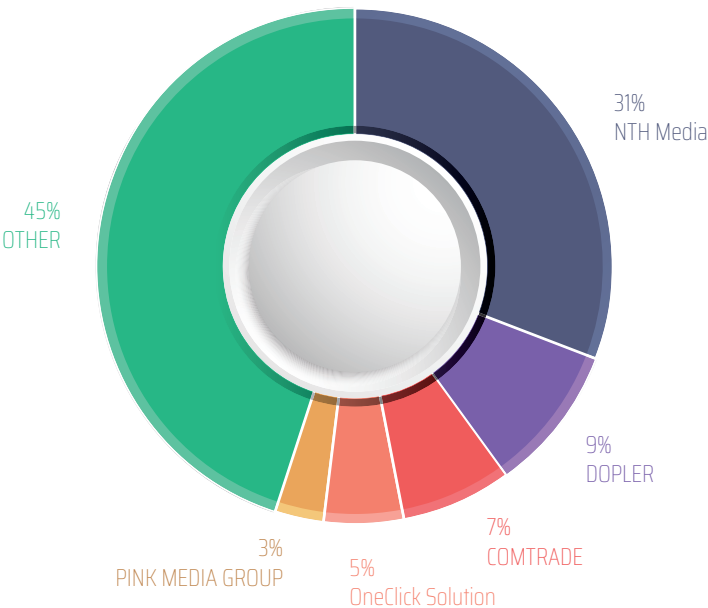
Value added service market is fully competitive. Figure 10.2 shows market share of VAS providers (VASPs) according to revenues made. However, it should be noted that the revenues are divided between VASPs, network operators and content creators.

Around 91% of the total revenues made by the operators in 2021 are revenues from messaging service (SMS, MMS) and VAS messaging, and the rest of the income comes from voice VAS. The technology that enables easier and better data processing for SMS and MMS and the expansion of direct electronic marketing have in the recent period led to a significant increase in the revenues made from messaging and value added services and to a simultaneous drop in the revenues from VAS voice transmission services, with the income share steadily setting in during the recent years. In addition, the large-scale usage of smart phone devices made the users lose interest in VAS by voice transmission or SMS messaging, which particularly affects voice VAS.

Figure 10.3. Market share by type of VAS and revenues made in 2018, 2019, 2020 and 2021
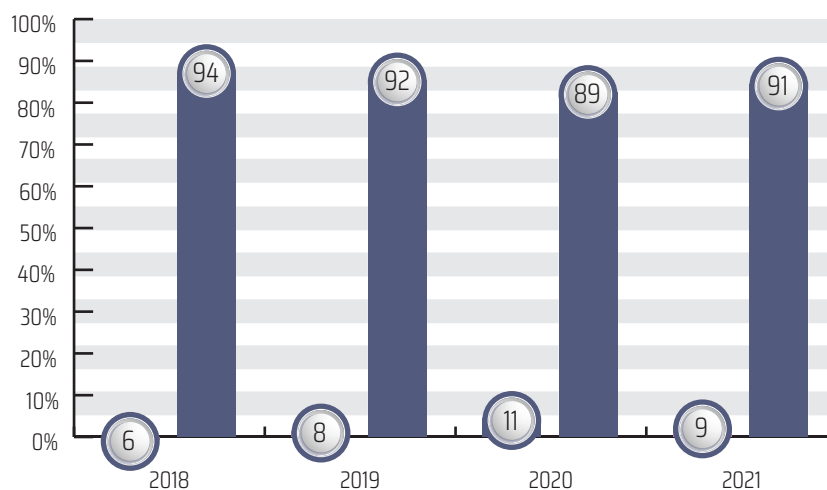
For the purpose of VAS voice transmission, the operators were assigned 520 numbers, which is 140 numbers less than the previous year.

In 2021, the voice value added service provision accounted for approximately 2525 million minutes of traffic, and the share by type of voice VAS is given in Figure 10.4.

Figure 10.4. Share of realized minutes by type of voice VAS in 2021

4%
Marketing

33%
Adult content

63%
Entertainment
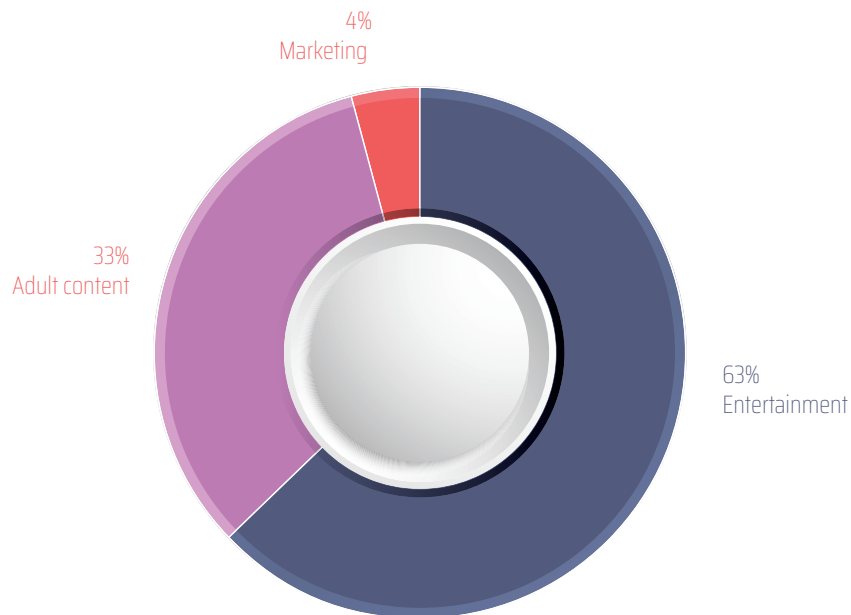
In 2021, the volume of bulk message transmission and VAS message transmission was 834 million messages, the 95% of which account for bulk messages, and 5% for VAS messages.

The share of realized VAS messages by purpose is shown in Figure 10.5.

Figure 10.5. Share of realized VAS messages by purpose in 2021

8%
Lottery

1%
Astrology

9%
Entertainment

2%
Media services

10%
Adult content

3%
Parking service

67%
Other
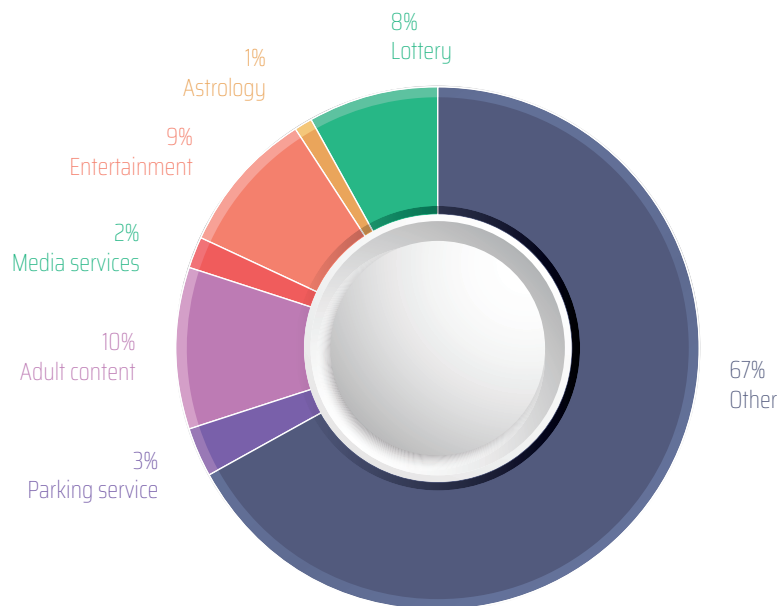
With 72% of the displayed messages belonging to the category "Other", since these do not relate to the standard set of value-added services, but rather serve to transfer information, notifications, taxi requests, perform search queries (for currency exchange values etc.) and payments for goods and services.

The share of realized bulk messages by purpose is shown in Figure 10.6, where it can be seen that 47% of the messages fall under category „Banking transaction notifications".

Figure 10.6. Share of realized messages by purpose for message transmission in 2021t

13%
Marketing

47%
Banking transaction notifications

39%
Other
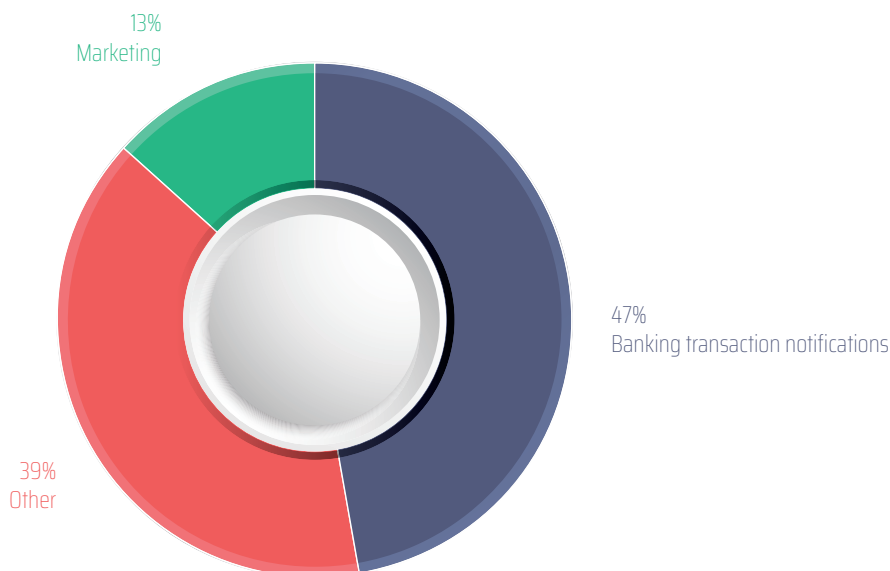
Revenues from voice VAS transmission amount to approximately 144 million dinars, with the shares by purpose being shown in Figure 10.7.

Revenues from message service transmission (bulk messages) and VAS messages amount to more than 1,476 million dinars, 62% of which account for the income generated from VAS message transmission and the rest of the income from bulk transmission. This is an expected ratio of realized revenues, due to the nature of bulk messages, which are charged at a considerably lower average rate than VAS messages.

Figure 10.7. Share of voice VAS revenues by purpose in 2021
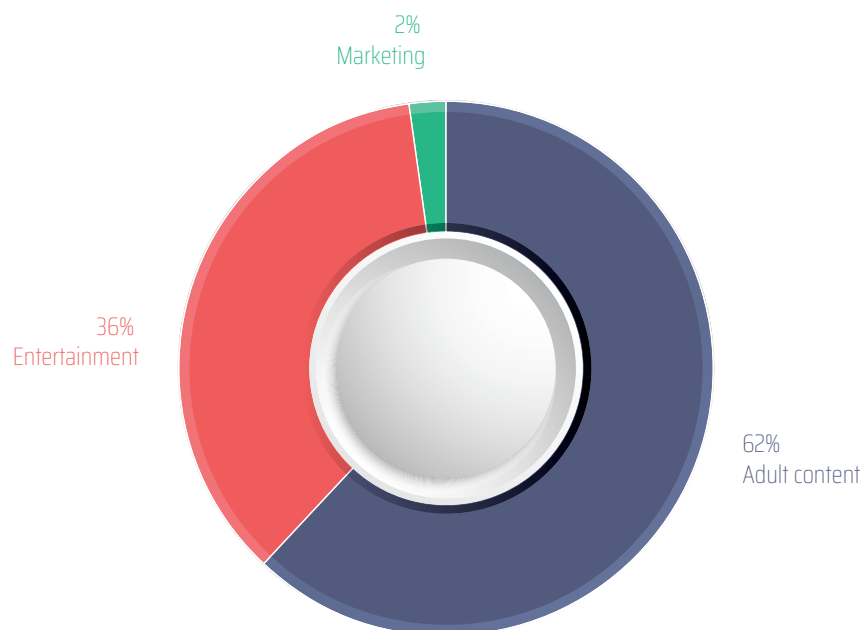
The share of revenues from VAS message transmission by purpose is shown in Figure 10.8, while the share of revenues from message transmission by purpose is shown in Figure 10.9.

Figure 10.8. Share of VAS transmission revenues by purpose in 2021
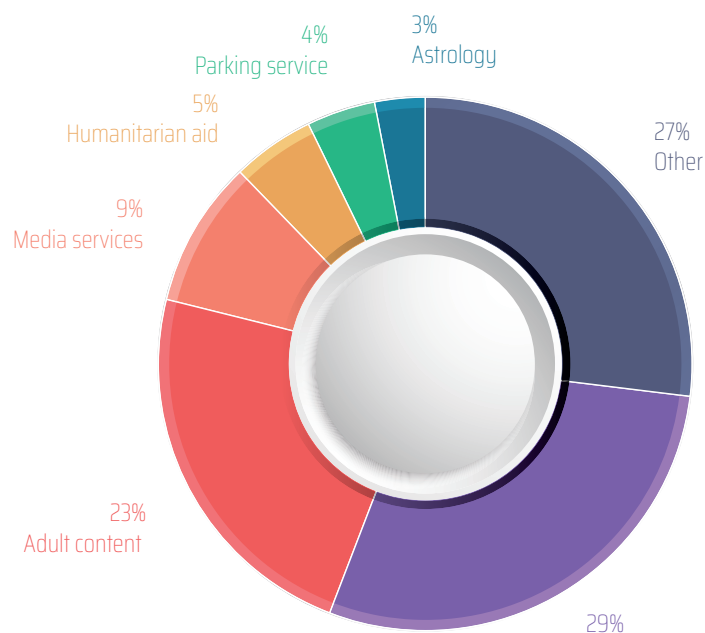
Figure 10.9. Share of message transmission revenues by purpose in 2021
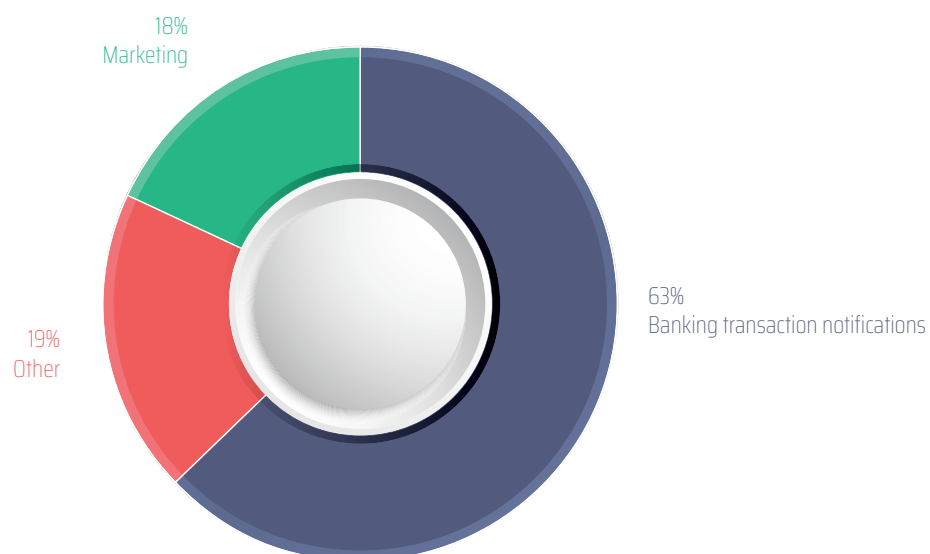
MONITORING OF ELECTRONIC COMMUNICATIONS NETWORK AND SERVICE QUALITY PARAMETERS

11

Monitoring of quality parameters for electronic communication services and networks is performed pursuant to the Rulebook on quality parameters for publicly available electronic communication services and monitoring of electronic communication activity ("Official Gazette" of RS, Nos. 73/11 and 03/14).

The Rulebook stipulates quality parameters for the following electronic communication services:

- Public voice service on the public telephone network at a fixed location,
- Public voice service provided via Internet (VoIP),
- Public services on the public mobile communications network,
- Broadband access
- Media content distribution;

and for the following networks:

- Public mobile communications networks.

The electronic communication operators are required to provide, at least once a year, upon RATEL's request, a report on the values of the quality parameters for services and/or networks, on appropriate forms for each service or network. RATEL also performs monitoring of quality parameters for services and networks, compliance with technical and other requirements and performance of the electronic communication activity, in accordance with the Law on Electronic Communications, the aforementioned Rulebook on quality parameters for publicly available electronic communication services and other bylaws and positive regulations.

RATEL maintains an up-to-date database on the quality of the public communication networks and services. In addition, the operators are required, pursuant to Article 106 of the Law on electronic communications, to make their terms and conditions, including the minimum quality of service provision, publicly available in a suitable manner, so as to inform the users on the values of the quality parameters used for measuring the electronic communication QoS.

The reports on the values of quality parameters for electronic communication services and networks for the previous year were submitted to RATEL by the operators within the prescribed delay, till March 15, 2022.

11.1. Average values of quality parameters for electronic communications services and networks for the period 2019 – 2021

The total of 132 operators submitted their reports for 2021. Further below is shown the value statistics of the selected electronic communication service/ mobile communication network quality parameters.

Average supply time for electronic communications services

For all electronic communications services, the average time from the moment of a valid service order being received to the moment a working service is made available for use, during last year was less than 3.5 days. The operators keep fulfilling the demands of users for electronic communications services more swiftly, so that, for the majority of services, the average supply time becomes shorter each year.

Table 11.1. Average supply time for service

	Prescribed value	2019	2020	2021
Voice service on the public telephone network at a fixed location	10 days for 50% new connections a year	3	3	3.5
Voice service provided via Internet (VoIP)	8 days for more than 95% requests	4	2.2	1.65
Broadband access service	8 days for more than 95% requests	3	2.2	3
Media content distribution service	8 days for more than 95% requests	3.4	2.2	2.6

Customer complaints about quality of electronic communications services

During 2021, the percentage of users' complaints about quality of electronic communications services was in average less than 10% for all types of services. The highest percentage of complaints (10%) was about the broadband access quality.

The time needed for the resolution of users' complaints (applicable for 80% of the complaints) was less than 1.3 days for the majority of services, except for the voice service on the public telephone network at a fixed location, in which case the time is 2.3 days. For all electronic communications services, the percentage of users' complaints about the correctness of bills was less than or equal to 1%, which is this parameter's maximum prescribed value. An increase in this parameter value has been observed, in comparison to the previous years.

Table 11.2. Users' complaints and complaint resolution

		Prescribed value	2019	2020	2021
Voice service on the public telephone network at a fixed location	Percentage of user complaints about quality of service	0.5%	2.17%	3.7%	3%
	Resolution time for user complaints for 80% of the complaints (days)	10.0	1.2	1.4	2.3
	Percentage of user complaints about bill correctness	≤1%	0.54%	0.61%	0.22%
Voice service provided via Internet (VoIP)	Percentage of user complaints about quality of service	-	2%	1.2%	0.65%
	Resolution time for user complaints for 80% of the complaints (days)	1.0	1	1	1.3
	Percentage of user complaints about bill correctness	≤1%	0.1%	1%	0.4%
Services on the public mobile communications network	Percentage of user complaints about quality of service	-	2%	1.33%	1%
	Percentage of user complaints about bill correctness	≤1%	0.1%	0.12%	0.08%

Broadband access service	Percentage of user complaints about quality of service	-	8%	11%	10%
	Resolution time for user complaints for 80% of the complaints (days)	1.0	1.3	1.65	1.3
	Percentage of user complaints about bill correctness	≤1%	0.6%	0.5%	0.8%
Media content distribution service	Percentage of user complaints about quality of service	-	7%	6.5%	7.7%
	Percentage of user complaints about bill correctness	≤1%	0.45%	0.6%	0.8%

Parameters of operator's contact services

A rule has been observed that the „response time for operator's contact services" parameter value increases with the number of users. The operators serving a great number of users should improve this parameter in order to provide a better communication contact to the customers.

Table 11.3. Response time for operator's contact services (Call Center) (in seconds)

	2019	2020	2021
Voice service on the public telephone network at a fixed location	28	45	63
Voice service provided via Internet (VoIP)	25	58	62
Services on the public mobile communications network	38	53.4	53
Broadband access service	35	45	43
Media content distribution service	32	49	42

Quality parameters for voice service on the public telephone network at a fixed location

The ratio of all unsuccessful calls comprising the percentage of unsuccessful national calls in fixed network within and outside of the local exchange, percentage of unsuccessful national calls from fixed network to mobile operators and other fixed operators, as well as percentage of unsuccessful international calls was 0.7% in 2021, which equals the value from the previous reporting cycle. The supply time for call was extended.

Table 11.4. Quality parameters for voice service on the public telephone network at a fixed location

	Parameter definition	Prescribed value	2019	2020	2021
Unsuccessful call ratio (all calls)	Percentage of call attempts to an existing user which failed due to system failure or incorrectly dimensioned bundles.The case where the called party (B-Number) is busy or not responding is not regarded as a failed call	≤1%	0.79%	0.7%	0.7%
Supply time for call (average time for national calls)	Time between selecting the last digit of the subscriber's number and call verification signal	< 3s	2.7	2.32	4

Quality parameters for services on the public mobile communications network

Four operators provide reports including quality parameters for public services on the public mobile communications network:

- Telekom Srbija
- Telenor
- A1 Srbija
- GLOBALTEL

whereby GLOBALTEL is a virtual mobile operator.

The measurement of quality parameters for services on the public mobile telecommunications network, which are supposed to correspond to average values measured for the peak traffic hour in a 7-day week, was carried out in the 52nd week of 2021, between the 20th and 26th of December 2021.

Table 11.5. Quality parameters for public mobile service

	Parameter definition	Prescribed value	2019	2020	2021
Call Setup Success Rate for GSM mobile network (Call Setup Success Rate)	CSSR=(successful call attempts/all call attempts)*100	> 98% na nivou GSM mreže	99.39%	99.55%	99.4%
Call Setup Success Rate for UMTS mobile network (Call Setup Success Rate)	CSSR=(successful call attempts/all call attempts)*100	> 98% na nivou UMTS mreže	99.25%	99.9%	99.4%
VoLTE Call Setup Success Rate (Call Setup Success Rate)	CSSR=(successful call attempts/all call attempts)*100	-	-	99.8	99.8%
Telephony Setup Time for GSM network	Time for connection setup from the moment user activates sending function	-	4.5s	4.61s	6.6s
Telephony Setup Time for UMTS network	Time for connection setup from the moment user activates sending function	-	2.7s	2.78s	5.3s
DL Throughput for Packet Interactive in GSM and UMTS mobile networks	Average throughput toward user (DL) for packet interactive	> 128 Kb/s	5.3Mb/s	2.8Mb/s	2.6Mb/s
DL Throughput for Packet Interactive in LTE mobile network	Average throughput toward user (DL) for packet interactive	-	54.4Mb/s	43.7Mb/s	20Mb/s

Call setup in 2G and 3G mobile communication networks is extended, however since the public voice service is provided largely via LTE network, so-called VoLTE, where the parameter „supply time for service" is on average up to 2s, this increase is of no particular importance. Telephony setup

time for 4G networks is not prescribed by the Rulebook, and according to the measurement results it is less than 2s.

Network load for GMS and UMTS network voice traffic

The measurement of quality parameters for mobile communications networks, which should correspond to average values measured for the peak traffic hour in a 7-day week, was carried out in the 52nd week of 2021, between the 20th and 26th of December 2021.

Table 11.6. Network load for GMS and UMTS network voice traffic

		2019	2020	2021
GSM Voice traffic	Mean value of network load for GSM network voice trafic, Erlang/TRX	1.22	1.92	2.45
UMTS Voice traffic	Mean value of network load for UMTS network voice trafic, Erlang/TRX	2.59	3.35	3.24

The mean value of the LTE traffic volume in the week of measurement in 2021 amounted to 4,354,672 GB, demonstrating an increase in the network load by approximately 1,000,000 GB compared to the last year's monitoring period.

11.2.   Benchmarking of mobile communications networks

RATEL's strategy aims to encourage additional investments and further development of telecommunications market by fostering competition, cost-effectiveness and efficiency of mobile communications, and to inform users in a reliable and neutral way on the quality of mobile networks in the Republic of Serbia. For that reason, over the last five years RATEL has performed comprehensive benchmarking of mobile communications networks belonging to the following operators: Telekom Srbija, Telenor (now Yettel) and A1 Srbija.

The purpose of mobile network benchmarking is an objective parallel testing of QoS in mobile networks, from users' point of view, by measuring KPI quality parameters (Key Performance Indicators).

The manner of the commercial benchmarking measurement performance is dependent on the specific contractor. Specialized companies use their own scoring systems, whereas mobile operators carry out benchmarking campaigns based on their own criteria.

RATEL's measurements were carried out in accordance with technical recommendation (ETSI) TR 103 559 Annex A of ETSI (European Telecommunications Standards Institute), introducing a new methodology, with RATEL being one of the first organizations to implement it.

The use of this methodology has, for the first time, enabled standardized measurement and scoring of the achieved results. The crucial KPIs pertaining to the most important mobile telephony services are measured, weighted and finally added into the result which realistically reflects how the end user experiences the network performance. Additionally, a new feature makes it possible for the measurements to be mutually comparable and the results not to depend on the contractor performing the measurements.

The benchmarking measurements were carried out in a drivetest form, using two vehicles moving on the pre-defined routes, and in a walktest form, at ten hot-spot locations in Belgrade.

Benchmarking measurements were carried out in 55 cities, along 15,000 km of roads and 1800 km of railroads in the Republic of Serbia. During the campaign, more than 8,000 calls and 8,000 sessions for each of data transfer services on all mobile networks and using all available technologies (2G, 3G, 4G) were performed. The measurements included:

- radio parameter measurements for 2G/3G/4G technologies,
- *measurement of KPIs for voice service and data transfer service.*

In the five-year long mobile network benchmarking history carried out by RATEL in the Republic of Serbia, this year's project has been the largest so far. The benchmark comprised measurements in the form of drive tests, at hot-spot locations (such as squares, promenades, shopping malls, airport) and the railway, which made it the largest campaign to have ever been performed in the Republic of Serbia (without AP Kosovo and Metohija), with categorization strictly in line with recommendation ETSI 103 559 (Annex A). The map of routes used for measurements is shown in Figure 11.1.

Since the benchmarking of mobile networks was carried out in September, October and November of 2021, the measured and calculated values of quality parameters, including final results, refer only to that period.

Figure 11. 1. Map of measurement routes
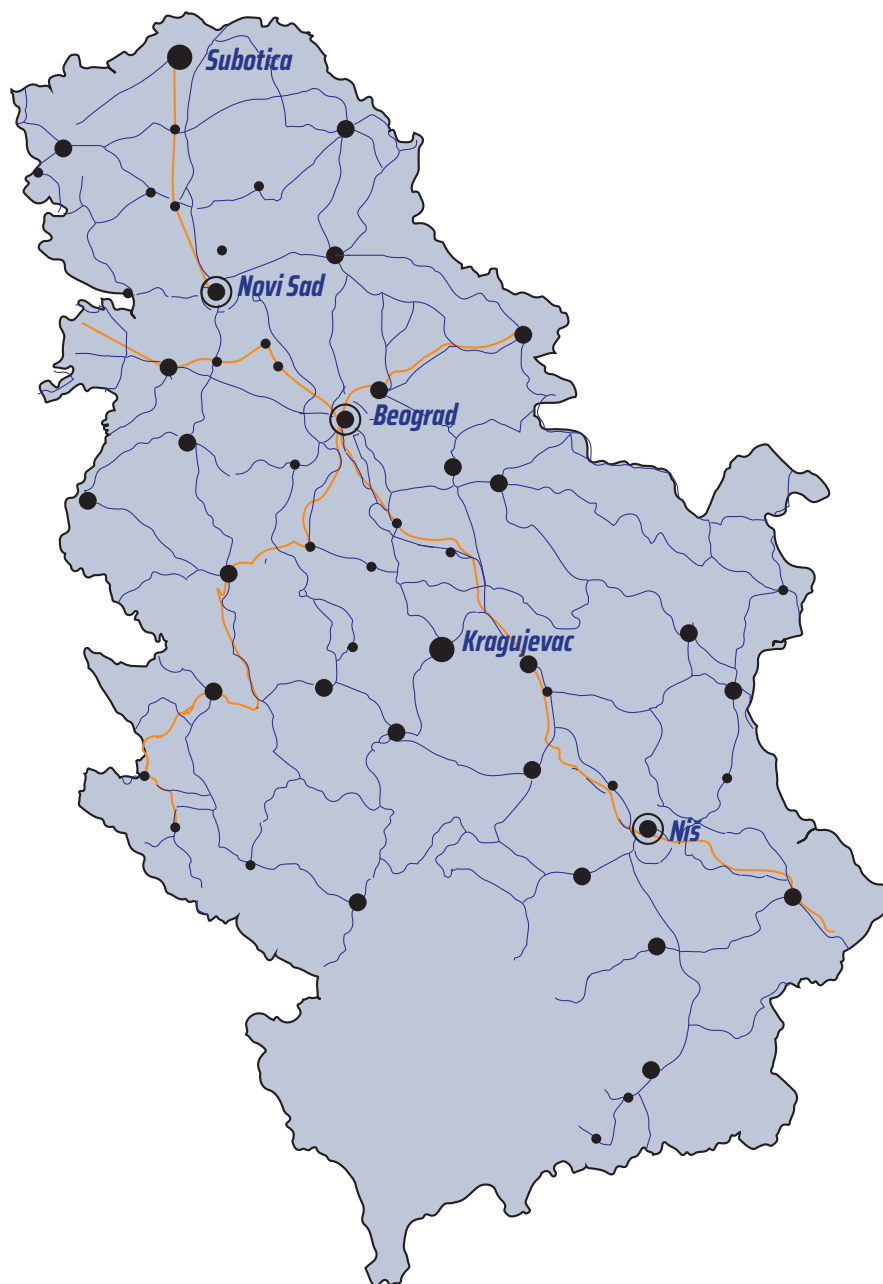
Radio parameters for 2G/3G/4G technologies

Radio frequency bands (2G, 3G, 4G) used by operators during the benchmarking campaign are shown in Figure 11.2.

Figure 11.2. Radio frequency bands used by operators during benchmarking campaign
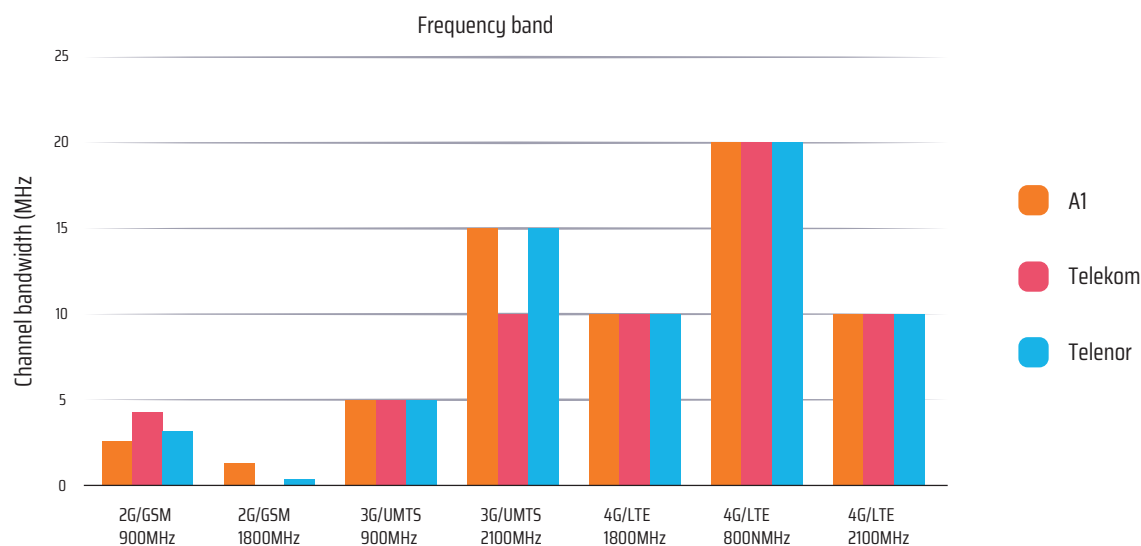
2G/GSM: All three operators used radio frequency band 900 MHz. Radio frequency band 1800 MHz was used by A1 Srbija, with Telenor using it to a slightly lesser extent.

3G/UMTS: Radio frequency band 900 MHz was used by all operators. All three operators also used radio frequency band 2100 MHz, with Telekom Srbija using it without UARFCN=10688 this year.

4G/LTE: Radio frequency bands 800 MHz and 1800 MHz were used by all three operators. Additionally, radio frequency band 2100 MHz was used by all operators, including Telekom Srbija, to which it had not been available during previous campaigns. In big and medium cities, all three operators mainly used LTE-CA with channel bandwidth 30-40 MHz, whereas A1 Srbija used channel bandwidth up to 50 MHz at certain locations. In small cities, Telenor mostly used LTE-CA with channel bandwidth 40 MHz. A1 Srbija and Telekom used channel bandwidth 40 MHz to a lesser extent along the roads.

The use of Carrier Aggregation (CA) depends on network configuration and the quantity of sent data during the test. In big cities, A1 Srbija and Telekom Srbija used LTE CA in 97% of cases, and Telenor

in 95% of cases. In medium cities, all three operators used LTE CA in more than 95% of cases. On highways, LTE CA was used most by Telekom Srbija, with 94%, A1 Srbija came in second with 86% and lastly Telenor with 68%. Along main roads, A1 Srbija used LTE CA most, with 70%, followed by Telekom Srbija with 53% and finally Telenor with 40%. Along rural roads, the LTE CA usage was the least, with 44% for A1 Srbija, 37% for Telekom Srbija and 26% for Telenor.

Mobile network benchmarking results 2021

In the 2021 Benchmarking campaign, Telekom Srbija had the best total score, thanks to an out-standing improvement of the quality of all services in all categories. Positions taken by the opera-tors based on final results during benchmark campaigns changed significantly. In comparison to years 2017 and 2018, when ranked third, Telekom Srbija significantly improved its network quality of service, which resulted in the top ranking throughout the next three benchmarking campaigns (2019, 2020 and 2021). This is a clear signal of a continuous improvement trend of Telekom Srbija's network quality. A1 Srbija and Telenor have also significantly enhanced their network's quality, whi-ch was on a similar level as in the 2021   benchmark campaign.

Due to the use of a different methodology for this year's benchmark measurements, the results achieved by the operators throughout all benchmarking campaigns can only be compared in their final score positions. This year's mobile network benchmarking was carried out in accordance with ETSI 103 559 (Annex A) scoring methodology. This year's benchmark methodology differs from the previous projects in the types of conducted tests and performance assessments, thus significantly limiting the trend analysis.

Figure 11.3. Comparison of final results by year

Final score – 2021
ETSI 103 559 Annex A Methodology

Final score – Ranking
Systemics PAB Methodology
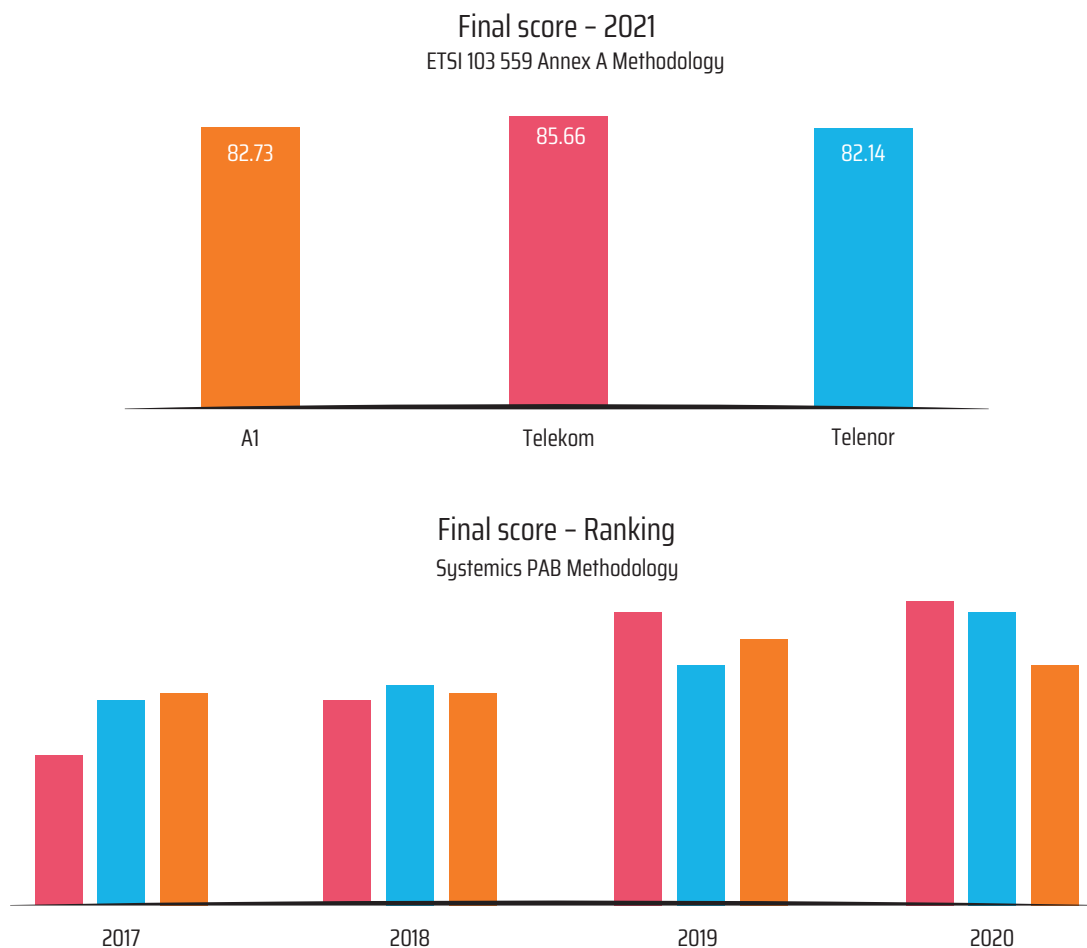
For the assessment of the overall performance and mobile network ranking, 5 main types of services were tested, namely:

- Voice service, with 40% share in the total result
- Web browsing, with 22,80% share in the total result
- Data transfer service, with 15% share in the total result
- YouTube, with 13,20% share in the total result
- Messaging service (via WhatsApp), with 9% share in the total result.

The results of the mobile network benchmark were clustered for all 5 measured service types and by all aggregation categories: big cities, medium cities, small cities, highways, main roads, rural roads, rail corridors and final score.

Voice service tests

The achieved KPI values for voice service tests are at the expected levels. The complete analysis and comparison of KPI parameters for voice service are shown in Figure 11.4.

Figure 11.4. Voice service testing results
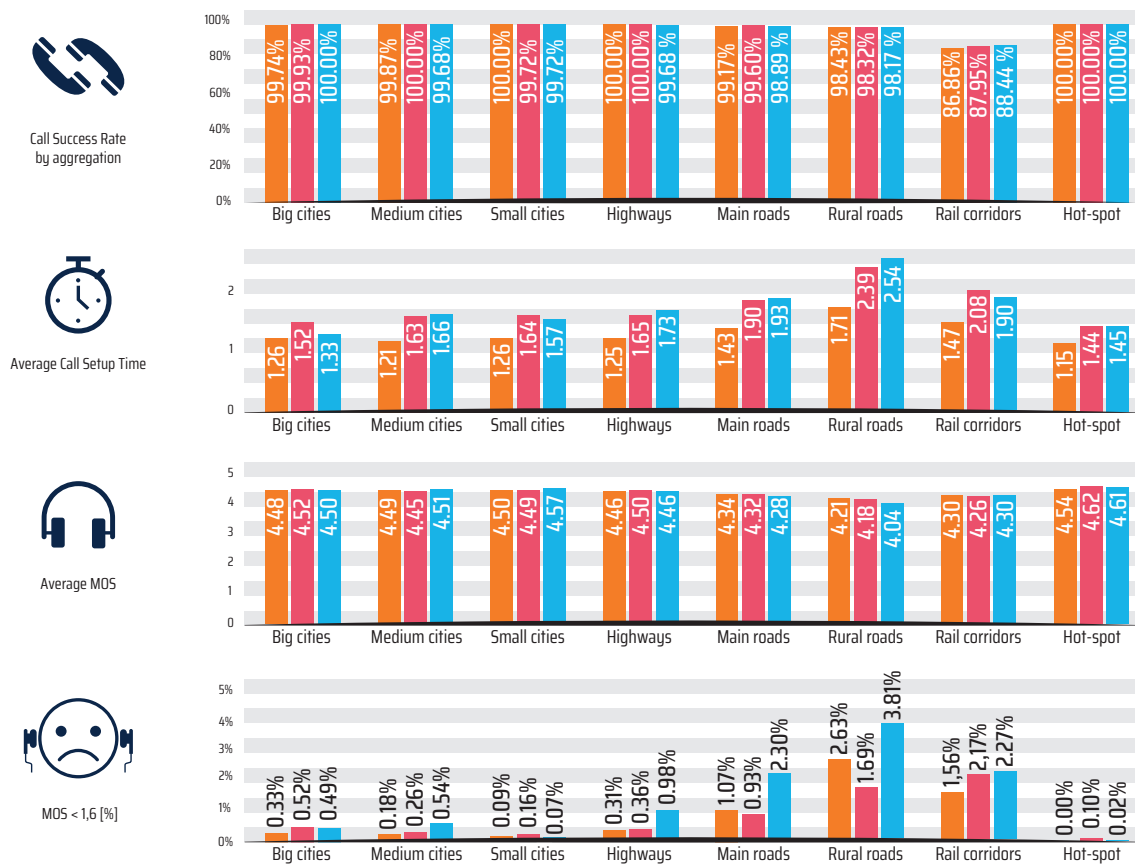
- *Call Success Rate by aggregation:*

  In big cities, all operators achieved excellent successful call rates. A1 Srbija had the shortest average call setup time, with Telekom Srbija displaying the best voice signal quality (MOS).

  Not unlike big cities, all operators achieved excellent successful call rates in medium cities as well. A1 Srbija had the shortest average call setup time, whereas Telenor displayed somewhat higher MOS values than Telekom Srbija and A1 Srbija.

  In small cities, all operators had excellent successful call rates. A1 Srbija achieved the shortest average call setup time and Telenor displayed somewhat higher MOS parameter values than Telekom Srbija and A1 Srbija.

  As for the roads, call success rates along rural roads were lower than those recorded along highways and main roads, for all three operators. A1 Srbija and Telekom Srbija achieved approximately the same results, with Telenor slightly lagging behind.

  Along rail corridors, call success rates were much lower than in other aggregations, mainly due to tunnels and mountainous areas, that hamper coverage. Telenor and Telekom Srbija had approximately the same results, with A1 Srbija slightly lagging behind.

  At hot-spot locations, like in big cities, all operators achieved excellent call success rates. A1 Srbija had the shortest average call setup time. Telekom Srbija and Telenor had identical voice signal quality, with A1 Srbija displaying a somewhat lower score.

- Average Call Setup Time: A1 Srbija had the shortest average call setup time in all eight aggregations, and is followed by Telekom Srbija (usually coming second) and Telenor, with almost identical results.
- Average MOS: All operators displayed similar voice signal quality (MOS). The results along the roads are to some extent weaker than in other aggregations, but still on a very high level for all three operators.
- High percentage of samples with unsatisfactory MOS parameter values (MOS<2.3 voice signal quality considered unacceptable by users) is observable along the rural roads and rail corridors.

Data transfer tests

KPI test results regarding data transfer services, achieved by the operators in various categories are shown in Figure11.5. Comparative data transfer values for WhatsApp messaging, browsing and YouTube video service are also shown below.

• *Small file transfer − Download*

Figure 11.5. Data transmission service testing results – Download
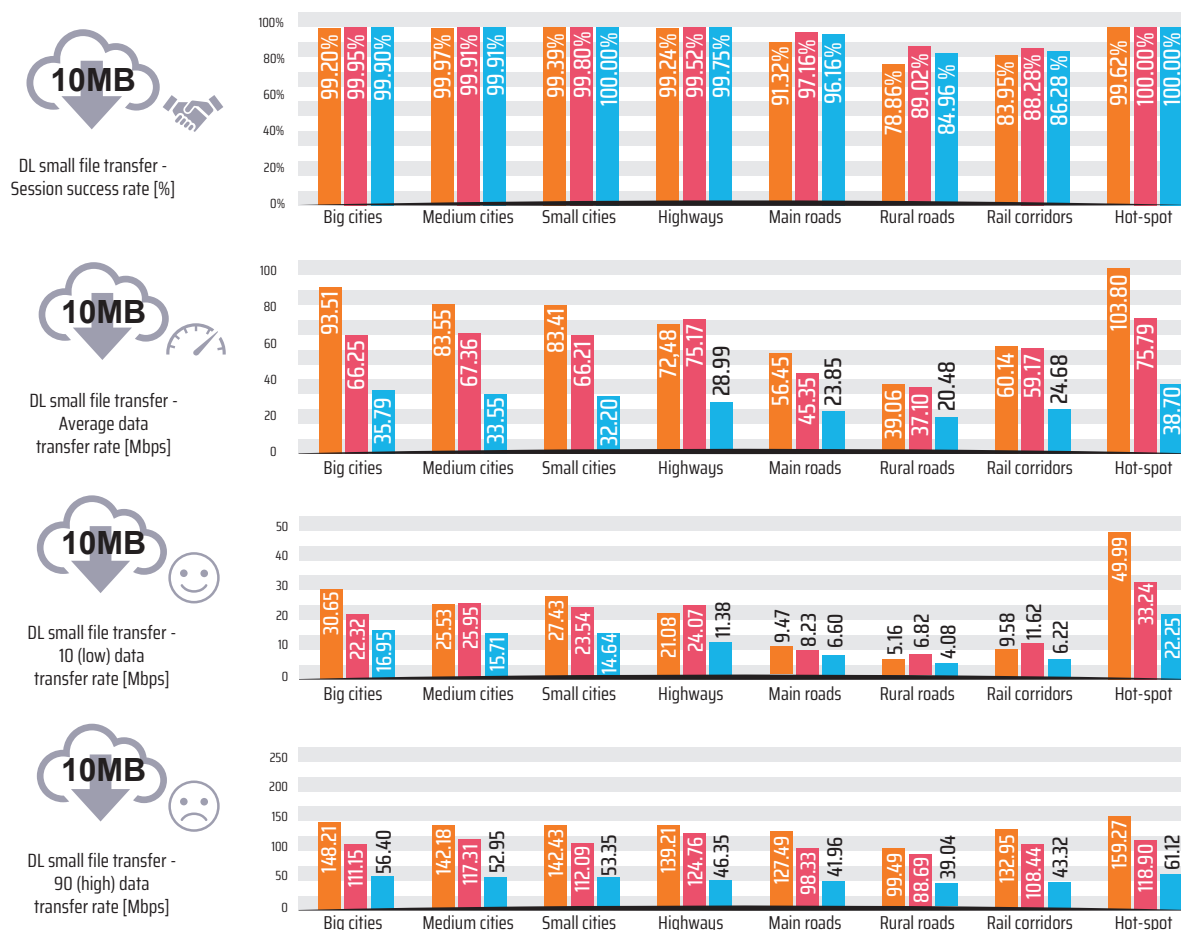
In big cities, all operators achieved high rates of successfully realized sessions. A1 Srbija attained the highest average data transfer rate (LTE-4CA technology was used), followed by Telekom Srbija and Telenor.

In medium cities, likewise, all operators achieved high rates of successfully realized sessions. A1 Srbija attained the highest average data transfer rate, followed by Telekom Srbija and Telenor.

In small cities, all operators achieved high rates of successfully realized sessions. A1 Srbija attained the highest average data transfer rate, followed by Telekom Srbija and Telenor.

As for the roads, session success rate was lower along main and rural roads than along highways. The best score along main and rural roads was achieved by Telekom Srbija, with Telenor leading along highways. A1 Srbija had the highest average data transfer rate.

Along rail corridors, session success rate was much lower compared to other aggregations, mainly because of hampered coverage due to tunnels and terrain configuration. The best score was achieved by Telekom Srbija, followed by Telenor and A1 Srbija. A1 Srbija and Telekom Srbija had almost identical data transfer rates.

At hot-spot locations, like in big cities, all operators achieved very high rates of successfully realized sessions. A1 Srbija had the highest average data transfer rate, followed by Telekom Srbija and Telenor.

• *Small file transfer – Upload*

Figure 11.6. Small file transfer - Upload
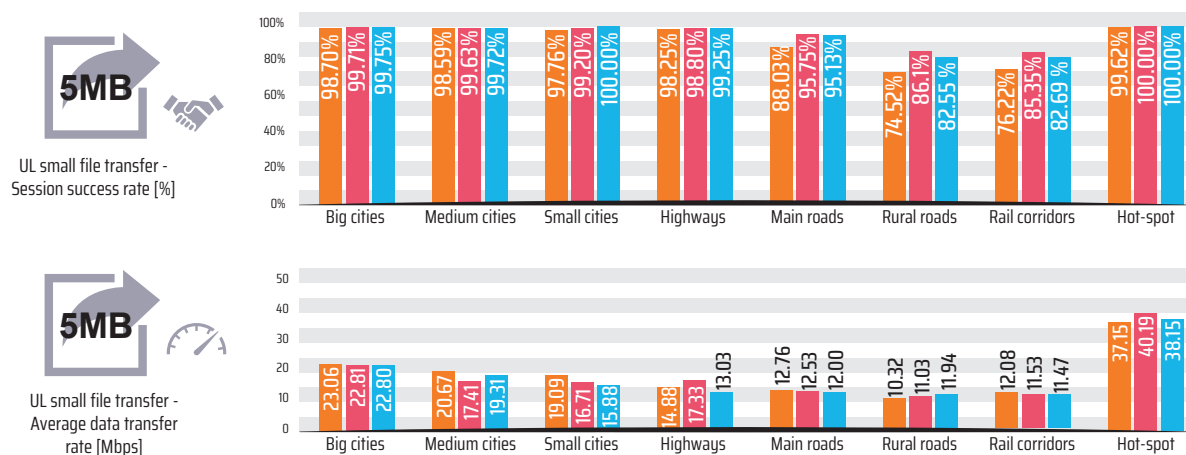
In big cities, all operators achieved high rates of successfully realized sessions. The highest average data transfer rate was achieved by A1 Srbija, followed by Telekom Srbija and Telenor. The attained results are on a very similar level for all operators.

In medium cities, like in big cities, all operators achieved high rates of successfully realized sessions. A1 Srbija had the highest average data transfer rate and highest P90 value (highest average data transfer rate attained by more than 90% samples), followed by Telenor and Telekom Srbija.

5MB ☹

UL small file transfer - 10 (low) data transfer rate [Mbps]

	Big cities	Medium cities	Small cities	Highways	Main roads	Rural roads	Rail corridors	Hot-spot
	2,64	2,79	1,63	1,61	1,27	1,22	1,04	15,68
	2,99	2,35	2,36	2,97	1,69	2,02	1,54	21,34
	3,30	3,15	3,03	2,35	1,83	1,63	1,47	17,89

5MB ☺

UL small file transfer - 90 (high) data transfer rate [Mbps]

	Big cities	Medium cities	Small cities	Highways	Main roads	Rural roads	Rail corridors	Hot-spot
	51,09	47,79	46,44	32,26	31,42	22,75	33,27	56,09
	49,65	42,68	39,42	39,68	27,44	25,89	31,13	55,79
	48,87	42,63	35,57	27,98	26,91	26,47	27,43	55,18

In small cities, all operators achieved extremely high rates of successfully realized sessions. The highest average data transfer rate was attained by A1 Srbija, followed by Telekom Srbija and Telenor.

As for the roads, session success rate was lower along main and rural roads than along highways. The best result along main and rural roads was scored by Telekom Srbija, with Telenor being the best along highways. All operators achieved average data transfer rates on a similar level.

Along rail corridors, session success rate was much lower compared to other aggregations, mainly because of hampered coverage due to tunnels and terrain configuration. The best score was achieved by Telekom Srbija, followed by Telenor and A1 Srbija. All operators had similar and not very high average data transfer rates.

At hot-spot locations, all operators achieved very high rates of successfully realized sessions. Telekom Srbija had the highest average data transfer rate, followed by Telenor and A1 Srbija.

• *Browsing*

Figure 11.7. Browsing service testing results
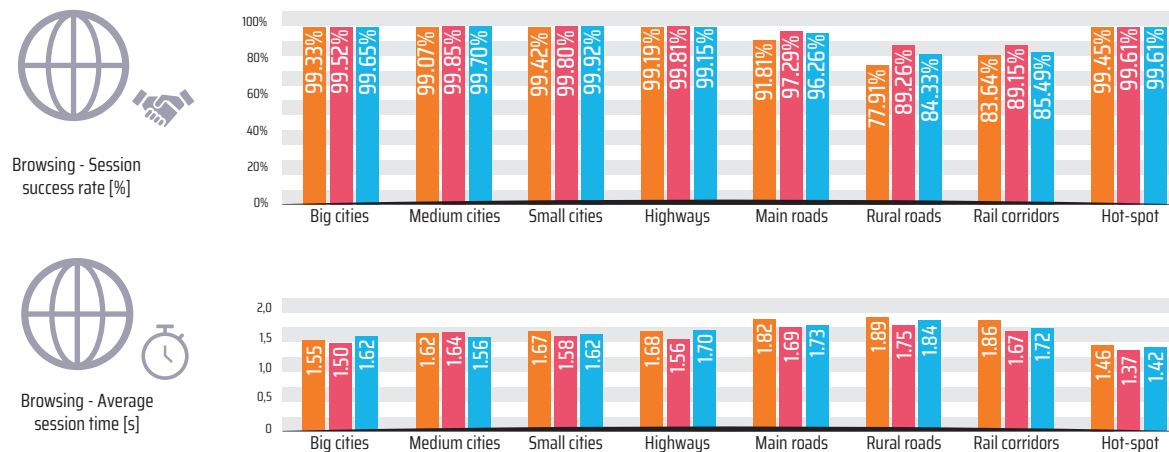
In big cities, session success rate was on a high level, for all three operators. The shortest average session time was achieved by Telekom Srbija, with all three operators reaching similar results.

In medium cities, session success rate was on a high level, for all three operators. The shortest average session time was achieved by Telenor, with all three operators reaching similar results.

In small cities, session success rate was on a high level, for all three operators. The shortest average session time was achieved by Telekom Srbija, followed by Telenor and A1 Srbija.
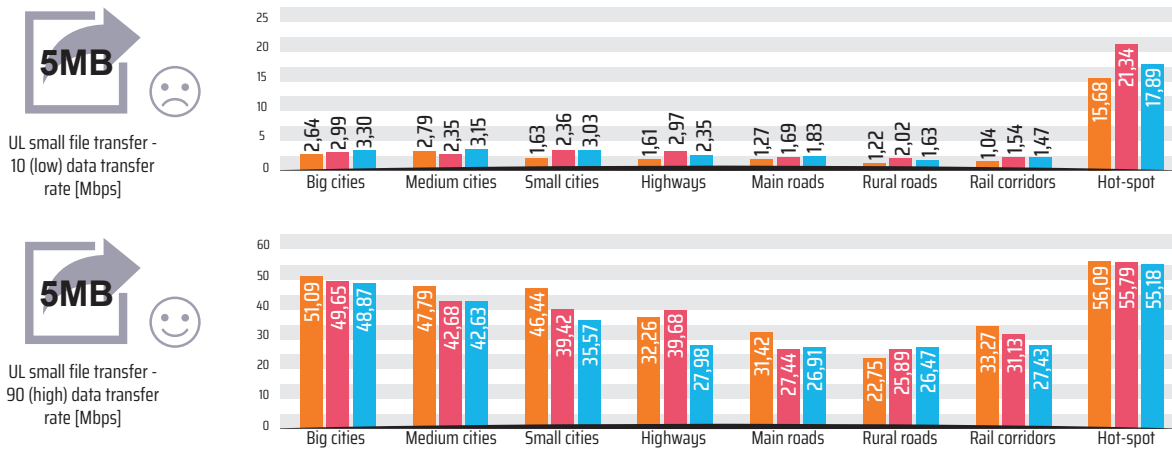
As for the roads, session success rate was lower along main and rural roads than along highways. The best result in all road categories and all tests was scored by Telekom Srbija.

Along rail corridors, session success rate was lower compared to other aggregations, mainly because of hampered coverage due to tunnels and terrain configuration. The best score was achieved by Telekom Srbija.

At hot-spot locations, all operators achieved extremely high rates of successfully realized sessions. Telekom Srbija had the shortest average session time.

• *YouTube video service*

Figure 11.8. YouTube video service testing results

In big cities, Telekom Srbija and Telenor had similar rates of successfully realized sessions. Telekom Srbija and A1 Srbija had identical VMOS results, with Telenor achieving a slightly better score. The shortest video service access time was attained by Telekom Srbija.

In medium cities, Telekom Srbija and Telenor had similar rates of successfully realized sessions. The values of other parameters were on a similar level for all three operators.

In small cities, Telenor had an extremely high session success rate, followed by Telekom Srbija and A1 Srbija. The values of other parameters were on a similar level for all three operators.

As for the roads, the rate of successfully realized sessions was lower along main and rural roads than along highways. Telekom Srbija had the highest session success rate and shortest video service access time, along main and rural roads.

Along rail corridors, the rate of successfully realized sessions was lower compared to other aggregations, mainly because of hampered coverage due to tunnels and terrain configuration. Telekom

Srbija had the highest session success rate and shortest video service access time. VMOS values were approximately the same for all three operators.

At hot-spot locations, all operators achieved extremely high rates of successfully realized sessions. Telenor had the shortest video service access time and highest VMOS value.

• *WhatsApp messaging*

Figure 11.9. WhatsApp messaging testing results
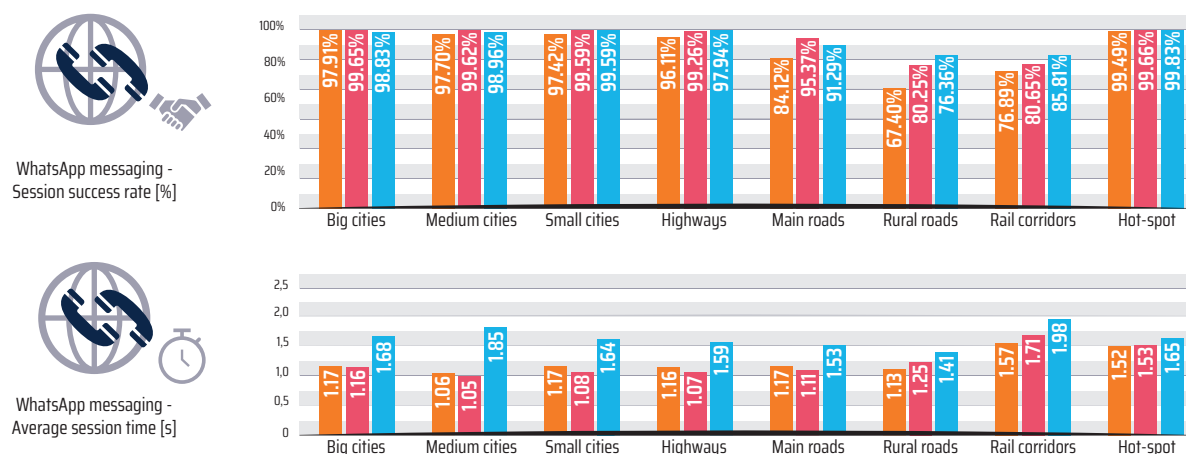
In big cities, Telekom Srbija had an extremely high rate of successfully realized sessions, followed by A1 Srbija and Telenor. Telekom Srbija had the shortest average session time, followed by A1 Srbija, with an almost identical value, and then Telenor.

In medium cities, Telekom Srbija had an extremely high rate of successfully realized sessions, followed by A1 Srbija and Telenor. Telekom Srbija had the shortest average session time, followed by A1 Srbija, with an almost identical value, and then Telenor.

In small cities, Telekom Srbija had an extremely high rate of successfully realized sessions, followed by A1 Srbija and Telenor. Telekom Srbija had the shortest average session time, followed by A1 Srbija and Telenor.

As for the roads, the rate of successfully realized sessions was lower along main and rural roads than along highways. Telekom Srbija had the highest session success rate on all road categories.

Telekom Srbija also had the shortest average session time, except along rural roads, where the best result was scored by A1 Srbija.

Along rail corridors, the rate of successfully realized sessions was lower compared to other aggregations, mainly because of hampered coverage due to tunnels and terrain configuration. Telenor reached the highest session success rate, whereas A1 Srbija had the shortest average session time.

At hot-spot locations, all operators achieved extremely high rates of successfully realized sessions. A1 Srbija and Telekom Srbija had almost identical values of average session time, which was slightly longer in Telenor's case.

Final results – Mobile Network Benchmark Portal

Upon the completion of the benchmarking measurements, followed by data processing and analysis of the results regarding mobile operators' network quality in the Republic of Serbia, the interactive portal for comparative mobile network quality was updated with the 2021 benchmark results. The portal is available in Serbian and English, at the following address: http://benchmark.ratel.rs.

Figure 11.10. Benchmark interactive portal
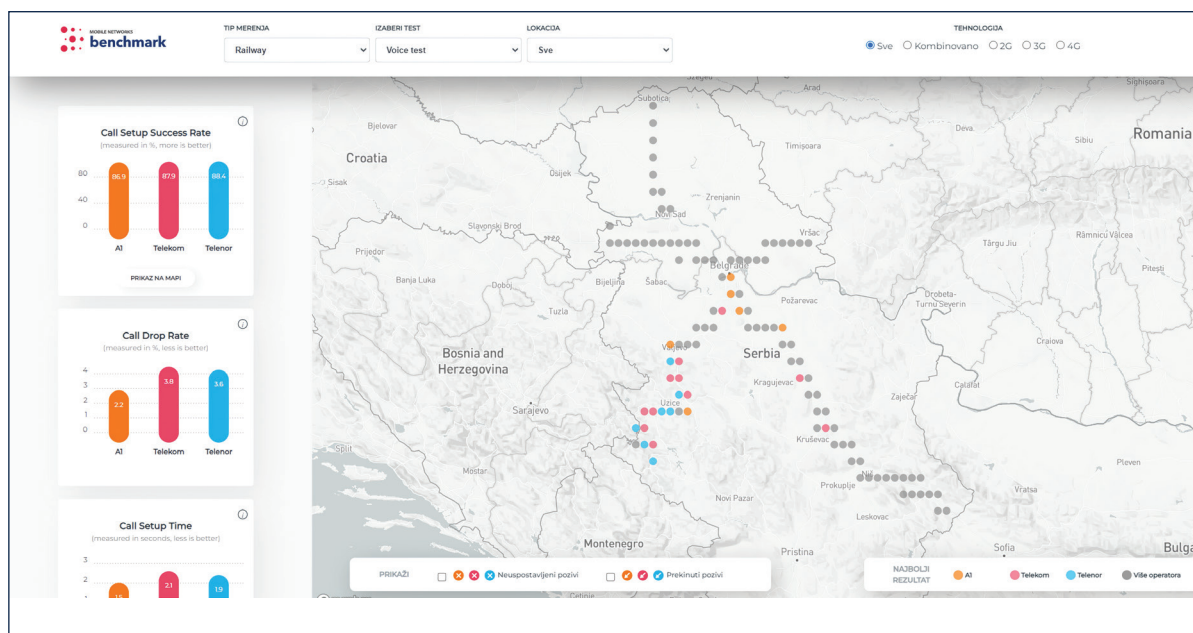
11.3. RATEL NetTest: testing of Internet connection quality

As of May 2016, RATEL enabled the users of Internet access services in public fixed and public mobile communications networks to measure QoS of broadband Internet access, by means of RATEL's application NetTest. In the meantime, the app has been upgraded with several new functions.

The testing of Internet connection in public fixed communications networks can be done using the RATEL's application available on its website: https://nettest.ratel.rs/en/map.

The Internet connection testing in public mobile communications networks can be performed by means of an application for Android i iOS mobile devices downloaded from Google Play Store and Apple App Store.

The purpose of RATEL NetTest application is to provide transparent and comprehensive information regarding the users' Internet connection quality. It measures connection from the user's device (PC, tablet, mobile terminal) to a measuring server. The measuring server is situated in the immediate proximity of the Internet exchange point (IXP) connected to major service operators, representing an independent and optimal location not favoring any of the connections.

Figure 11.11. Mobile application home page

Figure 11.12. Map view of performed tests
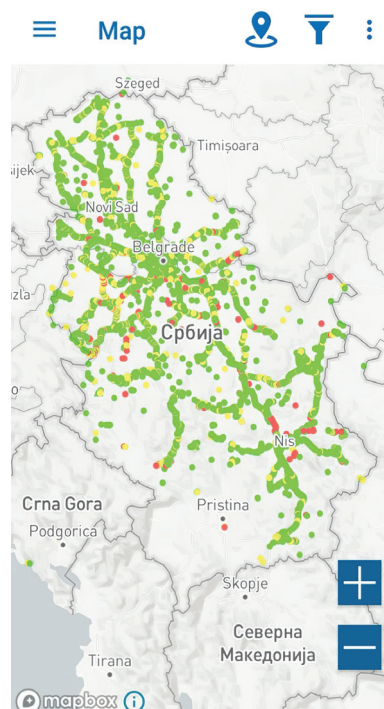
RATEL NetTest application offers to its users the possibility to test the quality and speed of current Internet connection. At the same time, the results of other users who performed the testing can be compared on the interactive map of Serbia. This feature enables comparative analysis of Internet service providers, depending on the location or type of Internet access (fixed/mobile). Color scale red/yellow/green serves as a visual indicator of the connection quality level for the majority of Internet services. This scale does not refer to the technology used, however extremely high speeds in mobile networks can only be achieved by means of certain technologies, such as LTE.

By means of RATEL NetTest application, the following quality parameters of Internet connection can be tested:

- data download speed: measurement from measuring server to user (download),
- data upload speed: measurement from user to measuring server (upload),
- ping (latency),
- packet loss,
- signal quality (RxQual, Ec/Io, RSRQ) and signal strength (RSSI, RSCP, RSRP), if a mobile terminal is used
- Zero measurements – measurements at locations with no signal coverage, suggesting that service is not available, therefore tested parameters equal zero value. These spots on the map are marked in black.

Figure 11.13. Testing of Internet connection
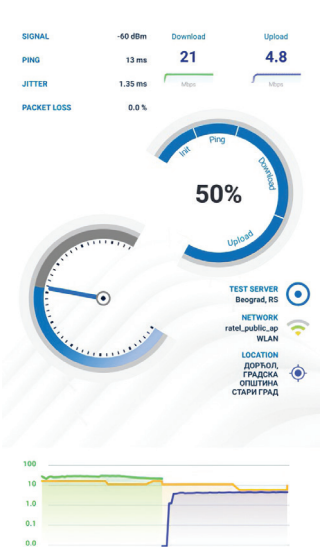
Figure 11.14. Testing results

Figure 11.15. Zero measurements

RATEL NetTest application has been improved so that all measurement results are now visible and publicly available to end users. The benefit of this functionality is that, by having at their disposal a number of measurement results in the selected area, the end users can get information about the operator's network QoS locally.

An Instruction for the measurement of Internet data throughput for RATEL NetTest app users was added to the application, now enabling the use of measurement results as the grounds for complaints pertaining to the quality of service of Internet data throughput. During the filing of complaint regarding the above service, it is necessary to perform several measurements during different parts of the day, in order to provide necessary measurement statistics, for the purpose of proper assessment of the performed throughput.

ELECTRONIC COMMUNICATIONS INFRASTRUCTURE INTENDED FOR SHARED USE

12

RATEL maintains an updated database on type, availability and geographic location of capacities that may be subject to demand for common use and access. Operators of public electronic communications networks are entitled to require shared usage of another operator's or third person's electronic communications infrastructure, when needed for the purpose of a competitive, cost-effective and efficient performance of electronic communications activities

The shared use of infrastructure in the Republic of Serbia is defined in the Law on Electronic Communications („Official Gazette of RS'', nos. 44/10, 60/13 – CC and 62/14, hereinafter: the Law) and Rulebook on the manner of collection and publication of the data on type, availability and geographic location of the electronic communications network's capacities („Official Gazette of RS'', no. 66/15).

Pursuant to Article 52 od the Law, RATEL keeps an updated database on the type, availability and geographic location of capacities which may be subject to shared use and access (hereinafter: the Capacity database). RATEL adopted the Rulebook on the manner of collection and publication of the data on type, availability and geographic location of the electronic communications network's capacities in July 2015. It prescribes creation of the records of the electronic communications network capacities which may be subject to shared use, in the form of an aggregated database.

Pursuant to Article 5 of the Rulebook on the manner of collection and publication of the data on type, availability and geographic location of the electronic communications network's capacities, RATEL is responsible for creation, maintenance and funding of the Capacity database, including definition of the manner of data provision (access, interfaces and protocols).

The Capacity database was created in June 2016. Coordination with operators was established and data input into the database was enabled, by web access or through automatic data exchange systems.

There is a choice between read access and read/record access. The read access is available to all registered electronic communications operators, whereas the read/record access is reserved only to electronic communications operators with recorded infrastructure lease service.

Users can access the application by means of providing a user name/password combination, Figure 12.1.

Figure 12.1. **Access to Web-GIS capacity database application**

In case of the building of a new infrastructure subject to shared use and access, the operators are obliged to submit all required data within 15 days from the beginning of the use of infrastructure and to update their data at least once in 3 months, should any changes in infrastructure occur.

The data on electronic communications network refer to electronic communications network cable ducts and antenna masts (Figures 12.2. and 12.3)

Figure 12.2. Web-GIS capacity database application – Home paged
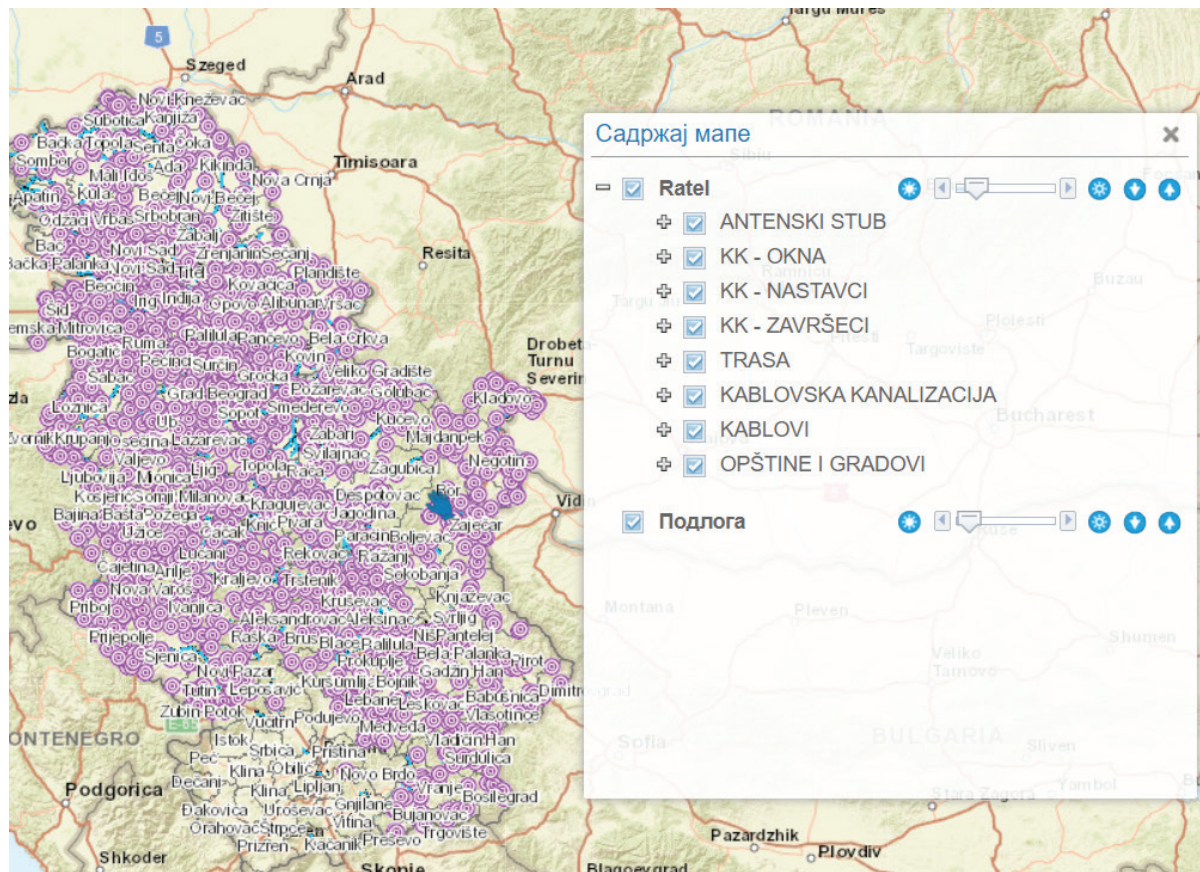
Figure 12.3. Web-GIS capacity database application – Enlarged detail
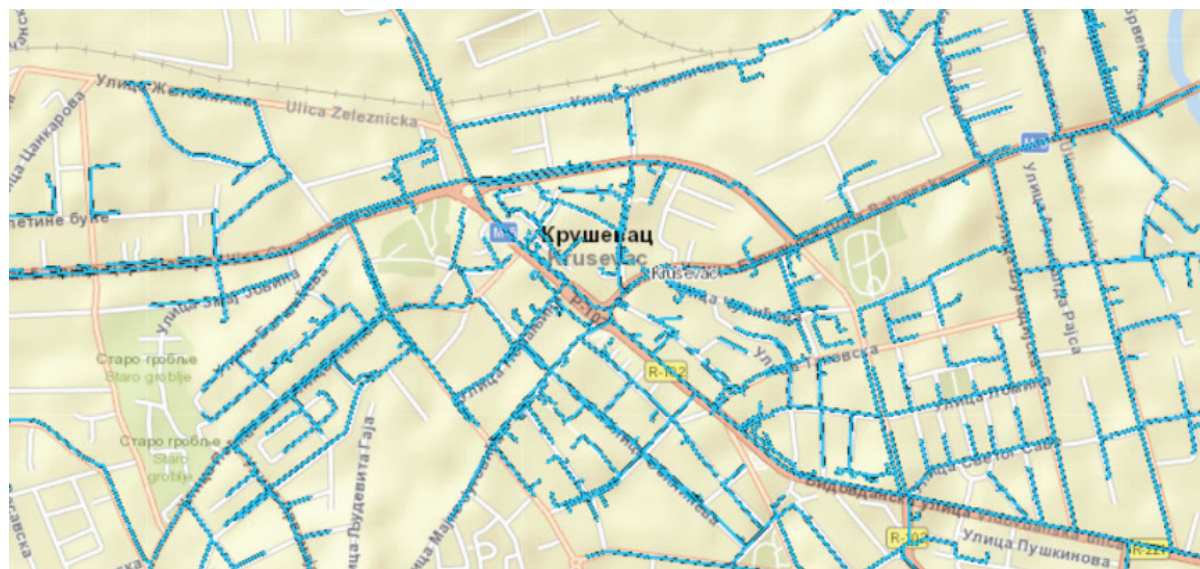
As of 31.12.2021, this database includes data for 1739 antenna masts, 1500 optic cables and around 200.000 cable canalization elements. The Capacity database for lease is available on the Agency's website to all interested operators of electronic communication networks in a Web – GIS application form. There are 27 operators with read access right and 16 operators with read/record access right.

In 2021, there were 18,848 accesses to the Database.

The Web – GIS application includes standard tools for map operation, such as (Figures 12.4 - 12.7):

- Switching on/ switching off of layers; zooming; definition of coordinates in different coordinate systems; measurement of distance/ surface;
- Selection of data using spatial inquiries/ selection of areas by hand;
- Selection of surface (satellite footages, topographic maps, street networks etc.)

Figure 12.4. Use of standard tools – various surface types – street network
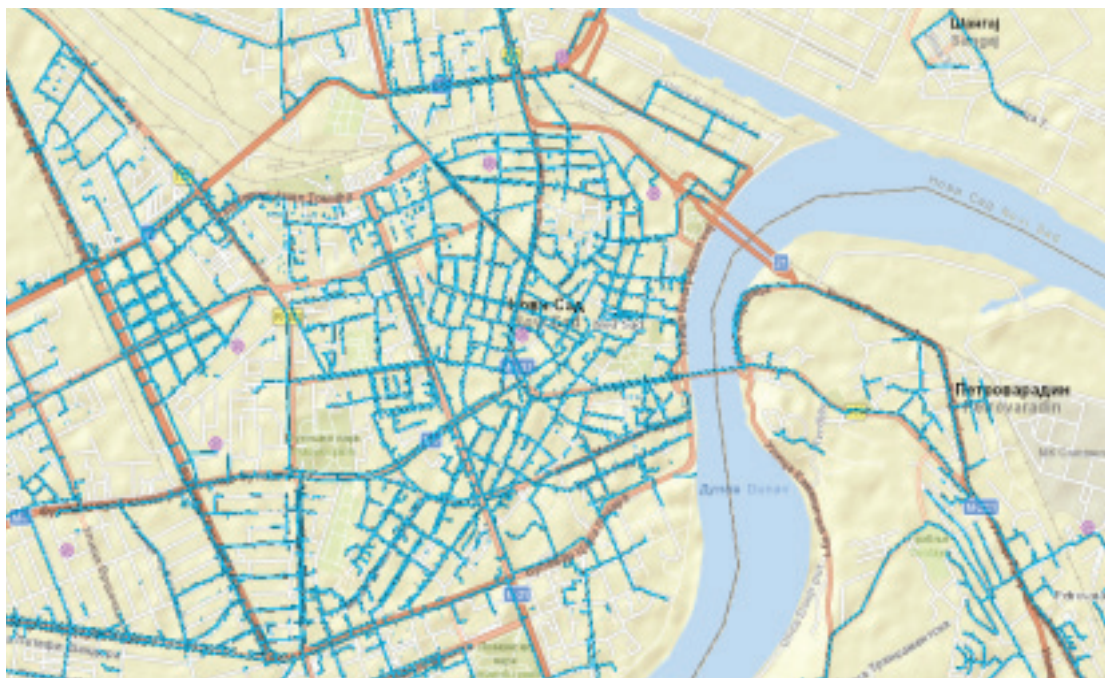
Figure 12.5. Use of standard tools – various surface types – satellite footage

Figure 12.6. Use of standard tools – various surface types – topographic map
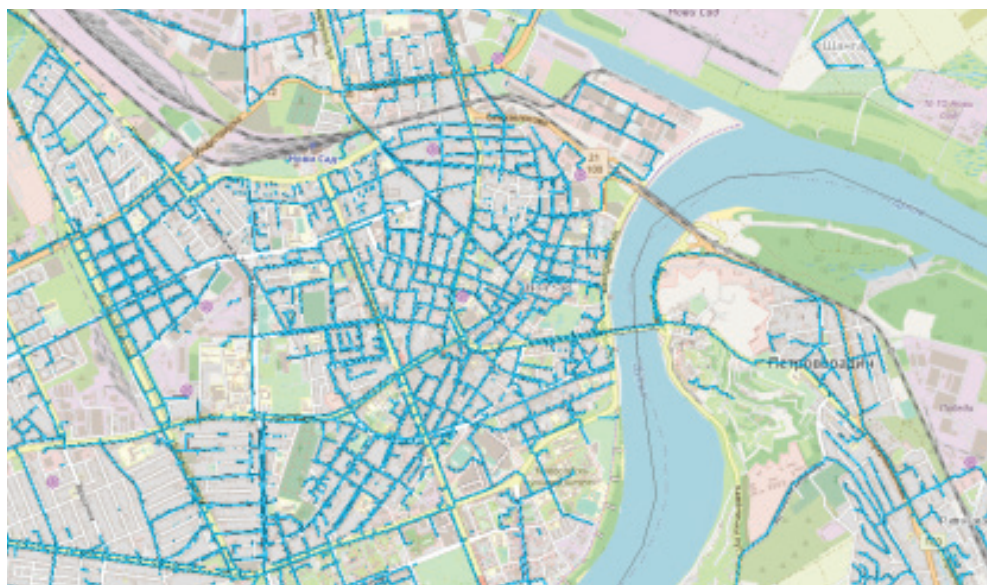
Figure 12.7. Use of standard tools – measurement of distance and surface
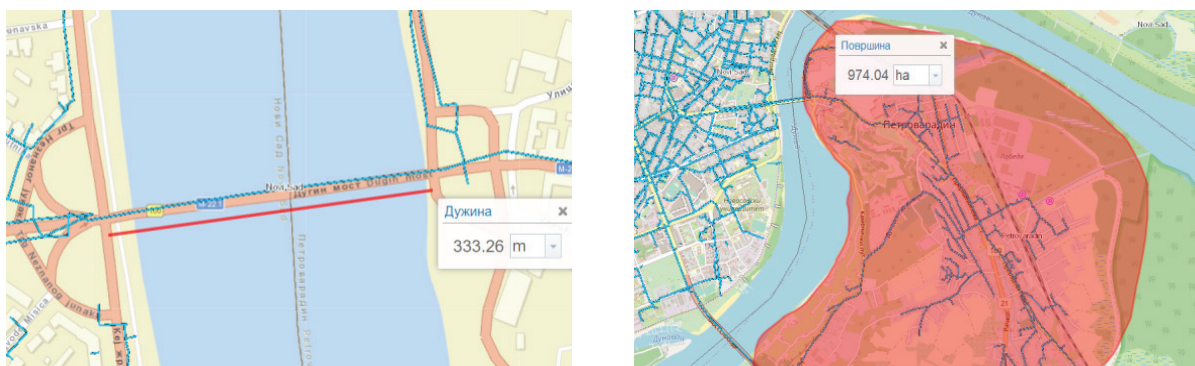
Electronic communications network cable ducts

Based on EKMI1 form, which is an integral part of the Rulebook on the manner of collection and publication of the data on type, availability and geographic location of the electronic communications network's capacities, the following cable canalization data are collected (Figures 12.8 and 12.9):

· Name of operator (owner)/ locations/ routes;
· WGS84 coordinates of important positions (start/ end, node);
· Route length/ geodetic footage;
· Cable type;
· Information on cable ducts (type of pipes/ number of pipes on the route/ type of cable shaft/ number of shafts on the route);
· Type of data transmitting equipment (optional);
· Capacity for lease/ unused capacity;
· Data on cable instalments (optional);
· Cable ending in the facility (optional).

Figure 12.8. Cable details
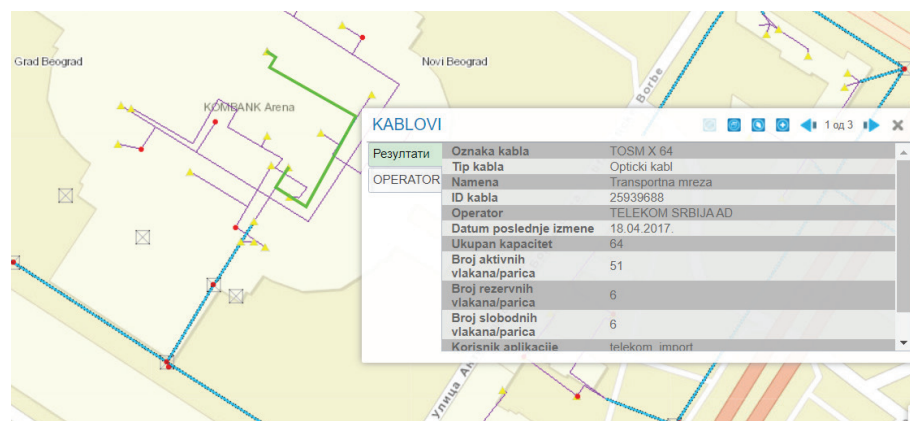
Figure 12.9. Cable duct segment details
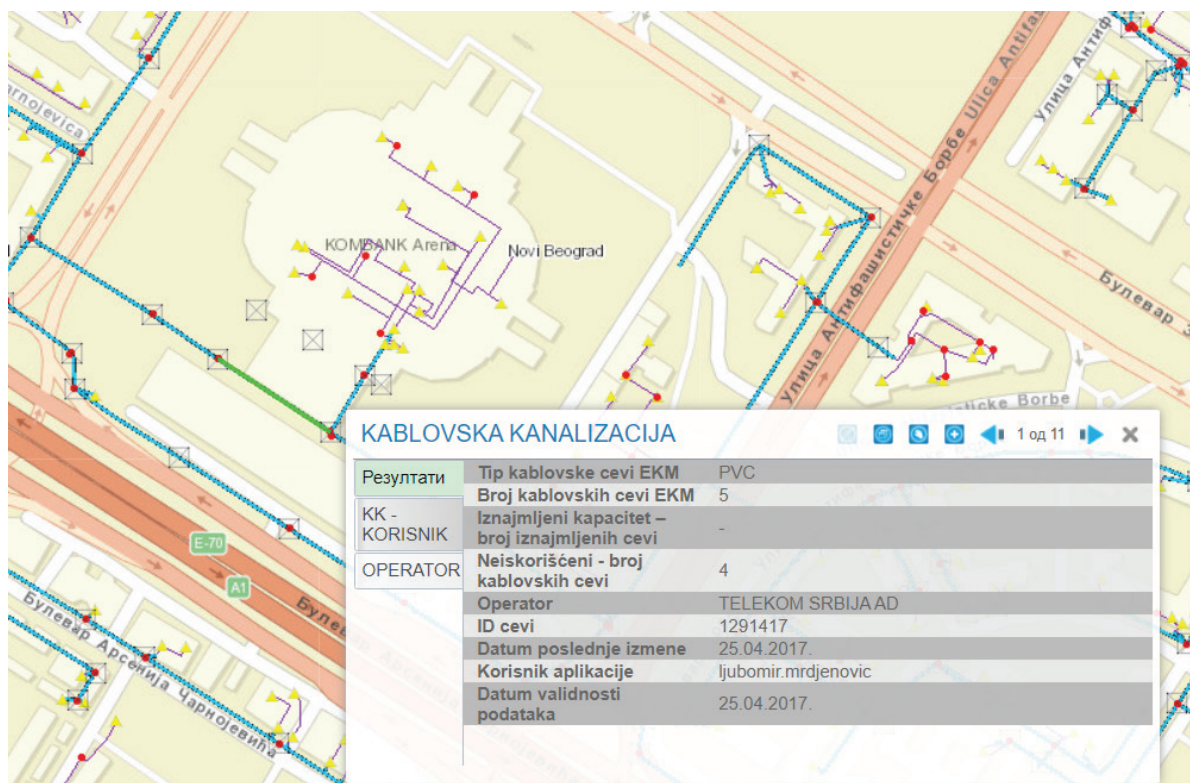
Electronic communications network antenna masts

Based on Annex 2, EKMI2 Form of the Rulebook on the manner of collection and publication of the data on type, availability and geographic location of the electronic communications network's capacities, data on antenna masts and equipment to be collected are the following (Figures 12.10 and 12.11):

- Name of operator (owner);
- Location of antenna mast;
- Mast construction;
- Shape of mast base/ dimensions of mast base (m);
- Mast height (m);
- Facility height in meters (if antenna mast is mounted on a facility);
- Information regarding free space on the mast (length of the free segment/ azimuth range available for mounting);
- Mounted equipment (type/ free capacity) – if subject to lease.

Figure 12.10. Antenna mast data

Figure 12.11. Antenna mast spatial query

POSTAL SERVICES MARKET

There were 39 postal operators, i.e. 1 Universal Service Provider – USP (the Public Postal Operator – PPO acts simultaneously as a USP and express service provider), 18 express service providers and 21 courier service operators performing postal services in the Republic of Serbia's postal market, over 2021. According to the data from the Register of issued and revoked postal operators' authorizations kept by RATEL, on the day of December 31, 2021, fourteen out of 53 postal operators had temporarily discontinued their activities in the postal market.

An overview of RATEL's regulatory activities regarding the dealings with postal operators during 2021 is given in Table 13.1.

Table 13.1. Regulatory activities carried out by RATEL

Activity	Number of authorizations/ decisions
Issuance of authorization after expired validity of 10 years	4
Issuance of authorization to a new postal operator	8
Authorization changes upon request	12
Approval of General trems and conditions	24
Approval of the PPO pricelist for non-reserved services from universal scope	2
Approval of the OPS pricelist	45
Revoked authorizations	6

Some of the operators, despite having authorization to provide other postal services (courier or express), did not do so in continuity, preferring to discontinue them for a shorter or longer period, which was recorded in the public Register of issued and revoked postal operators' authorizations as a „temporary discontinuation of service provision". As one of the requirements in the Law on Postal Services („Official Gazette of RS" No. 77/19) for the revocation of license/authorization is the discontinuation of service during 12 months straight, 2 authorizations were revoked under this provision in 2021, with an addition of another 4 authorizations being revoked for the lack of provision of postal services in accordance with the law, the manner and the conditions required by the authorization (due to the deletion from the registry of the Serbian Business Registers Agency). Also, further 3 licenses ceased to be valid on the request of the license holder, with another 4 authorizations having expired, with no applications by the operators for a renewal.

Since the beginning of market regulation in the Republic of Serbia, the postal authority has issued 143 and revoked 34 licenses/ authorizations, with the remainder of the operators seeing their licenses expired, without applying for renewal.

According to the Law on Postal Services, RATEL is tasked with approving the prices of non-reserved postal services from the scope of universal service obligation (USO) and approved the PPO pricelists twice over 2021:

- Pricelist for non-reserved postal services from the USO scope and services of access to postal networks in national postal traffic and Pricelist for non-reserved postal services from the USO scope and services of access to postal networks in international postal traffic, in effect as of April 1, 2021, and
- Pricelist for non-reserved postal services from the USO scope in national postal traffic and Pricelist for access services to the PE „Post of Serbia" postal network in national postal traffic, in effect as of January 1, 2022.

Postal service market indicators were calculated based on the processed data extracted from the annual questionnaires provided by the postal operators. Over 2021, data from 24 express service operators, out of which 11 provided postal services in national postal traffic (NPT), 5 provided services both in NPT and international postal traffic (IPT), with two postal operators performing services exclusively in IPT. During 2021, 6 operators reported that they had not provided postal services, two out of which acted on behalf and for the account of another postal operator. The analysis encompasses the data of 22 courier service operators, one of which reported not having performed postal services in 2021.

13.1. Postal market trends

Universal postal service (hereinafter: UPS) has been continuously marking a drop in the total volume share, a trend that is visible in 2021 as well (Table 2). For the fourth year in a row, a UPS volume decrease has been recorded, reaching a decrease by 0,1%, which is the lowest negative growth rate in the observed period (Table 3). With the exception of the year 2017, when a positive growth was recorded, the UPS volumes have been in decline for the last 9 years. Compared to 2011, the volume of services from the USO scope has dropped by 14%.

In Table 13.2 an overview of postal volume and income shares over the last five years is given – both for UPS and other postal services (hereinafter: OPS).

Table 13.2. Volume and income percentages of postal services 2017-2021

Type of service	2017		2018		2019		2020		2021	
%	Vol.	Income	Vol.	Income	Vol.	Income	Vol.	Income	Vol.	Income
UPS	90.4	46.9	89.1	44.7	87.4	42.1	85.1	38.9	83.7	40.6
OPS	9.6	53.1	10.9	55.3	12.6	57.9	14.9	61.1	16.3	59.4
Total	100	100	100	100	100	100	100	100	100	100

The movement of postal volumes over the last five years is shown in Table 13.3 and Figure 13.1.

Table 13.3. UPS and OPS volumes 2017-2021

Type of service	Volume in thousand units					Positive/negative growth (%)			
	2017	2018	2019	2020	2021	18/17	19/18	20/19	21/20
UPS	291,362	289,512	269,715	262,139	261,833	-1%	-7%	-3%	-0,1%
OPS	30,928	35,314	39,005	45,997	51,143	14%	10%	18%	11%
TOTAL	322,290	324,826	308,720	308,136	312,976	1%	-5%	-0,2%	1,6%

Positive trend in the OPS share against that of UPS continues its eleven-year growth pace, reaching 11.2% in 2021. However, a slight decrease in the income share of these services has been recorded, amounting to somewhat less than 60%.

Figure 13.1.Five-year UPS and OPS volume trend (in thousand)
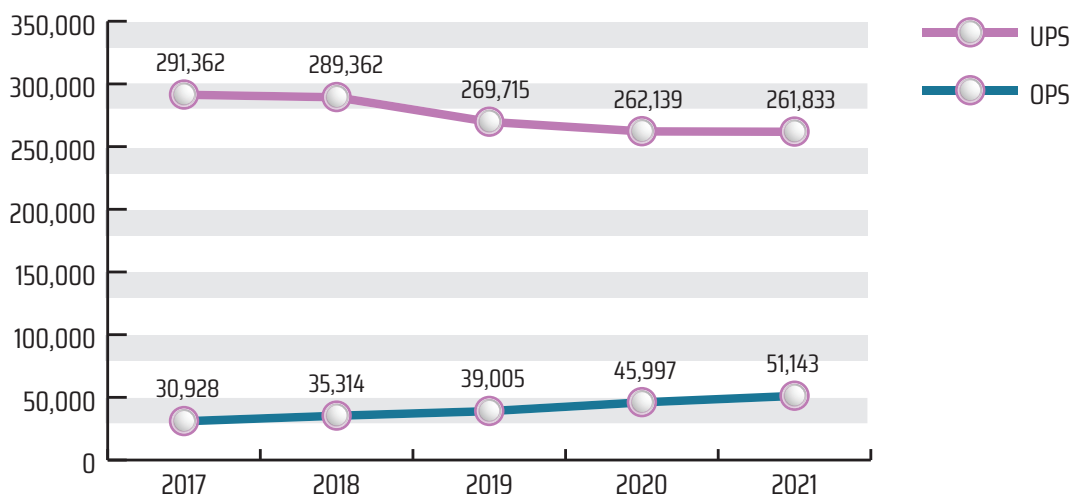
In 2021, postal services generated an income by more than 18% higher than that in 2020. Table 13.4 shows the revenues made over the last five years.

Over 2021, the UPS income growth rate of approximately 24% was recorded, by which a six-year positive growth trend was continued. The increase in revenues during 2021 was, above all, the result of a service price increase – both of reserved and non-reserved services from the USO scope.

The OPS income has been on a continuous rise, which is mostly due to the growth of volumes of postal items stemming from remote sales.

Table 13.4. UPS and OPS revenues 2017-2021

Type of service	INCOME in million dinars					Positive/negative growth (%)			
	2017	2018	2019	2020	2021	18/17	19/18	20/19	21/20
UPS	8,473	8,756	8,916	9,111	11,258	3,3%	1,8%	2,2%	23,6%
OPS	9,605	10,851	12,277	14,317	16,463	13%	13,1%	16,6%	15%
TOTAL	18,078	19,607	21,193	23,427	27,721	8,5%	8,1%	10,5%	18,3%

Figure 13.2 shows the trend of UPS and OPS revenues over the last five years.

Figure 13.2. Five-year trend of UPS and OPS revenues (in million dinars)
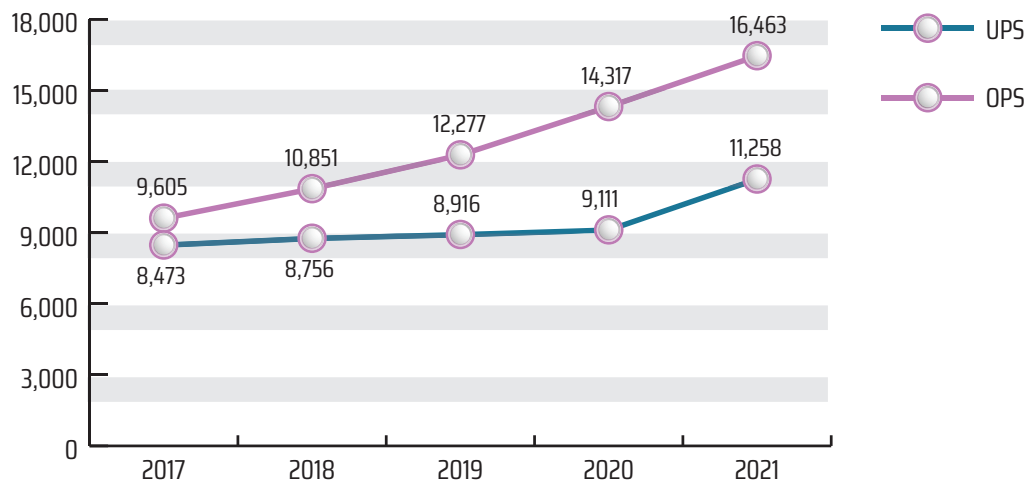
As for the courier services, following a three-year decrease, a considerable growth both in volume and income has been recorded, however, still not reaching the level of four years ago. (Figures 13.3. i 13.4).

Figure 13.3. Trend of courier service volumes 2017-2021
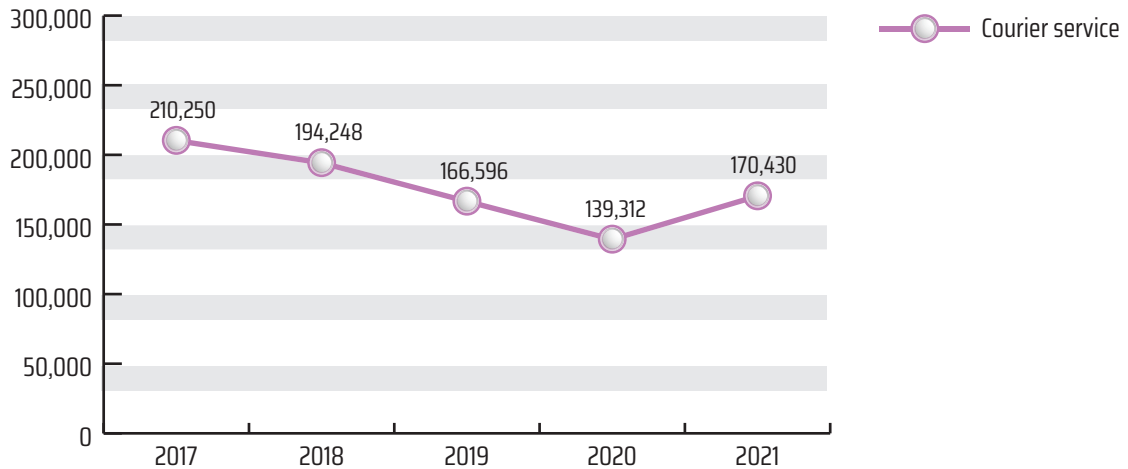
Figure 13.4. **Trend of courier service revenues 2017-2021**
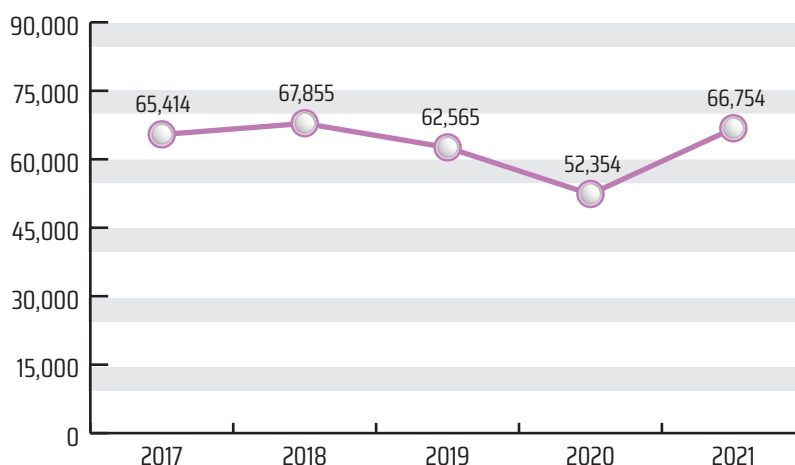
13.2. Postal market indicators

Postal operators in the Republic of Serbia generated approximately 313 million postal services in 2021 and more than 27.7 billion dinars of income, which is around 235.8 million Euros.

Postal revenues have been growing for the fifth year in a row. In 2021, over 4.8 million services more were provided compared to the year before, which represents an increase by 1.6%, after a two-year drop in the volume of postal services.

An average of 126 postal items per household were delivered over 2021, i.e. two postal items more than in 2020. Out of this number, 105 postal items is from USO scope, holding the 2020 level. An average of 44 postal items per inhabitant were delivered in the same year. The average of delivered OPS items grew by more than 1 per inhabitant, which is 3 items per household.

The share of postal industry generated income in the GDP in the circulating prices is somewhat larger compared to the previous year, amounting to more than 0.44% (6,268,714 billion dinars).

After a seven-year increase in the number of postal workers in the Republic of Serbia, a drop by 1.16% (Table 13.5) was recorded. A decrease in the number of the PPO employees by 1.9% was observed, which is reflected in the reduction of the PPO staff share in the total number of postal employees, amounting to 78.1% in 2021.

Table 13.5. Postal industry employees

Operators	Year				
	2017	2018	2019	2020	2021
PPO	14,980	15,121	15,001	15,063	14,779
Other postal operators	3,629	3,762	4,031	4,070	4,132
TOTAL	18,609	18,883	19,032	19,133	18,911

1 Statistical Office of the Republic of Serbia – Statistical calendar RS 2022

An increase in the number of employees by 1.5% was recorded at other postal operators, who also saw an increase by approximately 14% over the last 5 years was. The number of employees at other postal operators has doubled compared to 2011.

The postal industry hires more than 0.85% of the total number of employees (2,212,631 employees in 2021 nationally) in the Republic of Serbia. The share of postal employees is somewhat higher than in 2020, when it amounted to 0.83% of the economically active population.

Much like over the previous years, the employees in transport companies (AD Niš ekspres and Autoprevoz Kikinda), nor the employees of the logistics companies such as Gebrüder Weiss, M&M, Milšped, InterEuropa etc, were not included in the analysis, due to their core non-postal activity.

In 2021, more than 261.8 million services were provided under the USO scope, a dominant category in terms of postal volumes. As regards OPS, more than 51 million postal services were provided (Table 13.6).

Table 13.6. Postal services market in 2021

Type of service	VOLUME	INCOME	VOLUME	INCOME
	in thous.	in thous. din.	%	%
Universal postal service	261,833	11,258,765.00	83.7	40.6
Other postal services	51,143	16,462,699.39	16.3	59.4
TOTAL	312,976	27,721,464.39	100.0	100.0

Until 2021, a continuous negative growth trend of the UPS income share in the overall postal services market revenues had been recorded, however, in 2021, the trend became positive and an increase by 40.6% was recorded, which is somewhat higher than over 2020, when it had reached 39%. Over 2021, UPS generated an income of more than 11.2 billion dinars. It should be noted that, during 2021, the PPO increased the price of its reserved and non-reserved postal services belonging to the USO scope, therefore the revenues from these services rise, despite the shrinking of UPS volumes.

Other postal services generated revenues of more than 16,5 billion dinars. The growth of the OPS income has been recorded for the eleventh year in a row, however, a slight decrease in the income share (59.4%) occurred over 2021 compared to 2020, when the latter amounted to 61% (Figure 11.5). Most of the postal operators providing OPS increased the price of their services in 2021

Figure 13.5. **UPS and OPS volume and income shares in 2021**

Volume share of postal services in 2021

16% OPS

84% UPS

Income share of postal services in 2021

41% UPS

59% OPS
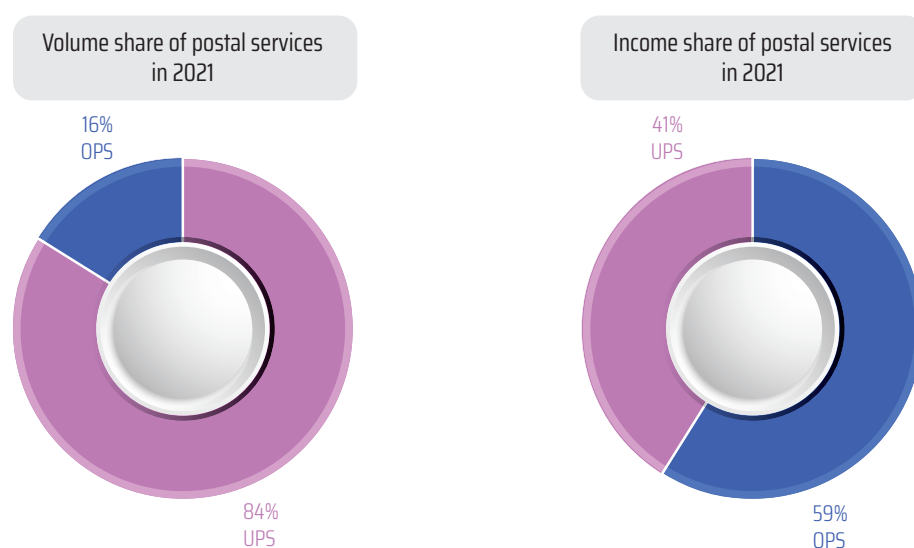
13.3. Comparative overview of UPS and OPS volume and income trends

Pursuant to the Law on Postal Services, a new classification of services has been set. Postal services comprise universal postal service and other postal services (commercial services as per the former law, until the end of 2019).

Universal postal service (UPS) is provided by the PPO, Public Enterprise „Post of Serbia", Belgrade, designated by the provisions of the Law on Postal Services, that is the exclusive license owner

(license for the UPS provision was issued in accordance with the provisions of the former law, following the expiry thereof, the new Law foresees the issuance of a special license), while other postal services are provided by all postal operators, based on an authorization.

Universal postal service (UPS) is, by definition, a service of general interest consisting of a set of postal services provided continuously on the entire territory of the Republic of Serbia, without interruption (in continuity). This service must comply with the set quality, therefore the universal service provider (USP) must meet certain quality standards. UPS is normally provided at affordable prices and under equal conditions for all users, without discrimination.

UPS includes collection, sorting, transport and delivery of the following items:

- letter-post items up to 2 kg,
- letters in court, administrative and offense procedures, regardless of the limits,
- collection and delivery of parcels up to 10 kg in national and international traffic,
- delivery of parcels up to 20 kg in international traffic,
- cecograms up to 7 kg, without postal charge in national traffic,
- collection, transmission and payment of postal money orders.

Universal service is set by the Law as a service of general interest, regardless of the type of network industry and therefore the legislator is obliged to establish the mechanisms of provision of this service category.

The European and global postal sector practice has shown that UPS represents a burden to USPs on one hand, but it is very important for the social and economic cohesion on the other, so a continuous search for new models of UPS funding and improvement of the existing ones is constantly under way.

Until the accession of the Republic of Serbia to the European Union, the Law foresees the funding of UPS from the scope of reserved services, which is an exclusive right of the PPO.

Reserved service limits are set by the law. The determined limit is 50g in terms of the weight, and two and a half times the amount of the postal charge for the fastest transmission level, in terms of the price, for the reserved services (other postal services must not cost below 112.5 dinars, VAT included).

Reserved postal services are entrusted to the public postal operator (PPO), they are part of universal postal service (UPS) and include:

- collection and/or sorting and/or transport and/or delivery of letter-post items up to 50 g;
- ollection and/or sorting and/or transport and/or delivery of letters in court, administrative or offense procedures, as registered postal items, regardless of the limits;
- collection and/or transmission and/or payment of postal money orders.

As of April 1, 2021, the Government of the Republic of Serbia approved a price increase for reserved postal services, namely non-recorded letters weighing 20 g, from 27.00 dinars to 30.00 dinars. Also, in the category of reserved services, the PPO introduced the priority letter, with an approved postal charge of 45.00 dinars for the first weight class.

After the last year's reduction of the UPS reserved services volume, there was a slight increase throughout 2021, so that the share of reserved services reached 96.7%.

Items up to 20 g remain the most numerous categories of reserved services, making up as much as 92.5% of the UPS volumes, out of which the most dominant are non-recorded letter-post items with 75% of UPS (their share grew compared to 2020). They are followed by items 21 g-50 g (4%), items 51 g-100 g (2%), items 101 g-250 g (1%), whereas other postal items participate in UPS with less than 1%. Priority items, introduced in the second quarter of 2021, scored by the end of the year an insignificant share of 0.15% in UPS.

The volume of selected postal services from the USO domain is shown in Table 13.8.

Table 13.8. **Positive/negative UPS volume growth by service in 2021/2020**

Postal service (UPS)	Postive growth	Negative growth
COD parcel	35%	
Court letter	11%	
Postcard	9%	
Non-recorded letter	5%	
Postal money order	5%	
Cumbersome parcel		-87%
COD insured letter		-53%
Addressed direct mail		-50%

Insured letter		-27%
Insured parcel		-25%
Registered printed matter		-17%
Printed matter		-8%

3 Priority letter is a non-recorded letter in national postal traffic, dispatched by the fastest route to its destination and delivered through regular delivery, bearing he sign „Priority" in the upper right corner.

Reserved service generated revenues, as the most dominant postal service category, participate with 64.4% in the total PPO's postal service income. The reserved services income share is continuously shrinking: in 2017 it was 74%, while ten years ago (in 2011) it had reached as much as 80%. The average UPS income per unit is 43 dinars, which is 8.25 dinars more compared to the previous year.

UPS reserved service income share is over 91%.

A modest reduction in the reserved service income share amounting to 6.2% of the total PPO postal service revenues was recorded as well.

The income share of items up to 20g (85.5%) is the most dominant in the UPS revenues, however is was lower compared to its value in 2020 (86.68%).

The income of selected postal services from the USO domain is shown in Table 13.9.

Table 13.9. **Positive/negative UPS income growth by service in 2021/2020**

Postal service (UPS)	Positive growth	Negative growth
Court letter	68%	
Postcard	18%	
Non-recorded letter	18%	
Printed matter	16%	
Registered printed matter	14%	
Postal money order	6%	
Special delivery or cumbersome parcel		-80%

Insured letter		-54%
COD insured letter		-54%
Addressed direct mail		-31%
Insured parcel		-20%

The biggest UPS share is accounted for by the items (non-recorded and court letters) transported by the PPO based on concluded contracts with legal entities. The share of these items is 89% regarding volume, and 78% regarding income, representing an increase compared to 2020.

In 2021, UPS share in international postal traffic (IPT) was approximately 3% in terms of volume and 12% in terms of income. Universal service in IPT was 32 times less frequent over 2021 than UPS in national postal traffic (NPT), which is slightly better than in 2020, when a slowdown in IPT due to COVID-19 pandemic occurred. Despite the IPT UPS inbound growth of 26.5% compared to 2020, the volume of items has not reached the 2019 level yet. On the other hand, a reduction in the volume of outbound items by 14% has been observed throughout 2021.

Inbound items to the Republic of Serbia make up around 79% of UPS international postal items, accounting for 56% of the total UPS IPS revenues.

Other postal services (OPS) pare provided by the postal operators and PPO, based on the authorization for the OPS provision.

Other postal services include:

- collection, sorting, transport and delivery of parcels over 10 kg in NPT;
- collection, sorting and transport of outbound parcels over 10 kg in IPT;
- sorting, transport and delivery of inbound parcels over 20 kg in IPT;
- value-added services;
- complementary services.

Value-added services are those requiring special features in terms of quality and manner of collection, sorting, transport and delivery. Value-added services are:

- courier services, which are postal services that include collection of the postal item at the sender's address, and direct transport and delivery at the recipient's address, without sorting;
- express services, which are postal services that include collection, sorting, transport and delivery of postal items in the shortest delays and guaranteed time frames.

For courier and express services, the limits by weight relevant for the reserved postal services do not apply, provided that their price is equal to or is higher than the amount which is two and a half times the price of the fastest transmission category item, according to the PPO's applicable price list (priority letter up to 20 g, with price of 45.00 dinars).

Within OPS, the most dominant category are other postal services in NPT, accounting for 98.14% of the volume and 86.3% of the income, very close to the 2020 level (Table 13.10, Figure 13.6). These services grew by over 11% in volume and approximately by 15% in income, representing less growth compared to 2020, when the volume increase approached 19%, and income growth was over 21%.

Average revenues per OPS NPT item continued to grow over a three-year period, and increased by over 9 dinars (3.4%) compared to 2021, reaching 283 dinars.

Other postal services in IPT, as the most exclusive services, generated as much as 13.3% of the income, despite participating in the volume with a little over 1.5% (Table 13.10). The 2021 shares in the volume and income remained on the previous year's level, while the average income per IPT item increased by 55 dinars (2%), reaching approximately 2,797 dinars. Following the previous year's drop, the 2021 growth was recorded at 13% in terms of volume and at more than 15% in terms of income generated by OPS.

Courier services marked approximately the same shares in OPS during 2021, amounting to more than 0.3% in volume and over 0.4% in income. The average income per service continued to grow, in 2021 by 16 dinars (over 4%), reaching approximately 392 dinars (Table 13.10). After a two-year drop, courier services marked an income increase, amounting to more than 27% in 2020. The growth in income was the result of the volume increase by over 22%. The volume growth was recorded after a years-long decrease, however it is still below the 2017 level. Ten years ago, the volume of courier services was 254,605, and they are, except for the years 2012 and 2017, constantly declining. The volume of services in 2021 was smaller by approximately 19% compared to 2017, and by 33% compared to 2011 (Table 13.11).

Table 13.10. OPS structure in 2021

Type of service	Volume	Income	Volume	Income
	thous.	thous. din.	%	%
OPS in NPT	50,193	14,214,055	98.14	86.3
OPS in IPT	780	2,181,890	1.5	13.3
Courier services	170	66,754	0.3	0.4
TOTAL	51,143	16,462,699	100	100

Figure 13.6. OPS shares in terms of volume and income in 2021

OPS volume share in 2021

1.5%
OPS in IPT   0.3% Courier services

98.1%
OPS in NPT

OPS income share in 2021

13.3%
OPS in IPT   0.4% Courier services

86.3%
OPS in NPT
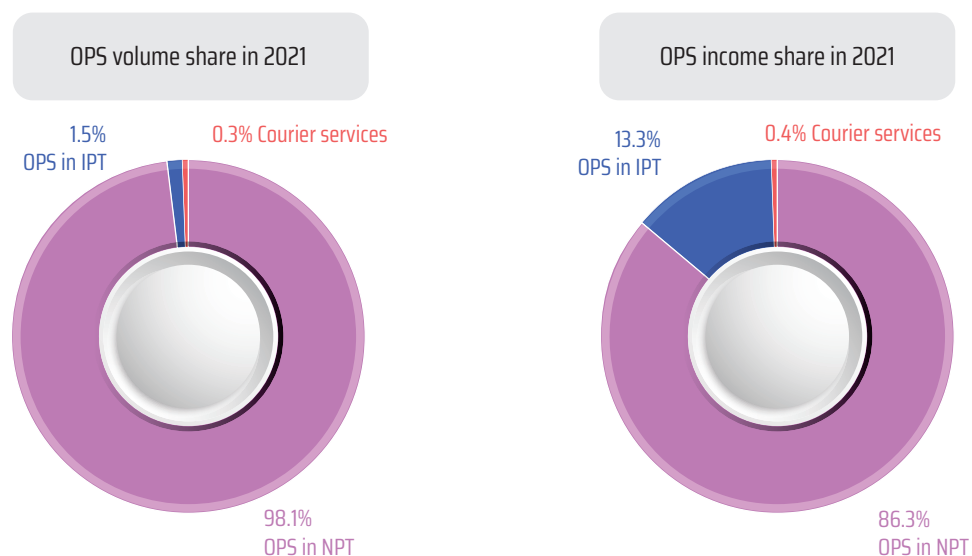
The increase in the OPS volume and income in the Republic of Serbia, compared to years 2017 and 2020, is shown in Table 13.11.

Table 13.11. Volume and income growth in 2021 compared to 2017 and 2020

OPS type	2017		2020		2021		Volume growth		Income growth	
	Volume thous.	Income mill. RSD	Volume thous.	Income mill. RSD	Volume thous.	Income mill. RSD	2021-2017	2021-2020	2021-2017	2021-2020
OPS NPT	30,123	7,877	45,167	12,372	50,192	14,214	67	11	80	15
OPS IPT	594	1,660	690	1,892	780	2,182	31	13	31	15
Courier services	210	68	139	52	170	67	-19	22	-1	28
Total	30,927	9,605	45,996	14,317	51,143	16,462	65	11	71	15

In comparison with 2017, NPT OPS volume was increased by 67%, and income by over 80%.

In comparison with 2017, these services marked a growth by 31% both in volume and income during 2021.

As mentioned earlier, the most dominant OPS in NPT are those whose shares in volume and income have been continuously increasing, while that of courier services over the last 10 years has been decreasing. This could be a sign of a disloyal competition in the market. The trend of OPS volume and income shares in the Republic of Serbia over the last 5 years is shown in Table 13.12.

Table 13.12. Trend of OPS shares in percent

Type of service/year	2017		2018		2019		2020		2021	
%	Volume	Income	Volume	Income	Volume	Income	Volume	Income	Volume	Income
OPS NPT	97.3	82.0	97.6	83.4	97.6	83.0	98.2	86.4	98.14	86.3
OPS IPT	2.0	17.3	1.8	16.0	2.00	16.5	1.5	13.2	1.5	13.3
Courier \ services	0.7	0.7	0.6	0.6	0.4	0.5	0.3	0.4	0.3	0.4
Total	100	100	100	100	100	100	100	100	100	100

13.4. Analysis of express services and impact of remote commerce

Express postal services are the most dominant OPS category. At the same time, they have shown gradual increase over the previous years and represented the main motor of the postal market development in the Republic of Serbia. As of 2018, RATEL started to elaborate quarterly overviews of express and courier service markets in the Republic of Serbia and publish them on its web page, with regular broader analysis of these market segments within its annual market overview.

Taking into account volumes and revenues generated by national and international express services, distribution by weight category and by content (documents/goods), including the ratio of outbound and inbound items in international traffic and analysis of the effects of remote sales, an overview of express services and impact of remote commerce in 2021 has been made.

In line with the ERGP (European Regulators Group for Postal Services) recommendations, items weighing up to 500 g are divided according to the content, to items containing documents and those containing goods.

Table 13.13 and Figure 13.7. show the structure of NPT express items by weight (in thousand).

Table 13.13. NPT express service volumes by weight (in thousand)

	NPT express items							Total express items		Total volume
	Items up to 500 g		Items 500 g-1 kg	Items 1 kg-2 kg	Items 2 kg-5 kg	Items 5 kg-10 kg	Items over 10 kg			
	Docs.	Goods						Docs.	Goods	
Volume	6,895	13,861	6,750	6,162	6,124	3,398	4,139	6,895	40,434	47,329
Share in total volume	15%	29%	14%	13%	13%	7%	9%	15%	85%	100%

Much like the previous years, the items containing goods are sixfold the number of those containing documents. The items of up to 500 g make up almost half of the total volume of NPT express items (44%), out of which 70% contain goods.

Figure 13.7. **NPT express service volumes by weight in 2021**

- 7.18% Items 5 kg-10 kg
- 8.74% Items over 10 kg
- 12.94% Items 2 kg-5 kg
- 13.02% Items 1 kg-2 kg
- 14.26% Items 500 g-1 kg
- 14.57% Docs up to 500 g
- 29.29% Goods up to 500 g
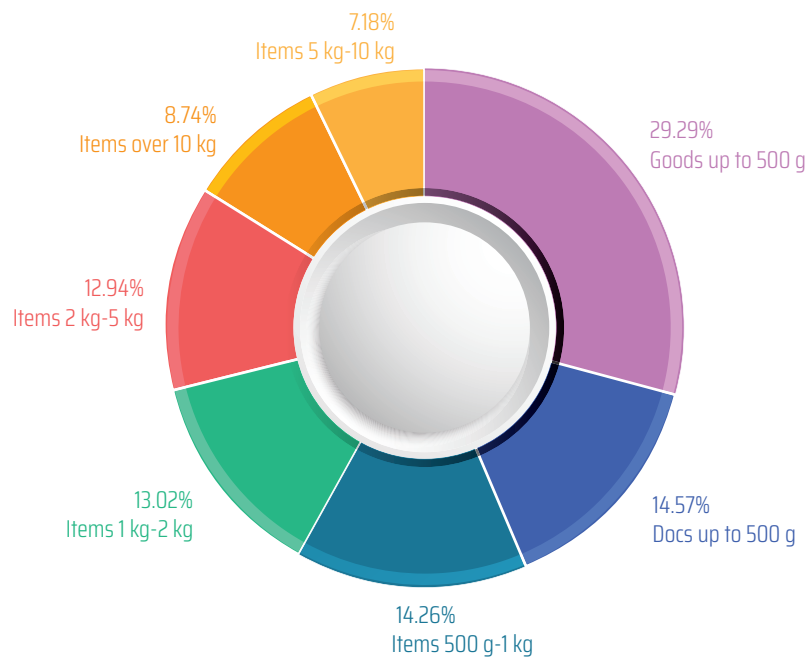
Table 13.14 and Figure 13.4 show the volume share for the items stemming from remote commerce, compared to the total NPT express service volume.

Remote sales (remote commerce) are boosting the postal volumes both in national and international traffic.

Remote commerce includes displaying an offer and concluding an agreement on the sale of goods/ services by means of one or more remote communication tools. E-commerce is a type of remote commerce realized in such a way that the goods/services are offered, ordered and sold via Internet. E-commerce is particularly performed as:

1. the sale of goods/services through an online shop (basic form of e-commerce);
2. the sale of goods/services via an online platform connecting sellers and consumers (e-commerce platform sale);
3. the sale of goods via an online shop or an online platform, whereby the goods are delivered to the end-user directly from the manufacturer/retailer ("dropshipping").

Other remote commerce is carried out by other means of communication, in particular catalogue sales, TV sales, commerce via mail, printed items, advertising material with purchase order, via telephone, mobile phone, text or multimedia messages in mobile telephony and automatic machines.

Merchandise payments are effectuated electronically or by COD, and the delivery of goods via mail – in national traffic usually by means of express postal items.

Items stemming from remote commerce, which continues to expand on the European market, account for almost 42% of the total volume of express postal items in 2021 on the market of the Republic of Serbia (Table 13.14), especially in the category of goods up to 500 g, accounting for more than 18% of the total express volumes.

Table 13.14. Share of remote commerce in total NPT express volumes in 2021 (in thousand)

	Docs up to 500 g	Goods up to 500 g	Items 500 g-1 kg	Items 1 kg-2 kg	Items 2 kg-5 kg	Items 5 kg-10 kg	Items over 10 kg	Total
Express volumes	6,895	13,861	6,750	6,162	6,124	3,398	4,139	47,329
Remote commerce volumes	1,121	8,617	3,470	2,586	1,997	822	1,124	19,737
Remote commerce share	16%	62%	51%	42%	33%	24%	27%	42%

The remote commerce volume share in the total express volumes continued to grow in 2021 as well (Table 13. 15).

4 Commerce Law („Official Gazette of RS", No. 52/2019)

Table 13.15. Share of remote commerce in total NPT express volumes 2018-2021

	2018 year	2019 year	2020 year	2021 year
Remote commerce share in total volumes	27%	31%	38%	42%

The trend of items containing goods up to 500 g being the most dominant remote commerce-generated items (almost 44%) has continued, followed by items weighing between 500 g and 1 kg (almost 18%). 94% of the remote sales items contain goods, while the rest of them contain documents up to 500 g.

Figure 13.8. **Share of remote commerce in total NPT express volumes by weight category in 2021**
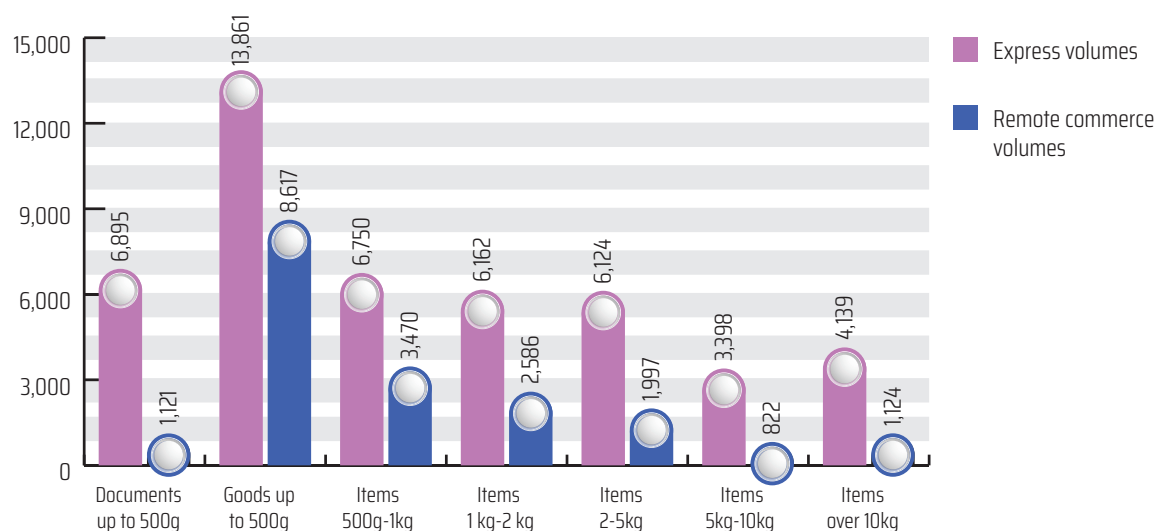
Table 13.16 and Figure 13.9 show the share of NPT express services income (in million dinars), by weight category.

More than 88% of the revenues are generated from the items with goods, while the share of the items with documents is seven times lower. The biggest income share is accounted for by the items containing goods up to 500 g, followed by those containing goods over 10 kg. These items, despite accounting for smaller volume share than the majority of item categories, have a significant income share, since the postage fee depends also on the weight.

Table 13.16. **NPT express services income share (in million din.) by weight in 2021**

	NPT express revenues							Total express revenues		Total income
	Pošiljke do 500 g		Pošiljke 500 g-1 kg	Pošiljke 1 kg-2 kg	Pošiljke 2 kg-5 kg	Pošiljke 5 kg-10 kg	Pošiljke preko 10 kg			
	Dokum.	Roba						Dokum.	Roba	
Income	1,608	3,304	1,762	1,582	1,774	1,169	2,591	1,608	12,182	13,790
Share in total income	12%	24%	13%	11%	13%	8%	19%	12%	88%	100%

Figure 13.9. NPT express services income share by weight in 2021
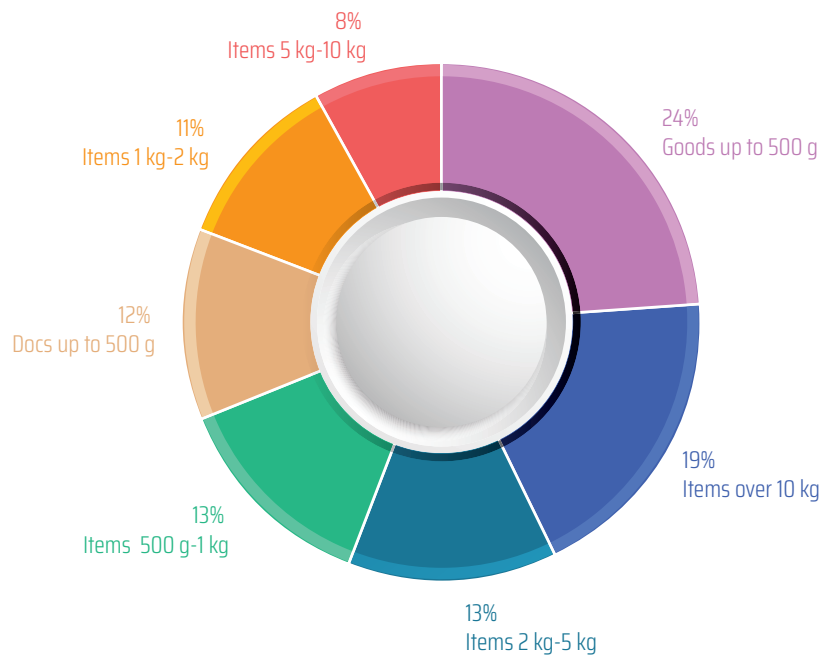
Table 13.17 and Figure 13.10 show the shares in the revenues stemming from remote commerce compared to the total income from NPT express items (in million dinars). Revenues from the remote sale items make up more than 38% of the total generated revenues from the NPT express items. The most dominant item category, goods up to 500 g, accounts also for the biggest income, amounting to around 36% of the total revenues from the NPT express items, with almost one half of these revenues coming from remote commerce items.

Table 13.17. Share of remote sales income in NPT express service revenues (in million din) by weight 2021

	Docs up to 500 g	Goods up to 500 g	Items 500 g-1 kg	Items 1 kg-2 kg	Items 2 kg-5 kg	Items 5 kg-10 kg	Items over 10 kg	Total
Express revenues	1,608	3,304	1,762	1,582	1,774	1,169	2,591	13,790
Remote commerce revenues	260	2,097	657	592	591	346	728	5,271
Remote commerce share	16%	63%	37%	37%	33%	30%	28%	38%

Figure 13.10. **Share of remote sales income in NPT express service revenues (in million din) by weight in 2021**
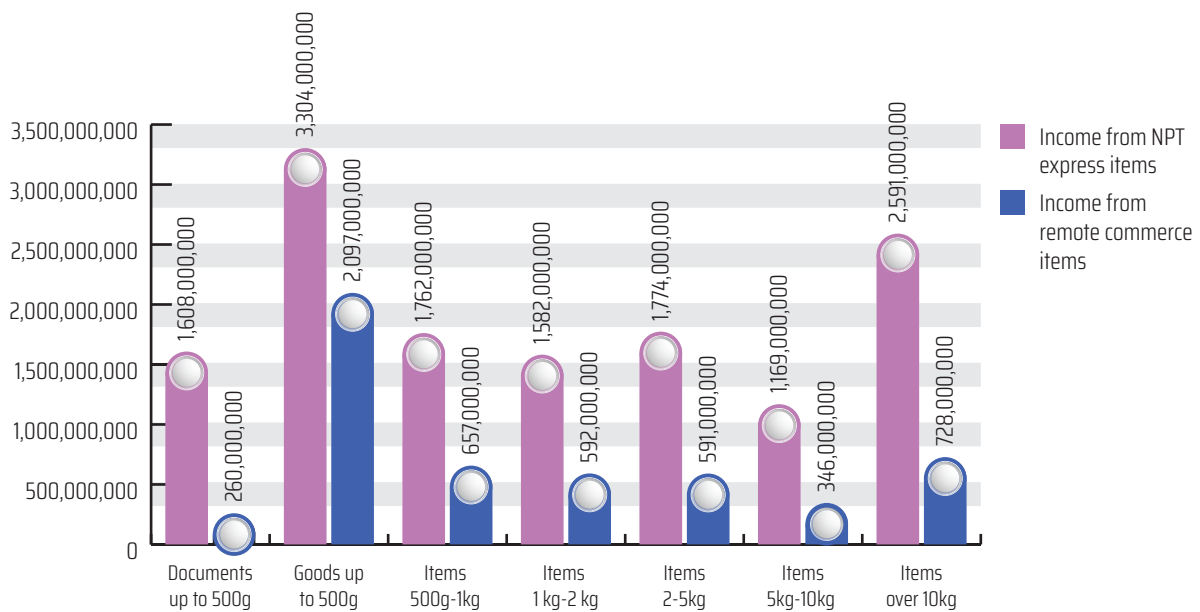
When analyzing the express service market situation compared to 2020, a clear growth can be observed in all market segments (Table 13.18), with express volumes increased by 11%. The biggest growth was demonstrated by the items weighing between 1 kg and 2 kg (23%), followed by documents up to 500 g (18%). The volume growth is also followed by income growth, which was approximately 14%, in comparison to 2020.

One of the main drivers of the further express service market development in national postal traffic is undoubtedly the advancement of remote commerce. Year after year, this segment has recorded gradual growth (Figure 13.11), so that, compared to 2018 (starting year of the analysis), the express volumes rose by 38% and the volumes generated by remote commerce increased by 115%.

Figure 13.11. Express items volume growth and remote commerce items volume growth 2018-2021
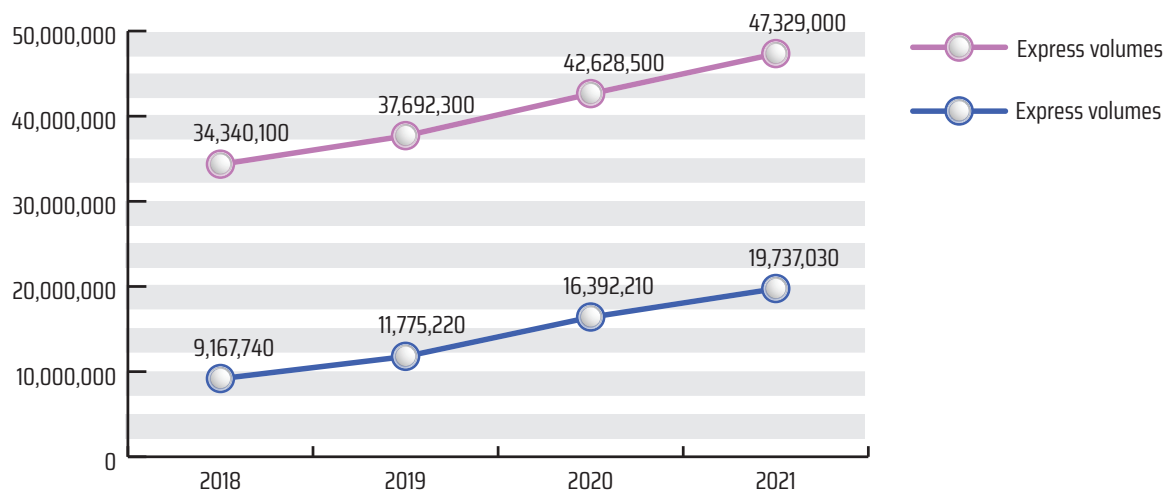
When comparing the volumes generated by remote commerce with those in the same market category during 2020, an increase of 20% is observed (Figure 13.12). Not unexpectedly, the volume growth is reflected in the income growth (by 21%) for the same type of service.

Figure 13.12. Comparison between NPT remote sales volumes of 2020 and 2021
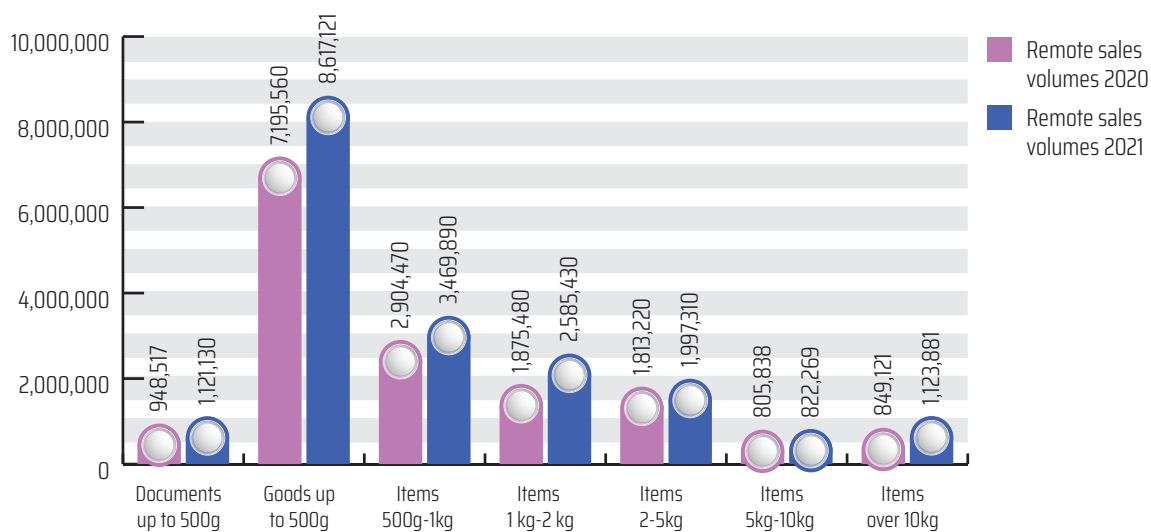
Table 13.18. Comparison between NPT express volumes of 2020 and 2021

	Docs. up to 500 g	Goods up to 500 g	Items 500 g-1 kg	Items 1 kg-2 kg	Items 2 kg-5 kg	Items 5 kg-10 kg	Items over 10 kg	Total
Express volumes positive/negative growth 20/21 (%)	18%	9%	14%	23%	5%	3%	3%	11%
Remote sale volumes positive/negative growth 20/21 (%)	18%	20%	19%	38%	10%	2%	32%	20%
Express revenues positive/negative growth 20/21 (%)	21%	11%	16%	25%	10%	14%	8%	14%
Remote sale revenues positive/negative growth 20/21 (%)	27%	29%	5%	32%	10%	10%	18%	21%

In comparison with the previous biennial period (2020/2019), both volume and income did record growth in all market segments, with however the percentage being slightly smaller in the latest comparative period (2021/2020). This is probably linked to an unusual circumstance in 2020, when the state of emergency was declared over a period of time and the movement of citizens was restricted, so home delivery of postal items was a preferred option when using postal services.

In addition to NPT express items, IPT express items were analyzed, based on the postal operators' data provided in Annual Questionnaires for 2021. In Table 13.19, the volume of IPT outbound and inbound express items (by weight) in 2021 is shown.

Table 13.19. Volume of international express items in 2021

	Docs up to 500 g	Goods up to 500 g	Items 500 g-1 kg	Items 1 kg-2 kg	Items 2 kg-5 kg	Items 5 kg-10 kg	Items 10 kg-20 kg	Items over 10 kg	TOTAL
Outbound volumes	114,548	25,951	20,530	20,680	29,390	14,534	8,373	7,597	241,603
Inbound volumes	156,772	56,381	52,078	51,540	62,196	38,724	28,127	37,490	483,308
Share of outbound items (%)	47%	11%	9%	9%	12%	6%	3%	3%	100
Share of inbound items (%)	32%	12%	11%	10%	13%	8%	6%	8%	100

Inbound items account for 67% items in the total IPT express items. The majority of international express items are documents up to 500 g (both outbound and inbound), containing documents, and are four times more frequent than those containing goods in the same weight category.

Compared to 2020, the total volume of postal items grew by 8%. Outbound volumes increased by 10%, whereas inbound items grew in volume by 5%.

During 2021, international express traffic reverted to its situation from before the COVID-19 pandemic, when a steady air traffic started to contribute to a new increase of express postal volumes again. The dynamics of IPT express volumes 2018-2021 is shown in Figure 13.13.

Figure 13.13. Volumes of IPT express items 2018-2021 (outbound, inbound and total volume)
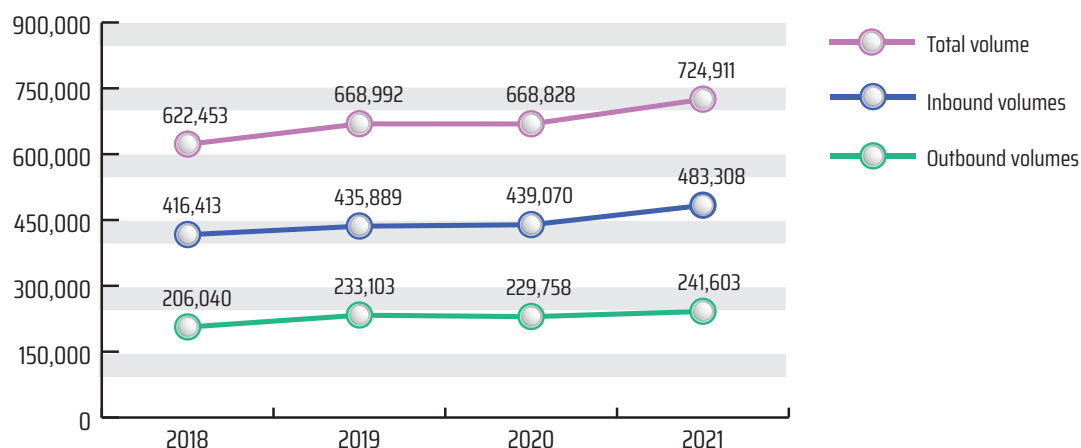
Express postal market concentration

The Herfindahl-Hirschman index (HHI) is the most reliable description of the market concentration. The value of HHI depends on the number of market participants and on the difference in their relative market power. With the increase in the number of market participants, the HHI values drops. The maximum HHI value is 10,000 (in case of a clear monopoly), while the minimum is close to zero (the nearer the HII value is to zero, the market is more competitive).

The index value is determined as the sum of single market share square values of all market participants.

From the point of view of express services (national and international) as a separate postal market compared to the UPS market, where the PPO holds a monopoly, HHI for 2020 was 2,177, implying that the express postal market is concentrated. Compared to 2020, the 2021 HHI value is slightly lower (in 2020 it was 2,649, Table 13.20).

Like the previous year, with six postal operators reaching the volume share over 1%, the HHI value is calculated based on these operators' share. The drop in the number of postal operators that meet the requirements for index calculation causes its own value to increase, suggesting a decrease in the market competition. Different economy sectors use different value intervals for HHI, however the HHI value of 2,177 corresponds in most of the cases to a competitive market.

Table 13.20. HHI values for 2018-2021

	2018	2019	2020	2021
HHI value	1,829	1,881	2,082	2,177
Operators with express volume share over 1%	7	7	6	6

13.5. Overview of postal markets in the EU based on ERGP Report

The European Regulators Group for Postal Services (ERGP) monitors and analyzes the single EU postal market, with an aim to identify main postal market development trends and, as an advisory body, give timely expert advice to the European Commission (EC) regarding the future advancement of the regulatory frame. Accurate details about the postal market development are of key importance not only for users and operators, but also for regulators. The data used for the analysis

and elaboration of the report on main indicators are collected by means of questionnaires sent out to all EU member countries including candidate countries. The 2020 data were provided by 33 co-untries (the report covers the period 2016-2020). Since the 2021 data to be published by ERGP will not be available before the end of 2022, the information described herein concerns the year 2020.

For a better identification of geographic trends related to specific market characteristics, the totality of the EU markets is divided in 4 areas:

- Western countries (AT, BE, DE, DK, FI, FR, IE, LU, NL, SE),
- Eastern countries (BG, CZ, EE, HR, HU, LT, LV, PL, RO, SI, SK),
- Southern countries (CY, EL, IT, MT, PT),
- Non- EU countries (RS, CH, ME, MK, NO,TR).

In 2020, the average price for a priority letter up to 20 g in national postal traffic was increased by 7.3% compared to 2019 and by 18.2% compared to 2016. Likewise, the priority letter price in international postal traffic grew by 7.1% compared to 2019 and by 25.6% compared to 2016.

As for the parcels up to 2 kg in NPT (priority parcel price), Norway has still the highest price of 17.18 EUR, with North Macedonia holding the lowest at 0.52 EUR, which demonstrates a big price gap for the same service between the countries. A number of countries have not changed their parcel price over the last four years (2016-2020): Switzerland, Cyprus, Estonia, Finland, Croatia, Malta, Italy, Lithuania, Luxembourg, Latvia, Sweden, Slovakia and Poland. The prices are shown in Figure 13.14.

5 HHI – Herfindahl-Hirschman index – a measurement reflecting a market's concentration, showing the level of competition within a market. https://www.moder-nanalyst.com/Careers/InterviewQuestions/tabid/128/ID/1003/What-is-the-Herfindahl-Hirschman-Index-HHI-and-why-would-you-use-it.aspx
6 ERGP PL II (21) 25 –Report on Core Indicators

Figure 13.14. Price of (priority, up to 2 kg) NPT parcel in 2016, 2019 and 2020

	AT	BE	BG	CH	CY	CZ	DE	DK	EE	ES	FI	FR	MK	HR	HU	IE	IT	LT	LU	LV	ME	MT	NL	NO	PL	PT	RO	RS	SE	SI	SK
2016	4.6	6.5	1.33	8.49	4.5	2.77	4.5	10.74	4.08	8.9	9.9	8.5	0.52	2.65	3.64	8.25	9	2.68	8.4	3.54		9	6.95	14.8	3.59	7.7	1.1	1.96	13.33	2.39	4
2019	4.8	6.7	1.58	8.49	4.5	2.77	4.5	12.75	4.08	12.85	9.9	8.8	0.52	2.65	4.37	9	9	2.68	7.2	3.54	0.77	9	6.96	16.71	3.59	6.5	1.18	2.17	13.33	2.89	3,9
2020	4.81	6.9	1.58	8.49	4.5	4.46	4.79	12.75	4.08	13.45	9.9	8.95	0.52	2.65	4.6	9	9	2.68	7.2	3.24	0.77	9	7.25	17.18	3.59	6.5	1.49	2.17	11.62	2.89	3.9

The average price for sending an international parcel up to 2 kg in 2020 in the cheapest European zone is 18.67 EUR. In comparison with 2019, this represents an increase by 1.7%. The discrepancy trend between prices of parcels in national and international traffic is still present (international parcel is on average around 205% more expensive), unlike the letters, where the gap is not extensive. The price gap between international and national parcels prompted the EC to undertake measures to harmonize these prices, by adopting the Regulation on cross-border parcel delivery services.

Over the period 2016-2020, the number of active postal operators in the European market grew by 956 operators compared to 2016 (5%). The biggest increase of the number of postal operators occurred in Italy, Spain, Greece, Austria and Switzerland. In another ten countries, among which the Republic of Serbia, an increase in the number of postal operators compared to 2016 was observed. Figure 13.15. shows the change in the number of active postal operators.

Figure 13.15. Number of active postal operators 2016-2020 (%)

● Variation 2016-2020 (%)   ● Variation 2019-2020 (%)

AT	BG	CH	CY	CZ	DE	DK	EE	EL	ES	FI	FR	ME	MK	HR	HU	IE	IT	LT	LU	LV	MT	NL	NO	PL	PT	RO	RS	SE	SI	SK	TR
555	-52	28	-5	54		-8	-21	31	11	-36	20		81	0	-16	10	17	-4	12	1	4	11		-8	13	-7	9	0	43	-23	
173	0	9	-10	16		0	8	9	8	0	0	38	34	10	-7	0	2	6	0	3	-7	0	0	-5	-3	5	0	4	54	-29	48
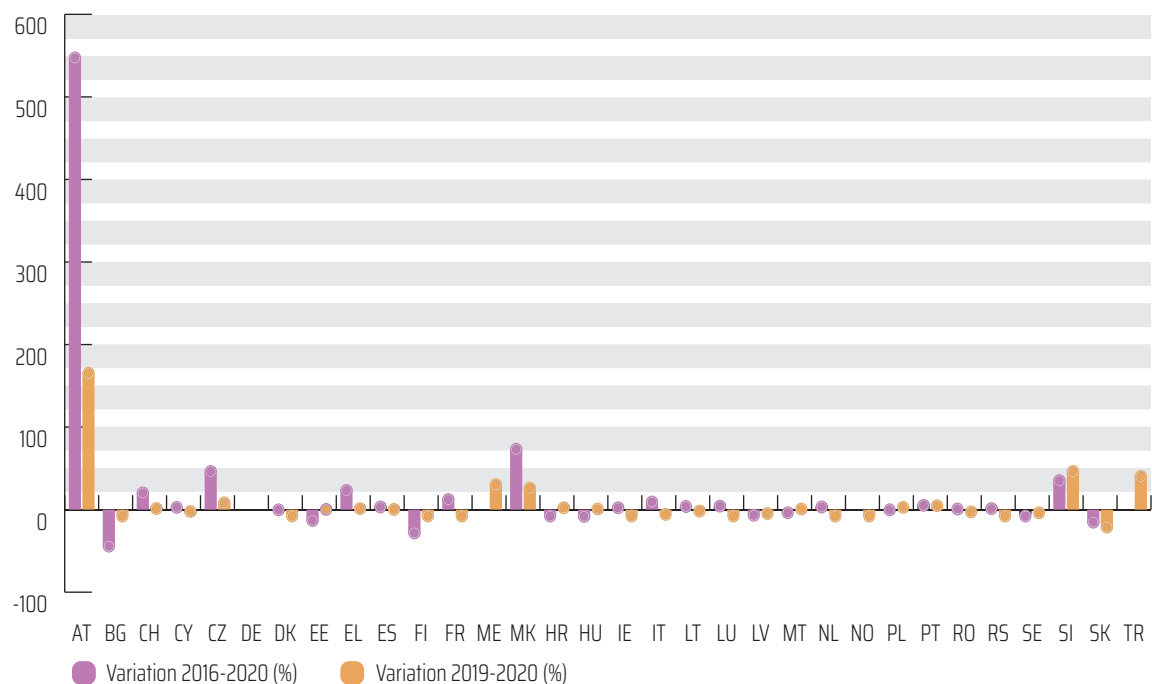
Over the past years, the total postal volume in all ERGP countries has been dropping, and as of 2016, the average decrease reached almost 4%. The biggest drop is attributed to the letter-post items, which are the most numerous postal items, causing the total volumes to plummet, despite the growth of parcel volumes. Unlike the letter-post items, parcel services are spiking. Table 13.21 shows volumes and percent changes for 2019-2020 and 2016-2020.

Table 13.21. Total postal service volumes and percent changes 2019-2020 and 2016-2020

	2016 (milion)	2019 (milioni	2020 (milion)	% change 2019-2020	% change 2016-2020
Total postal service volume	59,276	53,220	50,337	-5.4%	-4.0%
Letter-post service volume	52,053	44,865	40,672	-9.3%	-5.9%
Parcel service volume	7,078	8,311	9,621	15.8%	8.3%

In 2020, the impact of the COVID-19 on the postal sector was substantial. The data provided by the countries revealed that the letter-post items plunged even more deeply, while the parcels had a major volume increase compared to the previous year, It should be noted however that the majority of European regulators consider express parcels a non-USO parcel service, without any separate track record thereof, in contrast to the Republic of Serbia, where express postal items are dominant.

Unlike the volumes, the total revenues have grown on average by around 1.3% compared to 2016, mainly owing to an increased parcel service income – in 2020 it accounted for approximately 65% of the total revenues. The income from letter-post services is on the decline (Table 13.22).

Table 13.22. **Total postal service revenues and percent changes 2019-2020 and 2016-2020**

	2016 (milion)	2019 (milion)	2020 (milion)	% change 2016-2020	% change 2019-2020
Total postal service income	€ 74,333	€ 75,213	€ 78,053	+ 3,8%	+ 1,3%
Letter-post service income	€ 31,193	€ 29,307	€ 26,893	- 8,2%	- 3,6%
Parcel service income	€ 41,733	€ 45,190	€ 50,417	+ 11,6%	+5,1%

The total employment over 2016-2020 plunged by approximately 8.1%, the reason being a gradual reduction of the USP number of employees by roughly 7.9% in the observed period. Like in the previous years, the USP employee share is significantly higher than that of other postal operators (Figure 13.16). Overall it can be observed that the COVID-19 pandemic had no effect on the number of postal employees.

Figure 13.16. Total number of USP and other postal operators' employees 2016-2020
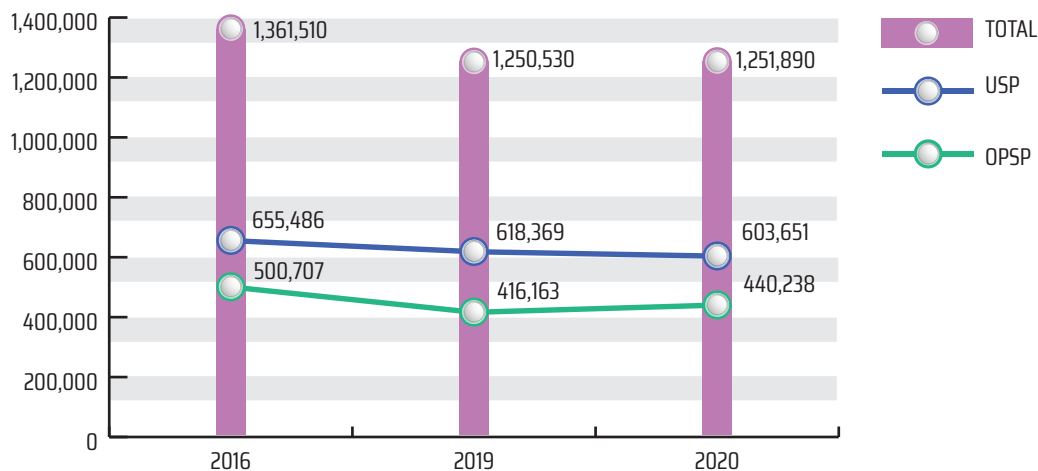
In the countries that provided data for period 2016-2020, an increase in the number of postal business units by 21% is observable. The USP recorded a drop in this number by 0.7%, while other postal operators recorded a rise by 56.8%. The number of USP postal business units has not significantly changed over the past two years, however that of other postal operators grew in 2020 by 14.8% in comparison to the year before (Figure 13.17).

Figure 13.17. Total number of USP and other postal operators' business units 2016-2020
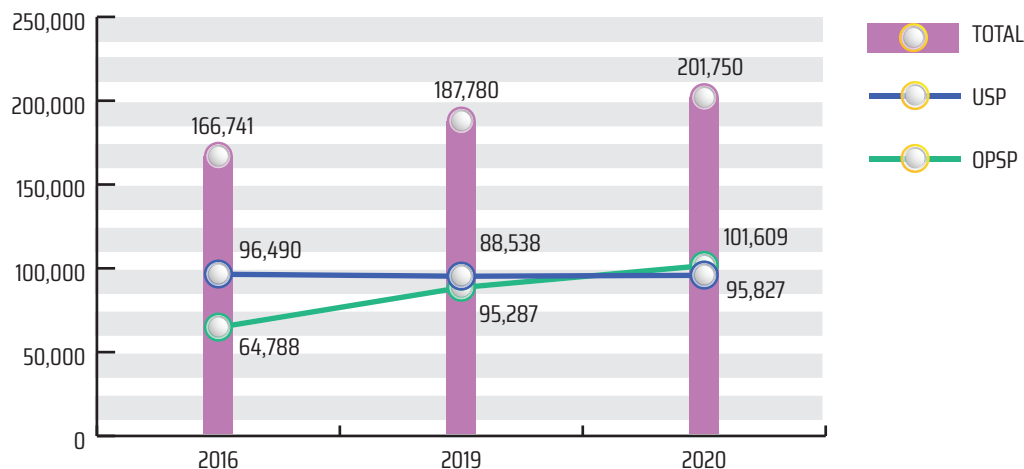
ERGP reports provide details about postal network resources such as postal and residential mailboxes, parcel lockers etc. Parcels mark constant growth over the years and are ever so more present in most of the countries. It seems that other postal operators prefer to invest in this type of postal resource, even though the USPs as well increasingly used parcel lockers over 2020.

The European Green Deal is undoubtedly a hot topic in the EU countries. Reaching this goal by 2050 will affect many economic sectors, including postal services. Postal sector will, above all, be affected in the segment of transport, in terms of the gas emission reduction, energy efficiency and renewable energy sources.

The analysis of postal markets revealed that most of the countries had not yet implemented the notion of an environment-based postal service sustainability. However, many European countries have taken steps to substantially reduce carbon emission, such as using more electric vehicles, more "green" energy powered operations in business units and sorting centers and only recycled packaging materials.

In addition, digital (online) platforms have become more numerous over the past few years. E-commerce personal delivery causes the volume of parcels to grow dramatically, which makes it an interesting topic for ERGP. At the EU level, the legal status of these platforms has not yet been legally defined. Still, there are countries where online platforms are considered postal operators. Bearing in mind their practice and operations, the following conclusions have been drawn:

- provided services do not qualify as postal services by definition;
- activities concern one or more phases within the postal chain and do not relate exclusively to transport;
- services are provided in the name of a third party;
- network organization, management and development, in particular in the segment of parcel delivery, do not differ from the operations applied by traditional postal operators.

There are, however, exceptions when online platforms are not considered postal operators:

- when delivered products are not postal items (food);
- when distribution of items is carried out through a postal operator;
- when companies have their own delivery system for their own products.

Conclusion

The growth of postal service volume by 1.6% is the result of the increase of other postal services volumes in the Republic of Serbia over 2021, carried out by 39 postal operators. In 2021, an 18% income growth is directly influenced by an increase in the OPS volumes, but also by an increase of UPS and OPS prices, performed by the PPO and other postal operators respectively in the market of the Republic of Serbia.

PThe drop in the UPS volumes by 0.1%, compared to 2020 is a continuation of a years-long trend, present both in the EU countries and around the globe. The traditional letter-post services are gradually being replaced by other types of communications, everywhere and in the Republic of Serbia as well.

Since 2017, a decreasing trend in the letter-post volumes has been observed. These services, being the most dominant part of UPS, directly affect the overall UPS volumes.

UPS parcels have grown by 16%, their volume still being extremely low, which is yet another specific feature of the postal market in the Republic of Serbia. The number of UPS parcels is almost twice smaller than the number parcels belonging to other postal services.

OPS parcels have grown by 1%, but are also extremely rarely present in the total service volume (their volume being slightly over half of million). They are provided only by the PPO, despite other postal operators being authorized as well for the provision thereof.

Other postal operators provide exclusively express services, which have been a preferred choice of postal service users in the market of the Republic of Serbia, over the past decade.

These services are fast, reliable and customized for the users' needs. The development of global commerce, which is a major generator of express items, was facilitated through the advancement of electronic communications.

Globally, Internet platforms are becoming one of the major sale channels. Lately, the big chains have started to opt for online selling of their products, which will additionally increase the importance of these services in modern society, favoring the globalization at all levels.

Modern users expect the postal item to be available within a flexible timeframe, prompting the operators to introduce new delivery options such as parcel lockers and postal kiosks, enabling the user to manage the postal item in its final transmission phase. This way the services are upgraded and value-boosted to better fit the requirements of a modern consumer environment.

Postal service users in national postal traffic opt for express delivery when ordering goods via Internet platforms, since express services are only sightly more expensive than regular parcel services. However, as far as IPT delivery is concerned, the users usually opt for services from the UPS domain, since they are significantly more affordable in terms of Internet purchase and cross-border delivery.

In 2021, one online platform was registered as a postal operator in the market of the Republic of Serbia, which is already a common occurrence in the EU. As a result, many more such Internet postal operator platforms are expected to follow in the years to come.

In the market of the Republic of Serbia, an OPS volume growth by 11% has been recorded, caused by an increase in the express items volume in NPT, which have been on the rise for the last 11 years, generating a continuous growth of OPS as well. A continuous growth of OPS revenues has been recorded as well (15% in 2021), directly influenced by an express income growth in NPT, since the beginning of postal market monitoring in 2010.

Like in the previous years, national market has seen a growth of the e-commerce based postal volumes by 20% (over the period 2020/2019, this increase was 39%). A notable fact is that the e-commerce share in the total express volumes has increased – in 2021, remote sales were about 42% of the total express volumes. According to the available data, 39% of the users in the Republic of Serbia have never purchased goods or products over the Internet, which represents a significant potential for the growth of express market in the future.

Courier service providers recorded a swinging number of active operators, evident also in the previous years. The 2021 record, however and unlike the recent period, showed a significant courier service volume increase (by 22%) and growth in revenues (by 27%).

At the end of 2021, a survey on the postal users' need satisfaction level was carried out (natural and legal persons). Whereas, over 2020, the impact of the COVID-19 pandemic was considerable, in 2021, more than half of the respondents stated that the pandemic had no or very little impact on their habits regarding postal services. This was confirmed by the effectuated growth of express services in national postal traffic, which was lower compared to the growth generated over 2020. However, around 20% of the respondents declared that they used postal operators' services more often. In addition, almost 24% of them do not purchase goods via Internet. All these results reveal that the postal market has a great potential in terms of a broader growth of remote commerce and consequently further increase of the volume and income of express services.

The importance of postal services as a basic human need in the modern world has been proven many times in the crisis period, such as the two-year long battle against the pandemic. Postal operators compete in creating new postal services which must be sophisticated, reliable and of high quality, in order to adapt to the users' needs in modern society.

7 ERGP (21) 23 Report on online platforms and e-retailers: implications for the future.
8 eCommerce Association of Serbia, https://ecommserbia.org/2022/03/07/vise-od-30-miliona-online-transakcija-placenih-karticom-2021-u-srbiji/
9 https://www.ratel.rs/cyr/page/cyr-studije-iz-oblasti-postanskih-usluga

QUALITY OF POSTAL SERVICE PROVISION

14

Pursuant to the Law on Postal Services, RATEL prescribes and monitors the quality parameters of postal service provision. The quality of universal postal service (UPS) is reflected in the results of the quality measurements performed by the public postal operator (hereinafter: the PPO) as the sole universal service provider (USP) in the Republic of Serbia. Over 2021, RATEL undertook an independent measurement of the UPS quality whose results will be analyzed within this chapter.

The quality of other postal services' provision, particularly express postal service, is currently considered based on the available data provided by the postal operators. In the following period, RATEL plans to undertake a survey on the quality of other postal services by measuring the quality of services provided by all leading postal operators in the market.

14.1.   Quality of universal postal service provision

The quality of universal postal service provision has been analyzed based on the data from an independent RATEL's measurement, internal PPO's measurement and RATEL's annual questionnaire data.

In accordance with the provisions of the Law on Postal Services („Official Gazette of RS", No. 77/19), RATEL adopted Rulebook on quality parameters for performing postal services („Official Gazette of RS", No. 114/20), which prescribes the dynamics of reaching the quality parameters. The full targeted transit times, prescribed by the standards, are expected from the PPO in 2023.

It is also stipulated that the PPO, as a sole universal postal service provider (hereinafter: the USP), be obliged to submit to RATEL an annual report on the state of the UPS quality. The annual report shall be

made in accordance with adopted standards: SRPS EN 13850:2014, SRPS EN 14508:2014 and SRPS EN 14012:2014.

Pursuant to legal provisions, since 2021, RATEL has been conducting independent screening of transit times of non-recorded letter-post items in national postal traffic.

Over 2021, the PPO carried out AMQM screening - continuous internal measurement of non-recorded letter-post transit times with internal panellists, using RFID equipment. Additionally, the PPO also conducted a screening of parcel transit times in national postal traffic in 2021, via an internal application.

1 Internal measurement carried out by the PPO is performed in line with the PPO internal act Methodology for QoS monitoring in postal traffic.
2 Rulebook on quality parameters for performing postal services („Official Gazette of RS", No. 114/20)

Speed and reliability of postal items transport and delivery

Speed and reliability of transmission and delivery of postal items in the Republic of Serbia are measured by means of transit and delivery times for national priority and non-priority items and international priority and air letter-post items, in line with delivery standards prescribed by RATEL.

As mentioned above, in 2021, RATEL undertook a continuous measurement of non-recorded letter-post item transit times in national traffic. The screening for non-recorded letter-post items has been performed according to standard SRPS EN 13850:2014. Takin into account that the PPO introduced the priority letter service in April 2021, as of the third quarter 2021, beside the independent screening of non-recorded non-priority letter-post item transit times, measurement of priority letter-post item transit times was organized as well.

The screening included:

- Creation of "test letters" so that they accurately represent real letter-post flows in the Republic of Serbia;
- Collection and delivery of "test letters" were performed in urban areas (with delivery of at least 5 days a week) and rural areas (with delivery at least 3 times, twice or once a week).

The measurement of transit times for non-recorded letter-post items in national traffic in 2021 was performed:

- By sending 10,094 non-recorded non-priority "test letters" and 581 non-recorded priority "test letters";
- By collecting and delivering letters across 13 geographic areas;
- By sending and delivering "test letters" among 43 panelists.

The achieved results were well below the standards for non-priority non-recorded letter-post items prescribed by the Rulebook (Table 14.1).

Table 14.1. Transit times for non-priority non-recorded letter-post items in national traffic in 2021

	Non-priority non-recorded items		
	Achieved result	Achieved result (extended deadline3)	Prescribed minimum
D+2	50.02%	55.92%	80%
D+3	69.97%	73.29%	85%
D+5	87.97%	90.39%	90%

For priority non-recorded letter-post items as well, the achieved results were well below the standards for priority non-recorded letter-post items prescribed by the Rulebook (Table 14.2).

Table 14.2. Transit times for priority non-recorded letter-post items in national traffic in 2021

	Priority non-recorded items		
	Achieved result	Achieved result (extended deadline4)	Prescribed minimum
D+1	29.74%	35.62%	80%
D+2	56.51%	58.81%	85%
D+3	73.23%	75.70%	90%

The achieved results for non-priority and priority non-recorded letter-post items remained well below the prescribed quality, even after the extension of transit times for the areas exempt from five-day delivery, in line with Article 15 of the Rulebook on quality parameters for performing postal services.

3 Deadline has been extended in accordance with Article 15 of the Rulebook on quality parameters for performing postal services.

4 Deadline has been extended in accordance with Article 15 of the Rulebook on quality parameters for performing postal services

In international traffic, transit times for the European countries, from „end to end" collection to delivery for priority non-recorded letter-post items defined in the Rulebook on quality parameters for performing postal services, are shown in Table 14.3. Over 2021, the PPO performed, in international traffic, the screening of „end to end" transit times for non-recorded letter-post items via UPU measurement system – GMS WORLD.

Table 14.3. Transit times for priority non-recorded letter-post items in international traffic in 2021

	Achieved result	Prescribed minimum
J+3 (outbound)	21.5%	80%
J+3 (inbound)	15.2%	
J+5 (outbound)	50%	92%
J+5 (inbound)	54.5%	

Based on the achieved measurement results for transit times for priority non-recorded letter-post items in international traffic in 2021, shown in the table above, quality targets have not been reached. For the remaining countries of the world, the quality is measured within internationally recognized independent measurement systems applied by the Universal Postal Union and the International Postal Corporation (IPC), with the prescribed minimum quality of J+5 for 80%.

The Rulebook on quality parameters for performing postal services additionally defines transit times for USO parcels in national postal traffic. The PPO has performed measurement of parcel transit times based on an internal monitoring application called IT Navigator and has purposefully outlined the manner of measurement in the Methodology for postal traffic quality monitoring. Based on the performed screening, the set quality targets for 2021 have been considered as fulfilled (Table 14.4).

Much as in national postal traffic, the inbound international USO parcels fulfill the deadlines defined in the Rulebook on quality parameters for performing postal services (Table 14.4). The PPO extracted the results on the quality of international parcel services from the UPU's international system for quality monitoring – QCS (Quality Control System). Transit times for the delivery of inbound international USO parcels represent the time period from the moment of arrival in the exchange office to the delivery to the recipient, excluding the time parcels spend at the customs.

Table 14.4. Transit times in national and international postal traffic in 2021

	National parcels		International parcels	
	Achieved results	Prescribed minimum	Achieved results	Prescribed minimum
D+2	91.18%	80%	89.0%	80%
D+3	96.56%	90%	94.4%	90%
D+5	98.89%	95%	97.4%	95%

Transmission of USO parcels both in national and international postal traffic has reached and fulfilled the transit time values defined in the Rulebook. On the other hand, transit times for non-recorded letter-post items, like in previous years, did not comply with the quality standard. It is necessary for the PPO to undertake measures to improve quality in order to meet the target transit time values prescribed by the Rulebook on quality parameters for performing postal services.

Availability of universal postal service

The availability of universal postal service is assessed based on the territorial accessibility of post offices, accessibility of post letter boxes, working hours of post offices, availability of post office counters and availability of item delivery.

Table 14.5. Availability of post offices and letter boxes

Postal network capacities	Year					Trend (%)			
	2017	2018	2019	2020	2021	18/17	19/18	20/19	21/20
Number of post offices	1,530	1,534	1,526	1,518	1,500	0.26%	-0.52%	-0.52%	-1.19%
Number of letter boxes	1,958	1,935	1,969	1,927	1,895	-1.17%	1.75%	-2.13%	-1.66%

The declining number of post offices has continued in 2021 as well (Table 14.5). In 2021, the PPO had a network comprising 1,500 post offices, which is 18 post offices less than in 2020. Out of these, 1,309 are corporate post offices and 191 are contractual post offices. Based on the ERGP report for 2020, the European average regarding postal network units per 10,000 inhabitants was 2.4, against 2.1 in our country, based on the data for 2021. Even fewer post offices per inhabitant are situated on the territory of the capital, however these have larger capacities (i.e. the number of counters), compared to other regions of the Republic of Serbia.

The decline in the number of letter boxes that had started in 2020, continued in 2021. (Table 5). Compared to 2020, the number of letter boxes dropped by 1,7%. In line with the prescribed Methodology for postal traffic quality monitoring, the PPO performs at least once a year an analysis of the volume of items sent via letter boxes. Based on a one-month screening, a daily average is established and an analysis of the justifiability of letter boxes at particular location is elaborated.

One of the criteria for the quality of postal service accessibility are the working hours of post offices, showing the time (number of hours per day) during which the post offices are available to their customers.

Out of 1,500 post offices, 978 (65.2%) are in rural, and 522 (34.8%) are in urban areas. Further analysis showed that 1,090 post offices (72.7%) are open during up to 7 hours a day, 361 post offices (24.1%) work between 7 and 12 hours, 41 post offices (2.7%) work more than 12 hours, whereas 8 post offices (0.5%) work around the clock. Out of 1,309 corporate post offices, 160 are open less than 4 hours a day.

One of the parameters of availability of postal counters to customers regarding the provision of universal postal service is the waiting time of customers in line, determined by screening. In 2021, measurement of the waiting time of customers in line, in particular in front of the counters where collection of postal items is performed, was carried out. The result showed that the average waiting time for item collection was 6.8 minutes.

The availability of postal items delivery is the accessibility of the delivery to end-users. The Postal Directive prescribes that the USP must deliver postal items to all inhabitants at least 5 days a week, with possible exceptions. The legislation of the Republic of Serbia has also prescribed a 5-day delivery, i.e. delivery on business days, with possible exceptions, defined by RATEL in the Rulebook on the conditions for and the manner of provision of postal services („Official Gazette of RS", No. 115/2020), Articles 11 and 12, in force as of September 2020. The prescribed exceptions primarily refer to the settlements under 1,000 households, which are allowed, depending on the number of households, to receive their mail less than five days a week.

5 Deadline has been extended in accordance with Article 15 of the Rulebook on quality parameters for performing postal services

Table 14.6. Inhabitants and households per delivery area

Settlement category	Number of inhabitants	Number of households	% household
More than 1,000 households	5,009,736	2,066,297	71%
From 500 to 1,000 households	1,433,451	552,260	19%
From 250 to 500 households			
Less than 250 households	743,704	301,815	10%
Total	7,186,891	2,920,372	100%

The analysis of data about the number of inhabitants and households by delivery areas showed that around 71% households were covered by the everyday, i.e. 5-day delivery. Around 20% households receive their mail 2 or 3 times a week, with 10% households receiving their postal items once a week (Table 14.6).

Security of items

An overview of lost and damaged items (registered mail, recorded delivery items, court letters, insured letters, parcels and money orders) in the period 2017-2021, is shown in Table 14.7.

Table 14.7. Lost and damaged items in national traffic

TYPE OF ITEM	2017	2018	2019	2020	2021
REGISTERED ITEMS					
- lost per 100,000 items	9	16	35	36	5
- damaged per 100,000 items	0	0	0	0	0
RECORDED DELIVERY ITEMS					
- lost per 100,000 items	4	3	2	3	2
- damaged per 100,000 items	0	0	0	0	0
COURT LETTERS					
- lost per 100,000 items	12	11	12	14	13
- damaged per 100,000 items	0	0	0	0	0
INSURED LETTERS					

- lost per 100,000 items	1	0	0	6	1
- damaged per 100,000 items	0	0	0	1	0
PARCELS					
- lost per 100,000 items	2	0	2	2	2
- damaged per 100,000 items	2	2	1	6	4
MONEY ORDERS					
- lost per 100,000 items	0	0	0	0	0
Percentage of lost and damaged items	0.008	0.010	0.011	0.013	0.008

Based on the data provided by the PPO, 2021 saw a decrease in the number of lost registered items, court letters and insured letters, i.e. decline in the number of lost recorded items per 100,000 collected items, which was reflected in an increased security level of the items.

Contrary to the above, an independent screening carried out by RATEL points out to a big number of lost items – both non-priority non-recorded letter-post items and priority letters. Out of the sample of 10,094 non-priority „test letters", 629 (6.23%) letters were lost, whereas out of 581 priority „test letters" 42 (7.23%) priority non-recorded letter-post items were lost. The PPO was alerted about such high number of lost postal items so that appropriate measures be undertaken to resolve the problem.

Efficiency of complaint handling

In 2021, 959 written complaints were sent to the work, regional and local PPO's units, which is by 6% less than in 2020. As usual, most of the complaints refer to the delivery of items (64%).

Over 2021, 31,613 inquiries were received through the PPO's corporate website (Contact Center), which compared to the previous year represents an increase by 11%. Out of the total number of inquiries, 95.7% were about service information, while 4.3% were complaints (out of which 68% refer to delivery).

As for the complaint handling procedures carried out in 2021, claims concerning national traffic were resolved in average in 3 days, which is at the same level as over the previous year. The duration of the resolution of damage procedures was reduced by 3 days, from 14 to 11 days (Table 14.8), which complies with the prescribed deadlines.

Table 14.8. **Average time for complaint resolution, realization and payment of indemnity in national postal traffic**

Year	Resolution of damage claim (days)	Indemnity realization (days)	Indemnity payment (days)	Total for resolution and indemnity payments (days)
	1	2	3	4=2+3
2017	4	9	4	13
2018	4	10	5	15
2019	3	6	5	11
2020	3	9	5	14
2021	3	7	4	11

These deadlines are fairly longer in case of international traffic claims, taking into account that the complaint handling procedures are carried out in at least two countries.

Users' satisfaction and availability of information

In its annual QoS report, the PPO regularly informs RATEL about the results of the performed survey on the level of service users' satisfaction and the availability of information. The PPO has conducted a survey on the Index of satisfaction regarding legal persons (sample of 183 legal entities), carried out by means of personal interviews of pre-selected customers and including rating of different letter-post service parameters. The parameters such as: reliability, speed, assortment, price and manner of service provision were commonly highly rated.

The PPO made available to its users several channels for questions and complaints (e-mail, by te-lephone, via website, by mail, directly at post office counters), which complies with the requirements of standard SRPS EN 14012:2014.

Complaints regarding universal postal service

The UPS items in the volume of 53,456,014 in national postal traffic were the object of 54,006 inqui-ries, the majority of which were found to be ungrounded (92.1%). Based on the PPO's General Terms and Conditions, should the sender think that a recorded item was not delivered to the recipient, or was not delivered within the proper deadline, an inquiry procedure shall be initiated at the post offi-

ce. The resolution of the inquiry is later on used in the process of indemnity claim. The majority of inquiries were filed for court letters (91%).

Out of the total number of filed indemnity requests, the majority referred to lost items (81.5%), followed by claims for damaged items and other items (2.3%), and finally to deadline overruns (0.8%). There were approximately 13.2% of unjustified inquiries (Table 14.9).

Table 14.9. Complaints about UPS in national postal traffic in 2021

Total number of filed complaints	Unfounded	Resolved as:				Indemnity
		Gubitka	Oštećenja	Prekoračenja roka	Ostale reklamacije	Iznos (u dinarima)
1=2+3+4+5+6	2	3	4	5	6	7
661	87	539	15	5	15	676,041.00

When compared to the previous year, the number of filed complaints in national postal traffic dropped dramatically (by 61%), as opposite to the situation during the COVID-19 pandemic, when the number of complaints increased due to the difficulties in postal traffic.

In international postal traffic, there were 5.051 inquiries filed in the UPS domain, out which 60% referred to outbound items, and 40% to inbound items. Almost all of the filed inquiries were deemed unjustified (94%). Like in national postal traffic, the complaints regarding UPS in international postal traffic also marked a drop by 56%.

Table 14.10 shows an overview of paid indemnities by the type of recorded mail in national postal traffic, for the period 2017-2021.

Table 14.10. **Paid indemnities by type of postal items in national postal traffic (NPT)**

NPT	2017 godina		2018 godina		2019 godina		2020 godina		2021 godina	
	pcs.	din.	pcs.	din.	pcs.	din.	pcs.	din.	pcs.	din.
Registered items	568	446,258.00	946	805,151.00	2,313	983,195.00	1,604	937,539.50	549	485,237.00
Insured letters	3	3,896.00	5	4,980.00	2	8,085.00	10	64,982.00	4	5,361.00
Parcels	15	38,817.15	7	23,741.00	11	22,945.00	25	115,417.30	19	144,983.00
Money orders	2	32,540.07	1	3,000.00	1	2,000.00	2	1,371.00	2	40,460.00
TOTAL	588	521,511.22	959	836.872,00	2,327	1,016,255.00	1,641	1,119,309.80	574	676,041.00

Over 2021, the number of indemnity claims dropped by 65%, in comparison to 2020, which was then reflected in the lower amount of paid indemnities by 40%.

In international postal traffic, the situation is opposite – an increased number of indemnity claims has been reported (82 claims in 2021 against 38 claims in 2020), consequently the paid indemnity amount is bigger. The increase in the number of complaints is a direct consequence of increased postal item volumes in 2021 compared to the previous year, when postal volumes were significantly lower due to the COVID-19 pandemic.

14.2. Quality of provision of other postal services (OPS)

The quality of OPS provision is analyzed based on the available data provided by postal operators in the annual questionnaires. The introductory part contains an overview of general information on the postal operators' network availability and innovations, followed by an analysis of the complaints filed by users about the work of postal operators while providing OPS.

The share of business units adapted to persons with disabilities makes almost 20% of the total number of business units. Eight postal operators (including the express service providers and the PPO) dispose of the totality of 292 business postal office units adapted to persons with disabilities. The total number of business units is 1,473, out of which the majority belong to the PPO, a sole USP. Compared to 2020, the number of business units has declined by 11%.

As for the postal network resources enabling a greater service availability, 100 parcel lockers were reported to have been installed in the Republic of Serbia in 2021. Parcel lockers are the postal net-

work resource for delivery of postal items. With a 24h accessibility, parcel lockers greatly contribute to the simplicity and availability of postal delivery, by adapting to the users' needs. Over 2020, the postal network in the Republic of Serbia included 60 parcel lockers, with the growing trend, steadily rising in the EU over the years, finally present in our country as well.

Yet another parameter that marked a growth compared to 2020 is the number of electric vehicles. In 2020, the postal oerators had 17 electric vehicles, whereas in 2021 this number grew to 75. The EU project known as the European Green Deal has set the goal to improve the environmental situation and reach climate neutrality by 2050, by reducing carbon footprint by 50% by the year 2030. By adopting this strategy, the European Commission will pass regulations that will affect the whole transport sector, postal markets included. In the meantime, postal operators throughout Europe single-handedly carry out various activities in order to protect the environment (use of electric vehicles, recyclable wrapping materials, postal sorting centers powered by solar energy etc).

While performing expert monitoring over the postal operators' activity, RATEL, among other, analyzes express items delivery times. 94% of express items in a 1,195 sample in national postal traffic were delivered the next day. In international postal traffic, 51% inbound items are delivered on the same day when taken over from the customs service, while 48% of items are delivered the next day.

Complaints regarding other postal services

The structure of complaints about other postal services (OPS), based on the data provided by nine postal operators providing express services, is shown in Table 14.11. Like in the previous years, most of the 2021 complaints (around 46%) were unfounded (Figure 14.1).

Table 14.11. OPS complaint structure in national postal traffic for 2021

| Total number of filed complaints | Unfounded | Resolved as: | | | | | Indemnity |
		Lost	Reduced contents	Damaged	Transit time overrun	Other com-plaints	Amount (in thous. dinars)
1=2+3+4+5+6	2	3	4	5	6	7	8
52,829	24,413	4,944	1,343	13,400	6,296	2,433	133,161

Figure 14.1. Complaints about OPS in national postal traffic for 2021

46.21% Unfounded

53.79% Founded
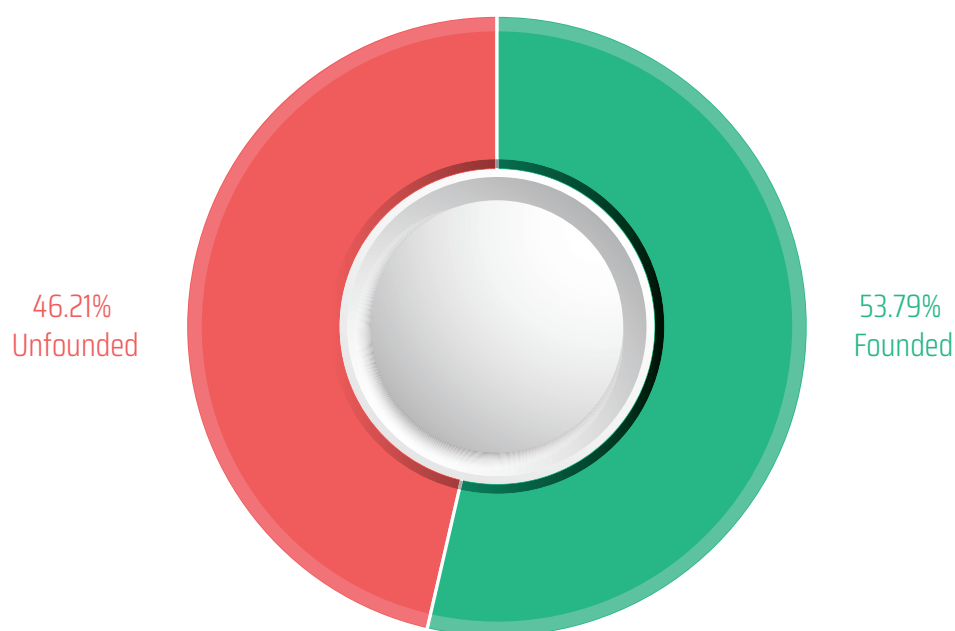
Figure 14.2 offers a share composition of complaints under the claims recorded in 2021.

Figure 14.2. OPS complaint structure in national postal traffic for 2021

4.72%
reduced contents of item

8.56%
other

17.40%
loss of item

47.16%
damaged item

22.16%
deadline overrun
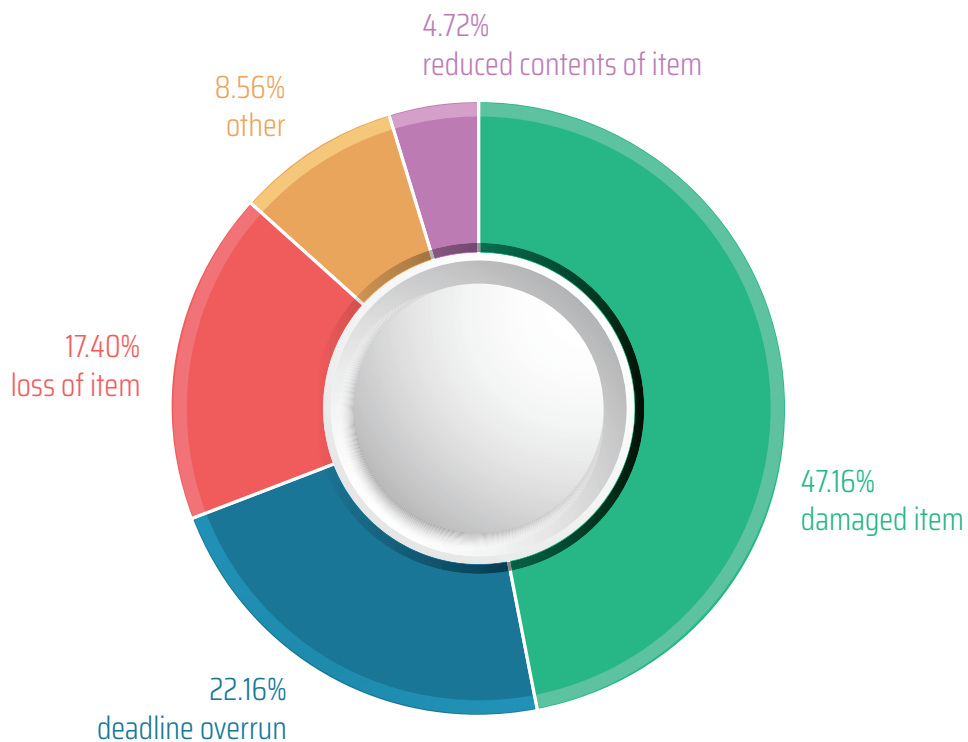
By comparing the number of OPS complaints in 2021 and 2020, we observe a drop in the total number of complaints (1.7%). Despite an OPS volume growth in 2021, primarily of express services in national postal traffic, the complaints have declined, which demonstrates a higher quality level of provided services and better user satisfaction. Complaints about damaged postal items remain dominant, with an increase in the number of complaints about transit time overruns in 2021 being observed. Last year, there were more complaints about lost postal items.

Over 2021, 1,011 complaints regarding other postal services in international postal traffic were filed. The least of them referred to item loss (12%) and damaged items (12%), followed by reduction of item contents (9%) and transit time overrun (7%). Almost 11% of the complaints in international postal traffic were unfounded, while the majority did not fall under any of the above categories and have been recorded as other complaints (49%). Compared to 2020, the number of OPS international traffic complaints increased manyfold (in 2020 that number was 90).

Postal operators that perform courier services reported no complaints in 2021.

Survey on users' satisfaction

RATEL is, among other, obliged to follow the development in the area of postal services, to carry out measures in order to improve and encourage competition in the postal markets, to prescribe quality standards in the area of postal services and monitor their application, including periodical surveys of the level of postal users' satisfaction and fulfillment of their needs. In 2021, the Agency carried out a research on the level of satisfaction of postal users (natural and legal persons). The survey focused on all postal services, both UPS and OPS.

With regard to the rating of particular UPS features and natural persons' satisfaction, the users were mainly satisfied with the proximity of the post office (80%) and working hours thereof (77.89%). Apart from using financial services (which do not belong to postal services), users most frequently visit the post office in order to collect postal items, and 67.73% of the users describe the time spent at post office as „brief". The majority of the respondents (63.28%) said they never use letter boxes for sending their mail. Most of the users (87.6%) are familiar with the significance of correct addressing of items, however, considerable number of the respondents still make mistakes while marking their zip code in the address field. Consequently, the PPO was advised to repeat the activities regarding the education of users on how to properly address postal items, which is planned for the second semester of 2022.

A significant majority of the surveyed natural persons rated highly the quality of provision of express postal services. Furthermore, regarding alternative manners of express items delivery, the most appreciated feature is the possibility to set the precise time of delivery within a two-hour margin. As for the complaints, more than half of the respondents have not been informed about the manner of complaint filing, with a rather small number of them being familiar with the possibility of lodging a complaint with RATEL. In view of this, RATEL has reminded the postal operators about their obligation to inform their clients in their decisions about the dismissal of complaints that they are entitled to turn to RATEL, if unsatisfied with the operator's decision. All of the above highlights the necessity to inform the UPS and OPS users about their rights and manners of complaint filing. Users that have experienced problems such as damaged item, which is the most frequent reason for lodging a complaint in the domain of other postal services, stated (45.14%) that they had not been properly informed about the correct manner of packaging, in relation to the item contents. Consequently, during the expert monitoring, RATEL reaffirms to the postal operators the necessity of informing the users about the correct way to pack postal items and urges them to pay more attention in order to resolve this problem.

The majority of the surveyed legal entities, when inquired about the speed of item transmission, said they expected the letters to be delivered within three days. The half of the respondents find

it acceptable that the letters they sent be delivered within three days, around 36% of them would accept that deadline to be two days, whereas each tenth respondent expects the letters to be delivered the following day. Only 5% of the users expect postal items to be delivered within 4 or 5 days.

6 https://www.ratel.rs/cyr/page/cyr-studije-iz-oblasti-postanskih-usluga

RATEL's competence in respect of complaints

By coming into force of the new Law on Postal Services, RATEL received a new competence in respect of users' complaints. RATEL is entitled to mediate in an out-of-court dispute settlement between the postal operator and the user, initiated by a filed user's complaint.

The postal operator is obliged to provide its comments within eight days from the day of receipt of the complaint in national postal traffic and within the period prescribed by the acts of the Universal Postal Union in international postal traffic, by making a decision on the merits of the complaint. The new law also foresees that the user may lodge a complaint/ objection with RATEL against the decision of the postal operator.

The objection may be filed within 15 days from the day of receiving the operator's decision on rejection of the complaint. The user may also lodge a complaint/ objection to RATEL against the operator for not submitting a decision on the merits of the complaint.

Initiating and conducting an out-of-court dispute settlement procedure does not preclude or affect the exercise of the right to judicial protection, in accordance with the law.

Over 2021, RATEL proceeded under 91 objections against the operator's decision on the merits of the complaint or absence of provision thereof. There were 52 objections in written form and 39 in electronic form. Out of 83 objections based on which the operators were required by RATEL to reconsider the filed complaint, 14 requests (16.9%) were subsequently resolved in favor of the applicant. There were 13 objections regarding UPS and the remainder referred to express postal services.

Objections/ complaints lodged with RATEL were about:

- transit times overrun (42%),
- damaged items (38.5%),
- non-delivery of items (12%),
- excess postage payment (2.4%) and
- other (4.8%).

In 2021, RATEL received five objections less than the previous year. Also, in comparison with 2020, where the majority of objections were about damaged items, in 2021, most of the complaints referred to transit times overruns.

14.3. Quality of service, user protection and complaint handling in the EU7

UPS quality standards are set with the aim to guarantee a good quality of postal services. These standards primarily focus on transit times and service security and reliability. One of the NRAs' main tasks is to ensure compliance with the Directive's requirements, especially in respect of the achieved service quality. ERGP continuously monitors the liberalization effects on the postal market, using special indicators such as QoS measurements, taking into account the development of postal services, including users' protection and complaint handling procedures, to make sure the consumers are protected in line with the Directive. The aim is to collect all necessary data for the QoS monitoring and assessment of user satisfaction and complaint handling success rate in the context of regulatory measures undertaken in this field.

The quality-related ERGP report is based on the data of 33 member countries for 2020 and shows the current national regulatory bodies' practice regarding the QoS and user satisfaction on one hand, and user protection and complaint handling on the other.

Figure 14. 3 shows targeted goals and achieved results during the measurement of transit times for priority letters D+1. For 16 countries that have provided the data, the defined quality target has been reached, while in 8 countries this goal has not been reached. In 2020, Western European, Eastern European and Southern European countries saw a slight decline in the quality of services for transit time D+1. Regarding the methodology used for the priority letter transit times screening, 22 countries used standard EN 13850. Over 2020 exceptionally, many countries, during the transit times screening, took into account the effects of the COVID-19 pandemic, which resulted in selected periods being perceived as affected by force majeure and therefore excluded from the measurement.

7 ERGP PL II (21) 24 – Report on quality of service, consumer protection and complaint handling

Figure 14.3. Figure 14.3. Targets (in 2020) and achieved results (in 2018, 2019 and 2020) of priority letter QoS values (D+1)8
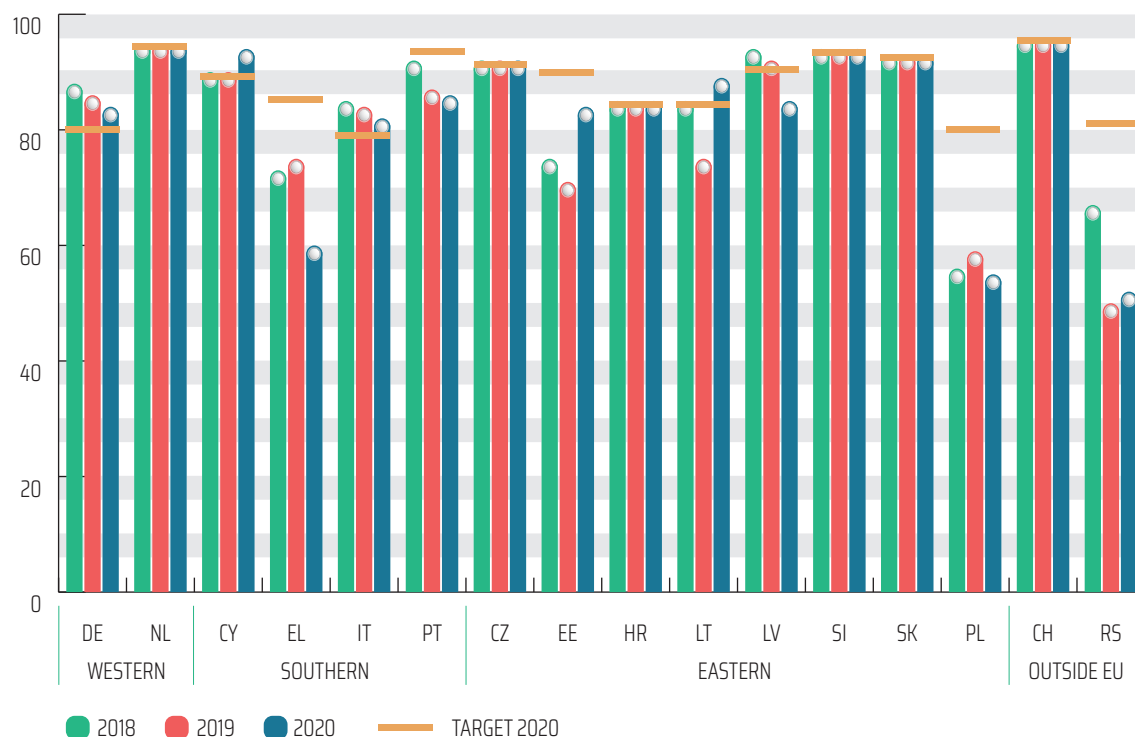
8 Data include 16 countries that have been providing records since 2018 (Western: DE, NL; Southern: CY, EL, IT, PT; Eastern: CZ, EE, HR, LT, LV, SK, PL; Outside – EU: CH, RS).

Sixteen countries have defined their regulatory targets for non-priority letters. Eight countries used European standard EN 14508, whereas two countries used EN 13850 for the measurement of transmission quality of non-priority mail.

As for the measurement of transit times for parcels, different methodologies were used. Three countries used European standard TR 15472, four countries used European standard EN 13850, two countries used a „track and trace" system based methodology and three countries used another methodology.

The number of National Regulatory Authorities (hereinafter: NRAs) stating that they are responsible for proceeding under users' complaints has remained the same for the last three years (there are more than 78% of the countries with this competence). All of the countries whose NRAs are responsible for complaint resolution have procedures set to do so.

Figure 14.4 illustrates the situation regarding the NRAs scope of competence for complaint resolution in 2020.

Figure 14.4. NRAs responsible for complaint resolution in 2020

BE, ES, NO, PL, SE, RS

AT, BG, CY, CZ, CH, DE, DK, EE, EL, FI, FR, HR, HU, IE, IT, LT, LV, LU, MK, ME, MT, NL, PT, RO, SI, SK, TR

YES NO
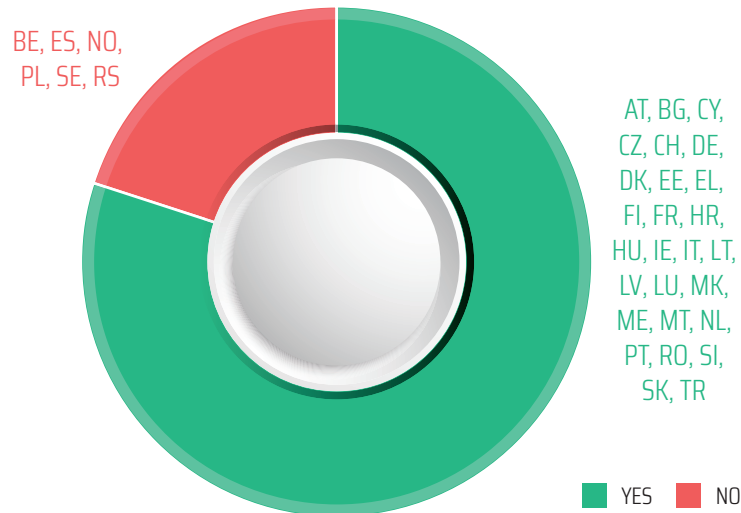
In almost all of the countries, the NRAs are obliged to publish the information about the procedures pertaining to complaint resolution. In addition, an out-of-court dispute resolution is usually carried out on a voluntary basis by both of the disputing parties.

As for the monitoring of users' satisfaction, 58% of the respondent NRAs (19) performs surveys on a periodic basis, with 17 thereof publishing the results (Figure 14.5).

Figure 14.5. Surveys on users' satisfaction carried out by NRAs and USPs

YES NO PUBLISH No info
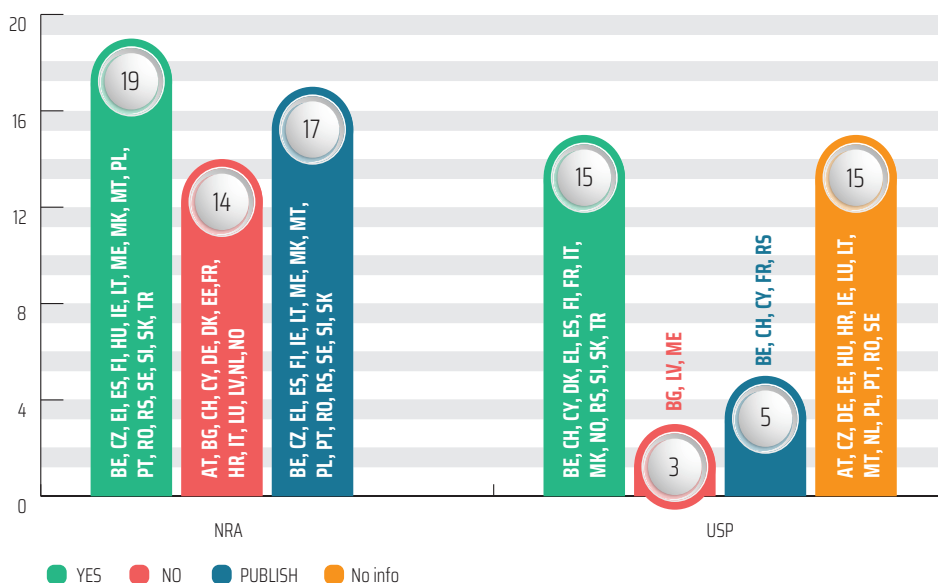
Seventeen NRAs carry out a research on the users' needs, with almost all of them publishing the results (Figure 14.6). Only 12 NRAs stated that the USP performs surveys in connection with the users' needs.

Figure 14.6. Surveys on users' needs carried out by NRAs and USPs
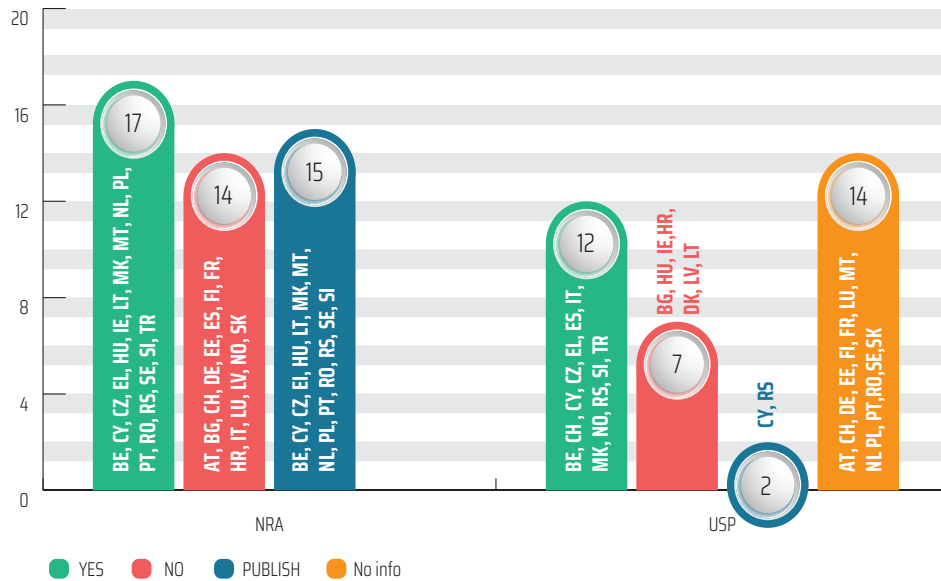
Conclusion

Over 2021, RATEL undertook the first independent measurement of transit times in national postal traffic, using standard SRPS EN 13850. Based on the first measurement year results, the conclusion was that a decreasing trend of D+1 and D+2 transit times has continued, whereas D+3 transit times were accomplished as regards non-priority items.

Taking into account that the priority letter was introduced in April 2021, the screening of transit times in the second semester of 2021 also included this item category. The results showed that in this category the prescribed deadlines were not met for any of the set transit times.

Since the prescribed transit times in national postal traffic were not met, the same consequently occurred with transit times in international postal traffic. In addition, the independent screening revealed a large number of lost items – namely, non-priority non-recorded letter-post items and priority letters. RATEL has therefore, throughout 2021, undertaken activities in order to avoid further decline in the quality of service. The PPO was asked to adopt a detailed plan for improving the quality of services and security of postal items, and the first effects of the undertaken activities are expected over 2022.

Based on the available data, RATEL verified transit times for parcels via internal applications of the PPO, which led to a conclusion that UPS parcel transit times both in national and international postal traffic (inbound) have met the set deadlines.

As for the OPS category, transit times were verified using the method of random sampling at the postal operators', during expert monitoring. Based on the analyzed data, the conclusion is that transit time values are extremely high for this service category, both in national and international postal traffic.

RATEL plans, as of 2022, to launch periodic quality screenings of other postal services. Over 2022, RATEL has started with the creation of an OPS quality measurement model, to be implemented in the second semester of the year.

In 2021, a significantly lower number of complaints was recorded in the postal services market. There was a decrease by 61% in UPS related complaints in national postal traffic, accompanied by a drop in the number of UPS complaints by 56% in international postal traffic as well.

Equally noteworthy is a decline in the number of complaints detected in the area of other postal services, which experienced a significant volume growth. The drop in the number of complaints by more than 60% resulted in the plunging of the number of indemnity claims, whereas in international postal traffic, the opposite was observed – an increased number of indemnity claims was recorded.

The analysis of the survey results on the satisfaction of postal service users' needs pointed to the necessity to improve the level of information about the complaint procedure and users' rights in the event of the postal operator's failure to fulfill its obligations.

In order to reduce the number of objections and to familiarize postal service users with the packaging rules of different types of postal items, RATEL has advised postal operators to describe in detail recommendations for correct packaging of items during the drafting of their general terms and conditions for the provision of postal services. As part of expert monitoring, RATEL reminds postal operators to pay special attention to the education of users with respect to the correct packaging of postal items, suggesting to the operators to visibly display the examples of correct and incorrect packaging on their web pages.

The accelerated development of electronic commerce both globally and nationally, has led to a massive growth in the express service volumes, particularly due to various restrictions during the COVID-19 pandemic, causing the needs and habits of the postal service users to change. The increased postal volumes, in their own turn, affected the quality of postal service provision. In the course of expert monitoring, it was observed that a number of operators had started to make great efforts to increase the quality of postal service provision through directing new investments into the expansion of existing capacities, improving the work technology and a better monitoring of activities and staff education.

SECURITY RISKS IN ICT SYSTEMS

15

The year of 2021 has been one of the most turbulent as far as cyber security is concerned. Governments and companies across the globe fought against the pandemic, bringing about a „new normality". There has been an accelerated digital transformation, which led companies to introduce new patterns of work, including working from home. However, the same questions about the levels of cyber security that were bothering many businesses during 2020, remained relevant still in 2021. In the meantime, the attackers did not lose their time. They did their best to turn the situation in their favor.

The volume of cyber attacks grew by 50% compared to the previous year, with the sectors of education and research taking the biggest blow, experiencing an average of 1,605 attacks weekly throughout the year. As expected, compromised SolarWinds products set off an avalanche of attacks against supply chains. These attacks lasted throughout the whole year 2021, with no signs of receding. This type of attack was carried out by compromising the SolarWinds Orion products and inserting a malicious code into a legitimate software update. By downloading the new version of the software, all users unknowingly enabled the attackers to easily penetrate the system. That way, the malicious attackers gained access to numerous organizations around the globe.

Cyber security worldwide

Statistics of attacks by different types of malware

Figure 15.1. shows the shares of different malware (malicious software) types worldwide in 2021 (as reported by Check Point). The highest incidence of attacks comes from infected devices' networks (botnets), used as initial vectors for other types of attacks. It is followed by malware Infostealer,

used by the attackers in early phases of the attack to collect data about the target. The next in the ranking is a malware type overtaking the victim's device resources in order to "mine" cryptocurrencies (Cryptojacking). Also, malicious software types specially designed to target the financial sector and mobile devices add up to the ranking. On the other hand, although at the bottom of the list, Ransomware has created even greater damage than the previous years, despite only a mild rise in the number of attacks, since it does not reflect the rising severity thereof.

Figure 15.1. Shares of different malware types at global level
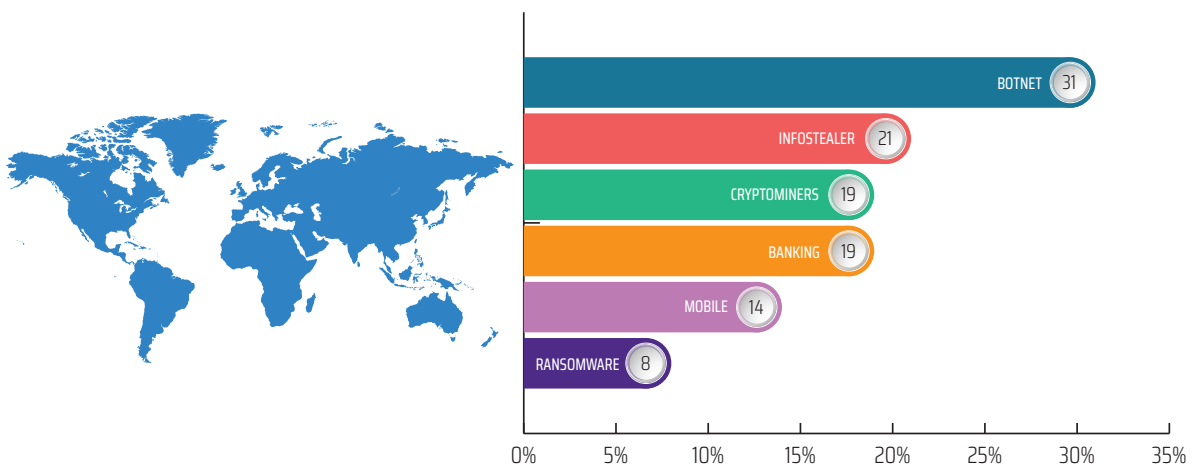
Ways of malware distribution

As for the ways of malicious software distribution (Figure 15.2), the attacks using e-mail remain dominant in 2021, in comparison with those using web pages. Furthermore, a detailed analysis shows an increase by 1% of the e-mail based malware distribution compared to 2020, and a drop by 20% of the web page based malware distribution compared to 2019.

Figure 15.2. Comparative view of attacks using e-mail and web pages for malware distribution (2019 – 2021).
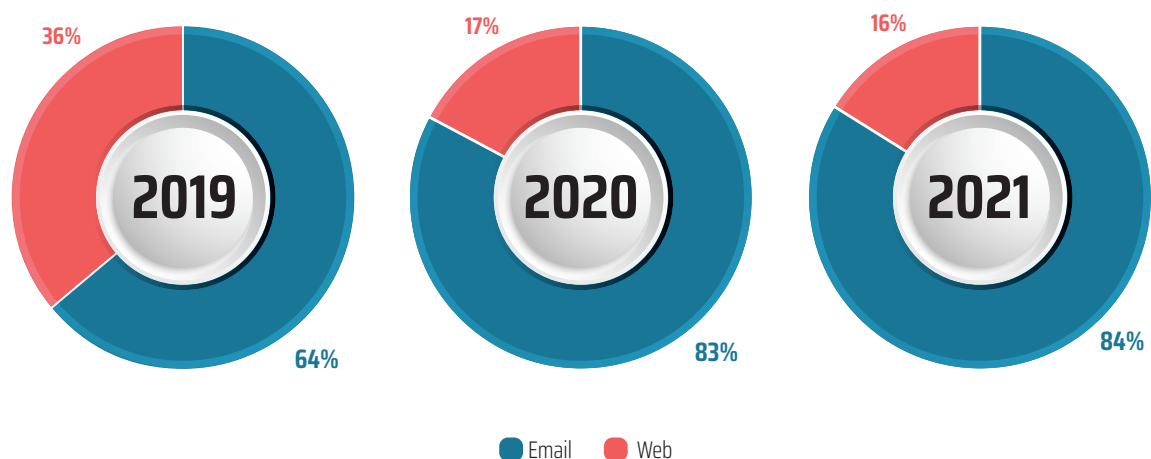
Statistics of attacks by different malware families

The percentage of organizations worldwide infected by a specific malware family is shown in Figure 15.3.

Figure 15.3. Distribution of malware on global scale
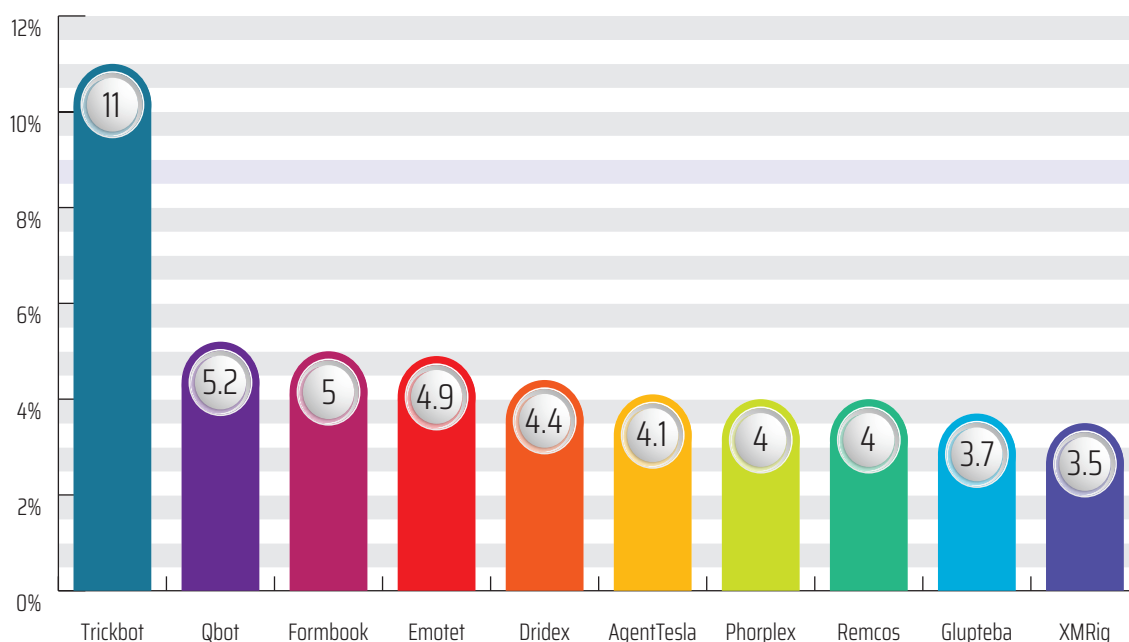
Some of the observable changes compared to the last year's malware ranking is that RigEK (Exploit Kit) and LokiBot infostealer are not in the 10 top distributed malware families anymore, now replaced with Glupteba and Remcos. TrickBot rose to the top of the list in February, replacing Emotet, and kept its ranking until the end of 2021. TrickBot has been used to create a network of infected devices or as a banking Trojan, is designed to exploit Windows OS and is also responsible for Emotet's revival in November of 2021. Aside from the fact that it attacks the largest international banks through webinject, TrickBot is also capable of stealing currency from Bitcoin wallet. It was widely used for initial access in targeted malware attacks such as Riuk, Conti or Bazar. Despite being temporarily eliminated in October 2020, TrickBot remained at the top of the malware list througout 2021, also being part of one of the most serious ransomware attacks of the year, the Conti ransomware attack against the Irish healthcare system.

Second most distributed malware types are Qbot and Formbook, followed by the famous Emotet family. Qbot is a banking Trojan, most commonly transmitted via infected e-mail attachments. It steals system information and user's credentials, but can also collect data typed by the user on

the keyboard. Formbook is, on the other hand, a malware designed to steal data, and is available as Malware as-a service (MaaS). As of 2016, hacker forums have been swarming with Formbook variants.

Statistics of attacks from infected devices' networks by different malware families

Among the most frequent attacks in 2021 were those using infected devices' networks (Botnets) as an initial vector for other types of attacks. In these instances, the used devices were predominantly infected with Trickbot (29%), Qbot (14%), Emotet (13%), Dridex (13%), Phorpies (10%) or other malware. Compared to 2020, Dridex fell from the second to the fourth place, whereas TrickBot became first ranked. Emotet, one of the most distributed malware groups, in circulation as of 2014, first as a banking Trojan, then as a Botnet, now appeared as third ranked in the botnet graph. Emotet was widely present before being eliminated in January 2021, having affected more than 1.5 million computers worldwide, with an average damage of approximately 2.5 billion USD.

Figure 15.4. Share of different malware families from infected devices' networks
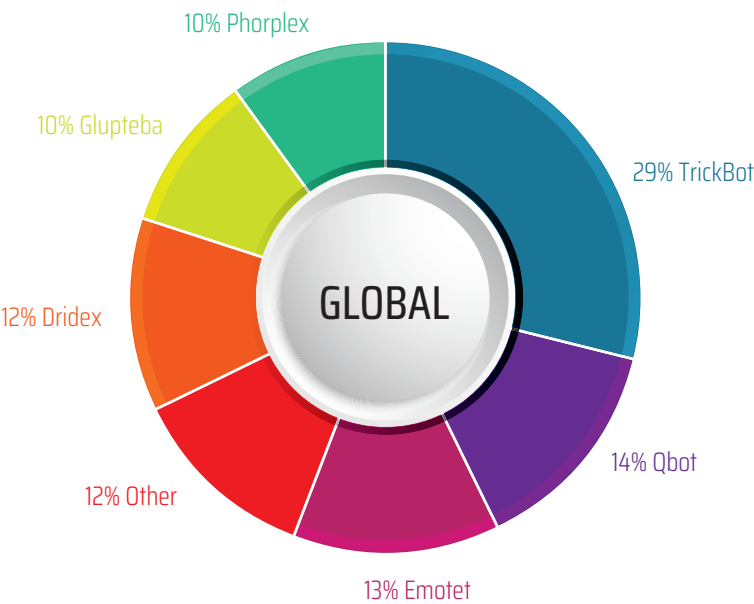
Emotet was one of the largest botnet operations, leaving a gap behind that was filled by TrickBot, IcedID and, lately, Phorpiek. In mid-November, hardly 10 months after its disappearance, the TrickBot infected devices started to distribute Emotet malware. The infected computers were used to launch a major campaign of Emotet malware distribution via e-mail. As a result, by the end of 2021,

Emotet rose to the third place, despite its nine-month inactivity period, which only demonstrates its high distribution..

Statistics of attacks from infected devices' networks by different malware families

This family is still dominated by several malware types. AgentTesla, popular malware, discovered in 2014, marked a drop by 50% compared to 2020. LokiBot, malware designed to steal users' data, which appeared in 2016, also experienced decline. Formbook, malware designed for users' data theft, now top ranked on the list, has been available for sale on the dark net, since 2016. It is designed in such a way to collect information typed by the user on the keyboard. In mid-2021, a new variant of Formbook, used in a large phishing campaign, was discovered. E-mails sent within this campaign contained Power Point documents infected with a new Formbook variant – Racoon. This users' data theft malware has been selling on the dark web for the last two years. Racoon's recent upgrades also include a feature of cryptocurrency theft.

Figure 15.5. Share of different malware families designed for data theft

7% NanoCore
8% Vidar
9% LokiBot
9% Raccoon
13% AgentTesla
16% Formbook
38% Other

GLOBAL
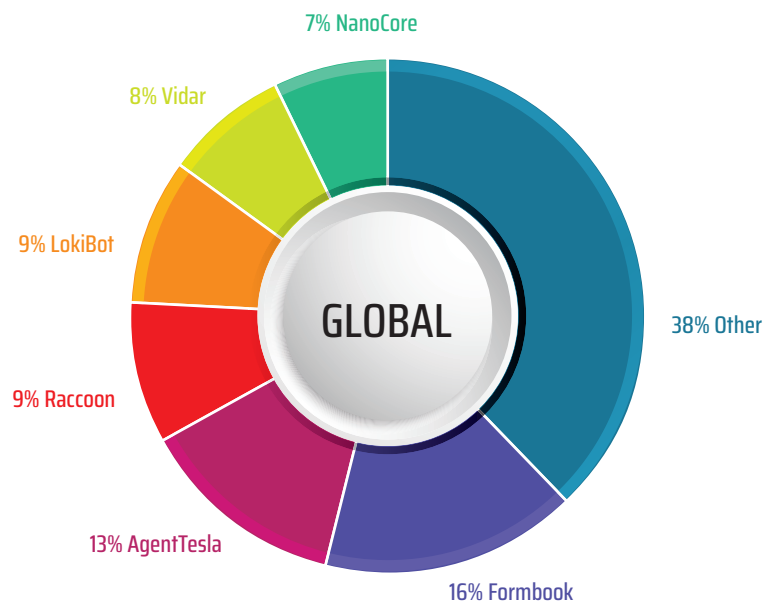
Statistics of attacks by different malware families designed for cryptocurrency theft

XMRig, a legitimate Monero currency mining tool, not only remains at the top of the Criptominer list, but is also by 25% more used in the attacks, compated to 2020. On the other hand, two malware families have become known this year, for the first time: LemonDuck, already at the second place and CriptoBot. LemonDuck, augmented by 50% compared to the middle of the year, is a botnet used to stel credentials, with additional functionalities allowing it to avoid detection and to move laterally. LemonDuck also operates as a downloading tool for malicious software. It has been noticed that this program is often used in conjunction with Ramnit Trojan. CriptoBot is an advanced malware designed for cryptocurrency theft, which collects information about the victim's „wallet" and other data about the user's account. In December, CriptoBot was identified in a campaign targeting the users with a pirated copy of Windows OS.

Figure 15.6. Share of different malware families designed for cryptocurrency theft
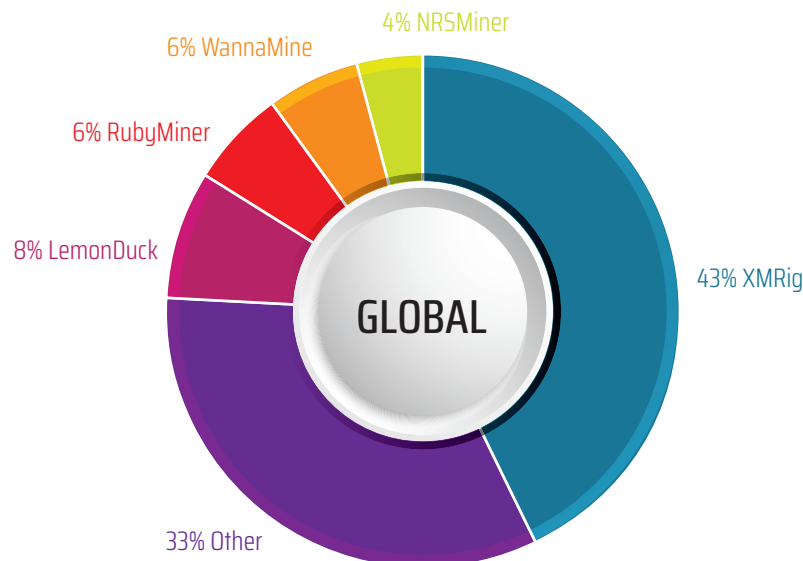
Statistics of attacks on financial sector by different malware families

In the segment of banking malicious software, concealed and adjustable types of malware remain dominant. TrickBot rose from position two to number one, whereas Dridex fell from the top of the list to third place, dropping by almost 60 % compared to the previous year. On the other hand, Qbot,

a banking malware, keeps developing. Even though initially designed to collect banking credentials, it currently possesses a distribution functionality similar to a worm's, with an additional feature to create networks of infected devices. Following a three-month pause, Qbot reappeared in September, in a large unsolicited mail campaign. This campaign was supported by Visual Basic and Excel 4.0. file macros. Dridex, another banking malware with a new capability to steal information and create networks of infected devices, experienced a significant plunge this year. Still, in September, the analysts discovered yet another variant of Dridex, equipped with new possibilities of collecting information, namely in an identity theft campaign involving specially created Excel documents. In addition, Dridex was in December one of the first malware families distributed in a campaign exploiting Log4j vulnerability in the process of computer infection.

Figure 15.7. Share of different malware families in financial sector
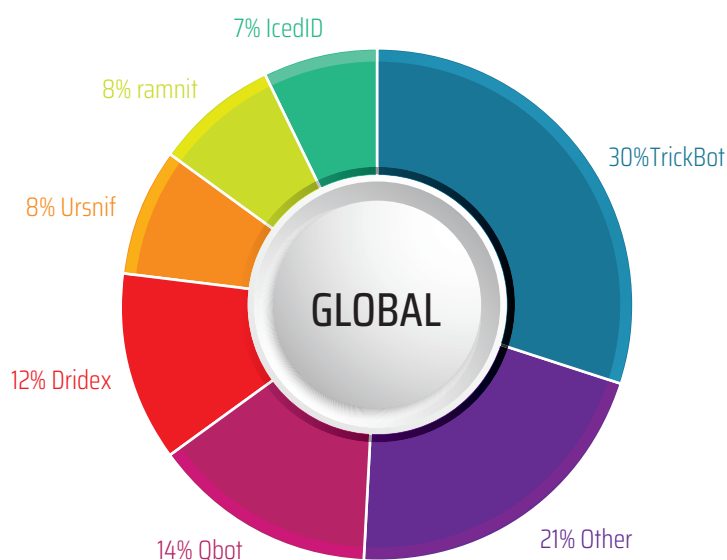
Statistics of attacks on mobile devices by different malware families

Hiddad, an Android malware designed to show advertisements, remains the 2021 most frequent malware. Over the previous period, the most used theme was the COVID-19 pandemic. It is followed by xHelper, whose share in the total malware volume got reduced by 25% compared to 2020. This year, two more malware families marked a growth for the first time, namely AlienBot and FluBot. AlienBot is an Android banking malware enabling the attacker to remotely insert an arbitrary code into legitimate financial applications, thus gaining access to the victim's financial resources on the account, eventually assuming total control of their device. At the end of 2020, another malware emerged, targeting Android devices' banking apps – FluBot. It is most commonly distributed via

text messages sent from infected devices' networks. FluBot campaigns rely on creative topics. The campaign targeting the Finnish speaking population in June and November was using voice mail services.

Figure 15.8. **Share of different malware families designed to attack mobile devices**
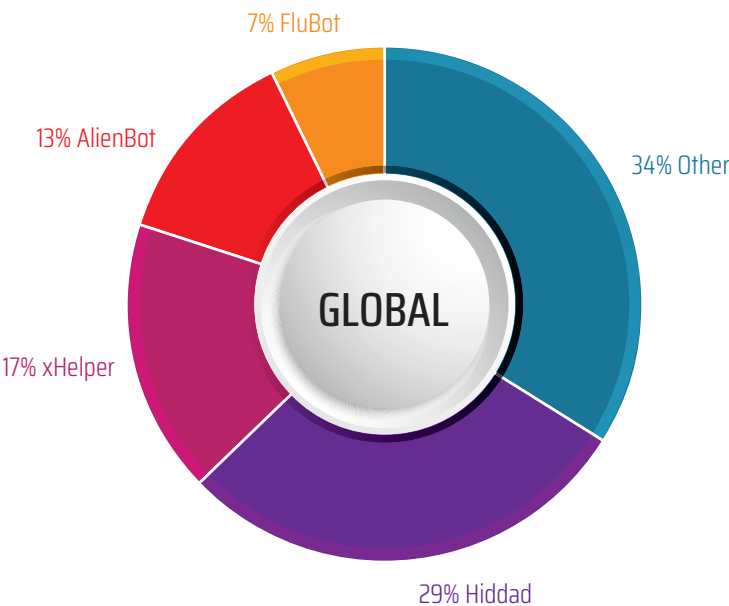
Check Point Global Threat Index

Figure 15.9 illustrates Check Point Global Threat Index values by country, in 2021.

Figure 15.9. **Graphical display of Check Point Global Threat Index values by country**
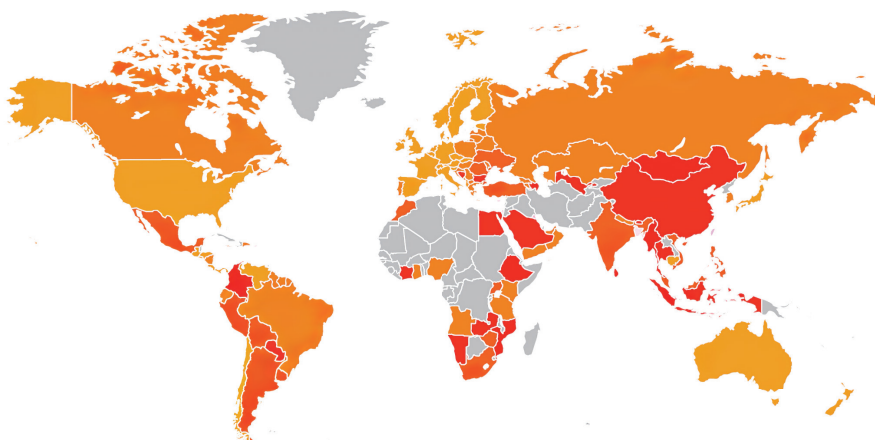
This index is calculated based on the data on attacks collected in real time through the Threat Cloud World Cyber Threat Map platform and describes the probability that a device in an observed country be infected by a malicious software. It has been observed that different countries have different levels of probability of infection. Darker shades indicate higher probability of malware infection, while grey shades represent areas that did not provide enough data for analysis.

Information security in the Republic of Serbia

Pursuant to the Law on Information Security („Official GazetteRS", Nos. 6/16, 94/17 and 77/19), all ICT systems operators are obligated to inform the competent authorized body on the incidents in ICT systems that could severely disrupt the information security.

During 2021, 280 such incidents, including those detected by the International CERTs, were reported to the National CERT. Incidents breaching the ICT security, pertaining to a criminal act, are reported in accordance with legal and by-law provisions or forwarded to the Special Prosecutor's Office for High-Tech Crime.

Figure 15.10. features reported incidents by incident group. Most of the reports relate to fraudulent activities such as phishing attacks, unauthorized use of resources and other types of fraud.

Figure 15.10. Reported incidents in 2021 by incident group
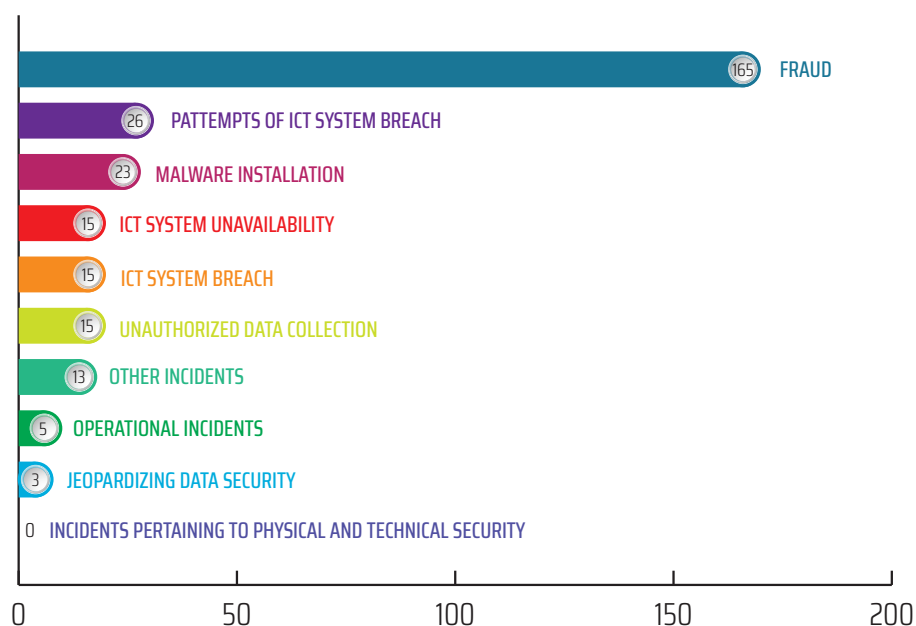
Considerable number of this type of reports suggest that attacks have become more sophisticated so that users find it more difficult to discern a legitimate sender from a fake one, since most of the attackers use social engineering to collect information about the victim, in order to better plan the attack. Bank Internet domains are often plagiarized (with one letter changed, for example), official logos are abused and fraudulent content that looks like a legitimate one is presented. Sometimes, the attackers use various communication channels, for example when targeting the e-commerce platform users. The advertizers or sellers are contacted by the supposed buyers, most frequently in Serbian language, through applications such as WhatsApp or Viber and provided with a link along with an explanation that a payment has been made via the app. By clicking on the link, the seller is contacted by a fake e-commerce platform administrator who then tells them to enter their credit card details, in order to supposedly finalize the payment.

Top five reported incidents in 2021 are shown in Figure 15.11.

Phishing is the top reported cyber attack in 2021. It is carried out via e-mail, social networks, telephone calls or text messages, along with a request to click on a link or open a document. The attacker uses social engineering to appear as a known or familiar sender and make the victim wilfully leave their personal information or download a malicious software. This type of attack is often involved with the cases of malware, botnets and cyber espionage. There were 137 reports of phishing provided to the National CERT in 2021.

Other fraud types mean fraudulent activities on the Internet, whereby the attacker uses IT technology and devices in order to contact the victim and force them to engage into an unsafe online behaviour, or to extort money in favour of the attacker. The National CERT received 21 reports on these kinds of threats.

There were 19 **attempts of the abuse of system's vulnerability** in 2021, whereby the attacker exploits certain vulnerability of a computer system, an application or any other software code, including application add-ins or software libraries.

Malware (or malicious software) is any software created for malicious purposes, or with an aim to cause damage to computer systems or networks. These programs include: computer viruses, computer worms, ransomware, computer Trojans, spyware and rootkits. A total of 13 malicious programs that did not qualify to be classified under any of the above categories were reported to the National CERT in 2021.

Having in mind the dynamic development of cyber attacks, it is more than expected to see **incidents not belonging to the above categories** ranked as number five, and with 13 reported cases to

the National CERT. This classification is based on the applicable taxonomy of incidents prescribed by the Ordinance on reporting of incidents in information and communication systems of special importance („Official Gazette of RS" No. 11/20).
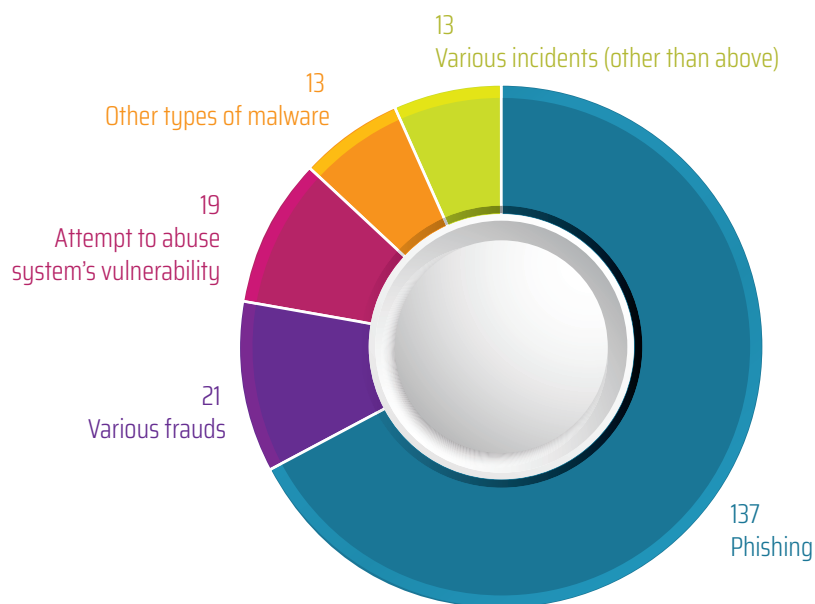
Figure 15.11. Top five reported incidents in 2021

Table 15.1 shows the trend and changes in ranking of reported cyber incidents in 2021, compared to 2020. The number of reported Internet frauds is lower than during the previous year, however, with no change in the ranking, so this group of incidents is still top-ranked. The trend of ICT system breach attempts was on the rise in 2021, while the installation of malware was somewhat less frequent than over 2020. An increase of unauthorized data collection, as well as ICT system breach was observed.

Despite the number of reports on ICT system unavailability being higher than the previous year, the ranking is in decline compared to more frequent groups of incidents. Other incidents not belonging to the mentioned categories were reported to a lesser extent, with their ranking also being on the decline. Operational incidents, jeopardized data security and incidents related to physical and technical security have kept their former positions.

Table 15.1. Trends and ranking changes for reported cyber incidents in 2021 compared to 2020

Groups	Trend in 2021	Ranking changes compared to 2020
Fraud	⬇	⊠
Attempts of ICT system breach	⬆	⊠
Malware installation	⬇	⊠
Unauthorized data collection	⬆	⊠
ICT system breach	⬆	⊠
ICT system unavailability	⬆	⊠
Other incidents	⬇	⊠
Operational incidents	⬆	⊠
Jeopardizing data security	⬆	⊠
Incidents pertaining to physical and technical security	➡	⊠

TREND: ⬇ Reports declining, ➡ Reports unchanged, ⬆ eports increasing

RANGIRANJE: ↓ Decresing , → No change, ↑ Rising,

Criminal offenses against computer and data security

In the period January 2021 – end of December 2021, 5,274 investigations were opened by the Special Prosecutor's Office for High-Tech Crime, namely:

- 468 cases against 471 known adult perpetrators
- 1,951 cases against unknown perpetrators and
- 2.855 cases related to various criminal offenses.

The total number of cases has augmented by 10.59% compared to 2020, when 4,769 cases were formed. The data referring only to known perpetrators of the offenses under the jurisdiction of the above Office are the following:

- Reported individuals – 471
- Individuals requested to provide necessary information – 293
- Individuals under investigation – 16

- Individuals against whom evidence was demonstrated – 246
- Individuals with bills of indictment – 173
- Individuals officially indicted – 3
- Plea agreements – 66

Internet threats

According to a report by Kaspersky referring to Q3 2021, Serbia was ranked 10th in the world when it comes to the number of users attacked by malware (Table 15.2).

Table 15.2. Top 10 countries attacked by malware

No.	Country*	% of attacked users**
1	Tunisia	27.15
2.	Syria	17.19
3.	Yemen	17.05
4.	Nepal	15.27
5.	Algeria	15.27
6.	Macao	14.83
7.	Belarus	14.50
8.	Moldova	13.91
9.	Madagascar	13.80
10.	**Serbia**	**13.48**

*Countries with the number of Kaspersky product users above 10,000
** Share of targeted users compared to the total number of Kaspersky product users in the observed country.
The above results are based on the data from users of Kaspersky products.

Source:
Check Point Cyber Security Report 2021
https://securelist.com/it-threat-evolution-in-q3-2021-pc-statistics/104982/