REPUBLIC OF SERBIA
RATEL
REGULATORY AGENCY FOR ELECTRONIC COMMUNICATIONS AND POSTAL SERVICES

AN OVERVIEW

OF THE TELECOM AND POSTAL SERVICES MARKETS IN THE REPUBLIC OF SERBIA IN 2019

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Belgrade, 2020

Title:
An Overview of the Telecom and Postal Services Markets in the Republic of Serbia in 2019

Publisher:
Regulatory Agency for Electronic Communications and Postal Services - RATEL
Palmotićeva 2, Belgrade
www.ratel.rs

Design and production:
EPOHA d.o.o.
Bakionica BB, Požega

Printed by:
Grafik centar
Kružni put 26, Belgrade

Circulation:
500 copies

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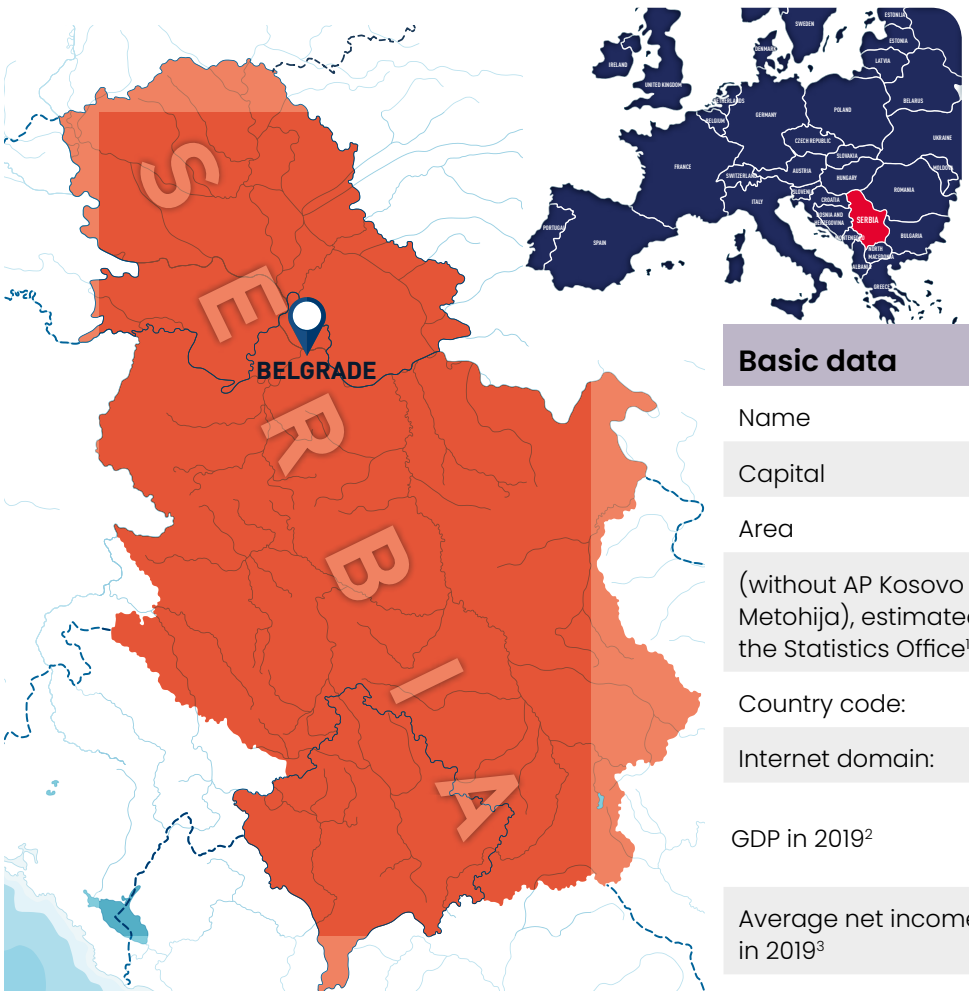
SUMMARY

1 BASIC FEATURES OF TELECOMMUNICATIONS MARKET IN THE REPUBLIC OF SERBIA

Figure 1.1. Republic of Serbia – Basic Facts



Basic data	
Name	Republic of Serbia
Capital	Belgrade
Area	88 499 km^2
(without AP Kosovo and Metohija), estimated by the Statistics Office[1]	6.963.764
Country code:	+381
Internet domain:	.rs
GDP in 2019[2]	5 410.79 billion dinars (45.91 billion euros)
Average net income in 2019[3]	54 926 dinars (466.06 euros)

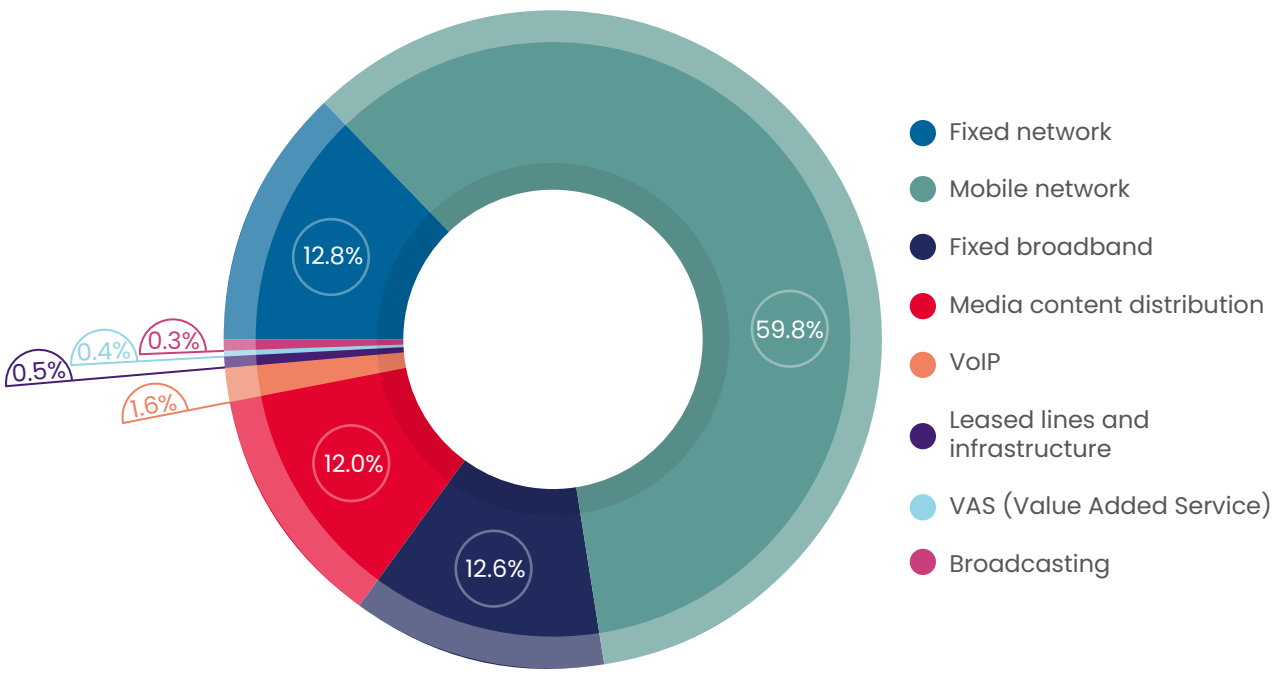
1 Statistics Office estimation for 1. 1. 2019.
2 Statistics Office estimation – as the sum of four quarters. Data taken form the publication Statistical Calendar of the Republic of Serbia, 2020, issued by the Statistics Office (the average RDS/EUR exchange rate for 2019 was 117.8524), p. 35.
3 Ibidem, p. 41.

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.

The total revenues made in the electronic communications market of the Republic of Serbia in 2019 amounted to approximately 206.8 billion dinars, which is slightly by 4.1% more compared with the previous year. According to the annual average middle exchange rate the total revenues amounted to 1.75 billion euros, which is a slight growth compared to 1.68 billion euros in 2018. The share of revenues from electronic communications in the Serbian GDP was around 3.8% in 2019.

In terms of market shares pertaining to different services in the Serbian electronic communication market in 2019, the largest share, like in the previous years, went to mobile service provision, accounting for 59.8% of the total revenues.

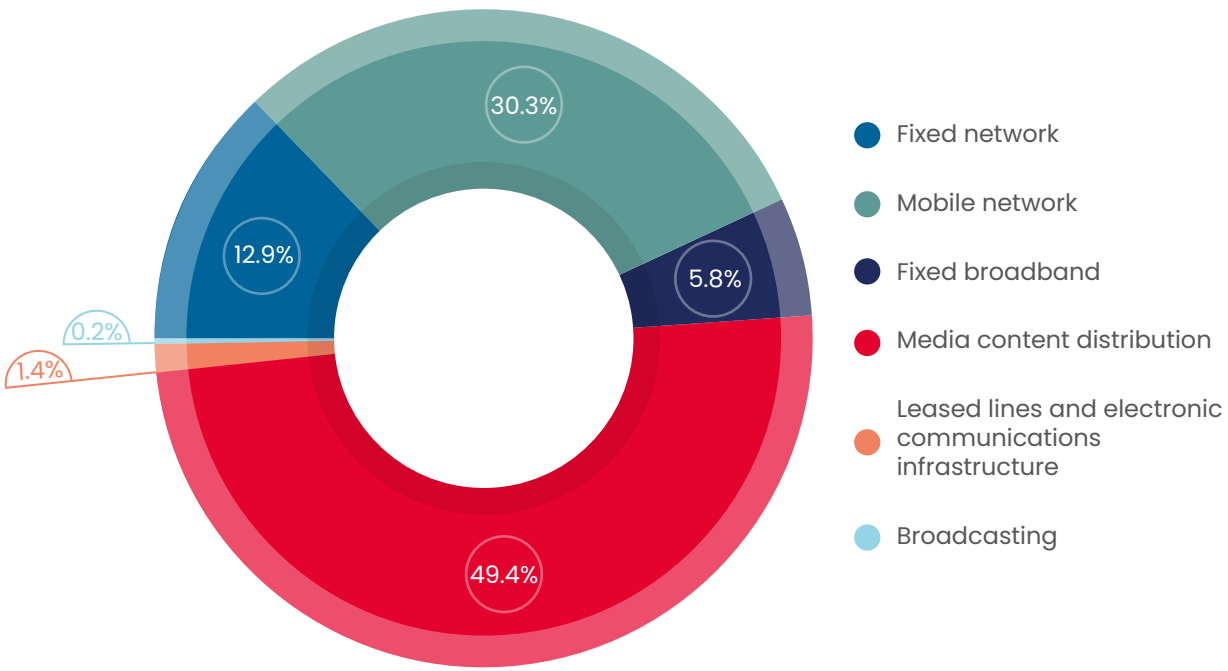
Figure 1.2. Structure of revenues by services in 2019



Source: **RATEL**

The total investments made in the electronic communications sector in 2019 amounted to 84.2 billion dinars or 714.3 million euros, which means they doubled with respect to the previous year when they amounted to 41.7 billion dinars. Considered in euros, the investments increased from 352.2 to 714.3 million euros, which is a growth of over 100%. Investments made in media content distribution have the largest share with more than 41 billion dinars (353 million euros) and account for nearly 50% of the total investments in 2019, while investments in mobile networks amounted to 25.5 billion dinars (216 million euros) account for 30% of the total investments made in 2019.

Figure 1.3. Structure of investments by services in 2019



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 bundled services for the period 2015-2019 are given in Table 1.1.

Table 1.1. A comparative overview of the number of users of basic electronic communications services in the Republic of Serbia (2015-2019)

Service	Indicator	2015	2016	2017	2018	2019
Fixed telephone - subscribers	Million	2.60	2.55	2.48	2.43	2.42
	Per 100 households	104.66	102.63	99.74	97.87	97.27
Mobile telephone - users	Million	9.16	9.09	8.62	8.43	8.45
	Per 100 inhabitants	129.38	128.52	122.46	120.42	121.40
Fixed broadband - subscribers	Million	1.32	1.45	1.48	1.55	1.62
	Per 100 households	53.07	58.30	59.52	62.39	65.27
Media content distribution - subscribers	Million	1.60	1.66	1.70	1.88	2.00
	Per 100 households	64.15	66.87	68.28	75.55	80.42
Bundled services - subscribers	Million	0.92	1.03	1.17	1.27	1.42
	Per 100 households	37.1	41.36	46.95	51.23	56.90

Source: **RATEL**

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 in 2019, compared with the data obtained in 2017 and 2018, based on weighted average. According to the collected data on natural entities and the data received from the Statistics Office on net income, in 2019, the cost of the low basket equalled 2.17% and the cost of the high usage basket equalled 9.88%of the average net salary.

Table 1.2. Low usage basket of electronic communications services

LOW USAGE BASKET	2017		2018		2019	
	Average bill (dinars)	% of the average salary	Average bill (dinars)	% of the average salary	Average bill (dinars)	% of the average salary
Fixed phone	764.01	1.60%	695.87	1.40%	647.06	1.18%
Mobile phone (prepaid)	321.38	0.67%	293.45	0.59%	323.00	0.59%
TV (public broadcasting service tax)	150.00	0.31%	150.00	0.30%	220.00	0.40%
Total	1,235.39	2.58%	1,139.32	2.29%	1,190.06	2.17%
Average net salary (RSD)*	47,893		49,650		54,926	

Notes:

** 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**

Table 1.3. High usage basket of electronic communications services

HIGH USAGE BASKET	2017		2018		2019	
	Average bill (dinars)	% of the average salary	Average bill (dinars)	% of the average salary	Average bill (dinars)	% of the average salary
Fixed phone	764.01	1.60%	695.87	1.40%	647.06	1.18%
Mobile phone (postpaid)	1,537.60	3.21%	1,481.73	2.98%	1,783.88	3.25%
TV (public broadcasting service tax) *	150.00	0.31%	150.00	0.30%	220.00	0.40%
Internet **	1432.54	2.99%	1,448.96	2.92%	1,435.86	2.61%
Media content distribution	1,236.24	2.58%	1,404.47	2.83%	1,339.44	2.44%
Total	5,120.39	10.69%	5,181.03	10.44%	5,426.24	9.88%
Average net salary (RSD)	47,893		49,650		54,926	

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).*

Source: **RATEL**

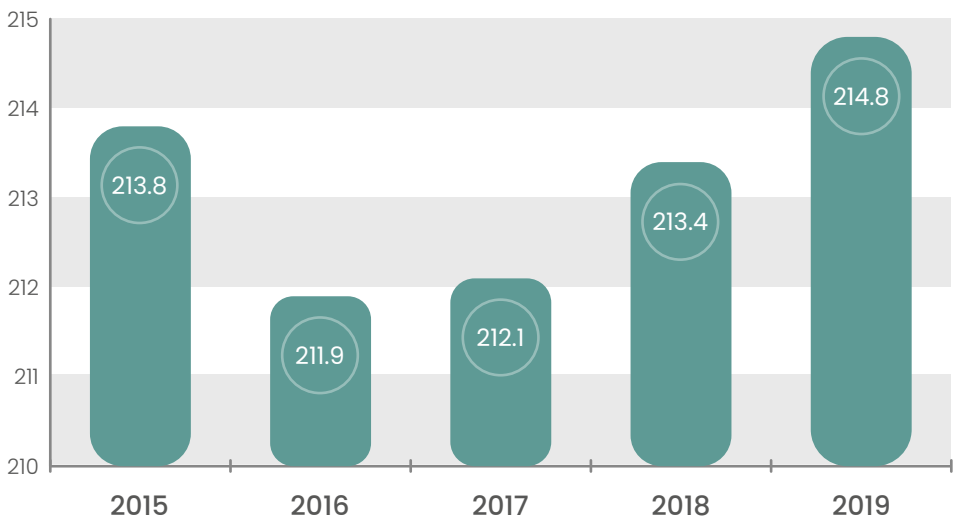
According to available data, the total number of people in the Republic of Serbia employed in the telecommunications sector in 2019 amounted to 13.2 thousand.

2 EU TELECOM MARKET STATE OF PLAY

Electronic Communications Sector Revenues

It is estimated that the operators in the European Union generated revenues of approximately 214,8[4] billion euros. The revenues from electronic communications in the EU continue to grow over the years. After a notable decrease in 2016, a constant growth can be observed over the four-year period.

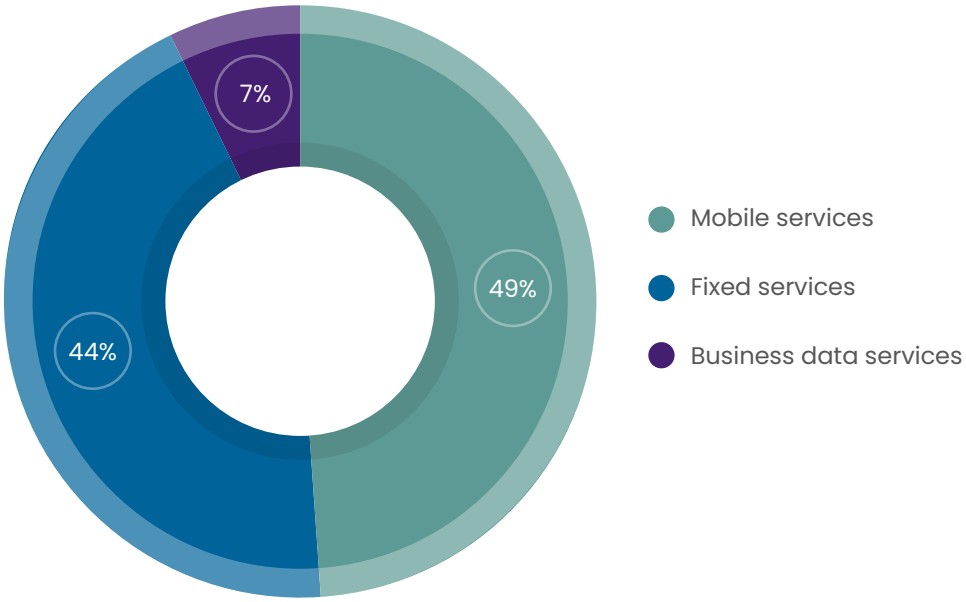
Figure 2.1. The total revenues in the electronic communications sector in the EU (2019 - projection)



If we break down the revenues into components related to services provided over mobile networks and services over the fixed lines, a continued stable share of the two categories of revenues can be observed. The projections made by the European Commission for 2019 reflect the trend seen in the past several years.

4 European Commission " 2019 DESI Report – Connectivity"

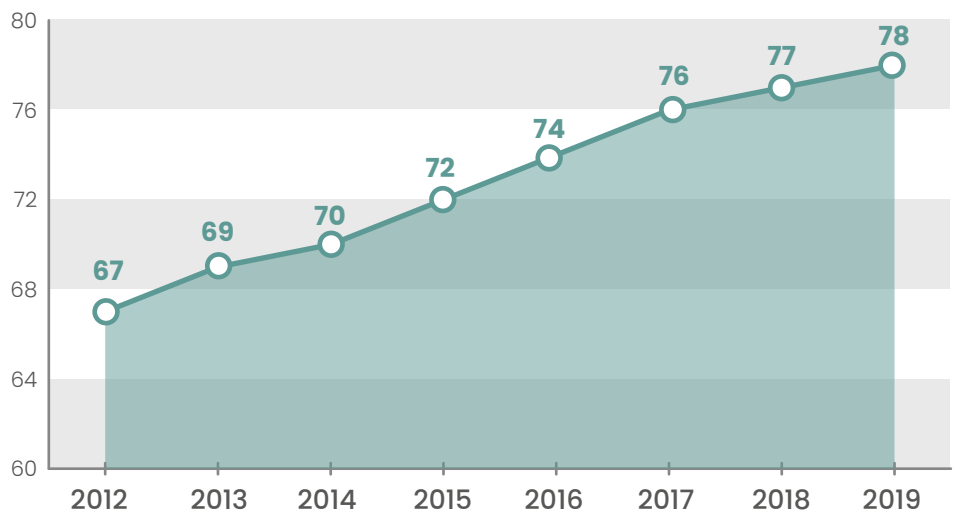
Figure 2.2. The total revenues in the electronic communications sector in the EU (2019 - projection)



Fixed Broadband

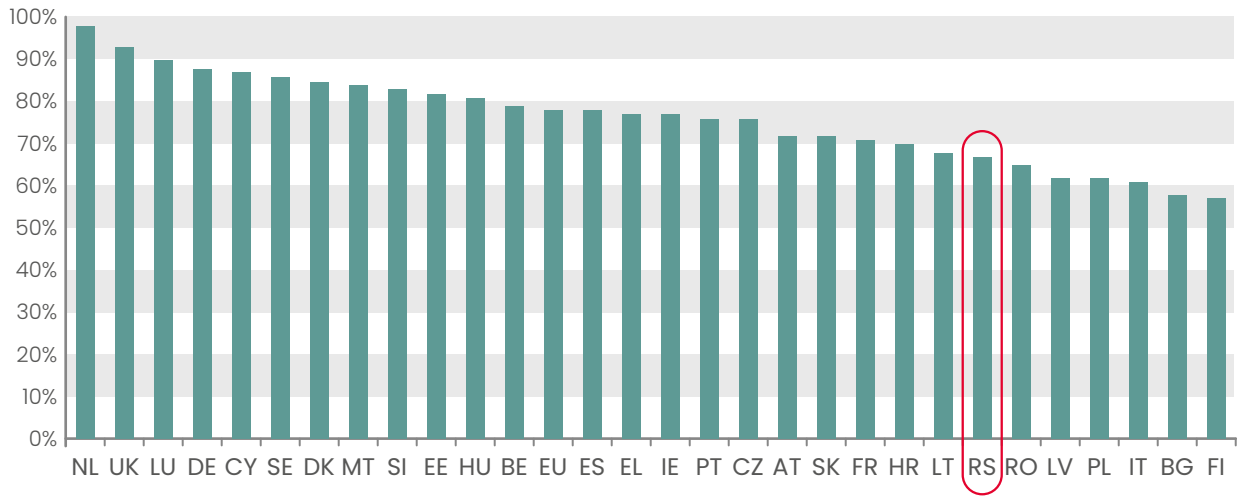
The number of fixed broadband users in the EU is constantly growing. In terms of the number of households, the percentage of fixed broadband subscribers has been growing over the years.

Figure 2.3. Average number of fixed broadband subscribers per 100 households - EU



Source for the EU: EC - Communications Committee – COCOM, https://ec.europa.eu/digital-single-market/en/connectivity, as on 3 August 2020
Source for Serbia: **RATEL**

Figure 2.4 - Fixed broadband penetration rate (per 100 households) – EU by Member States*

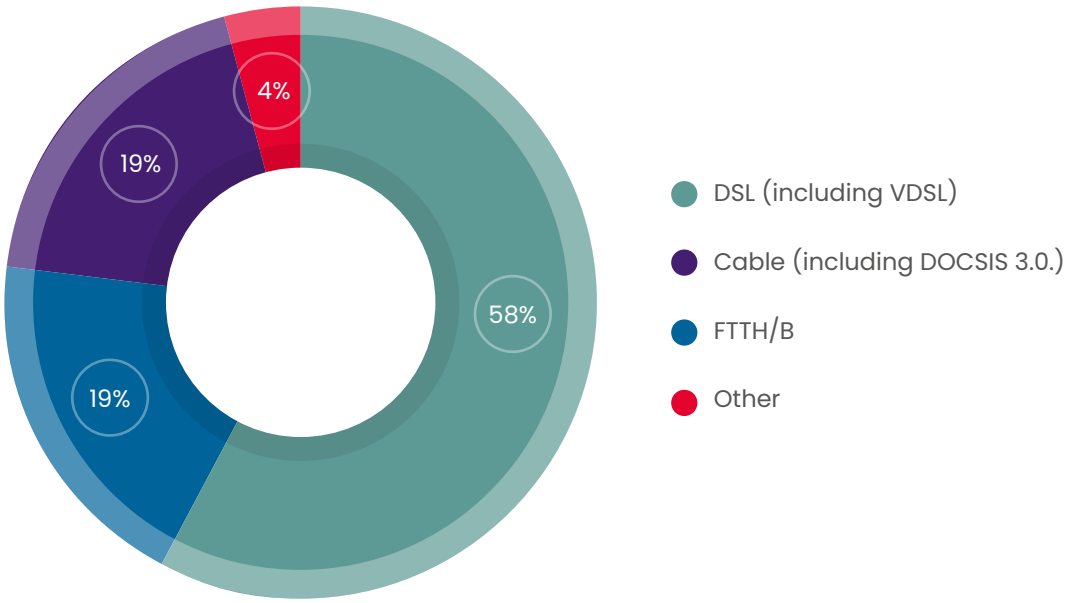


Source for the EU: EC - Communications Committee – COCOM, https://ec.europa.eu/digital-single-market/en/connectivity, as on 3 August 2020
Source for Serbia: **RATEL**

In the EU Member States the number of fixed broadband subscribers ranges from 57% to 98%. The Netherlands, the UK and Luxemburg have the highest rate of fixed broadband subscribers per 100 households (over 90%). On the other hand, Finland, Italy Poland and Latvia have the lowest rates of around 60%. According to some assessments, this may in part be a result of the fixed-mobile substitution. At the end of 2019. The number of fixed broadband subscribers per 100 households in Serbia was 65.

DSL still has the largest share in fixed broadband structure, with 58% of total fixed broadband subscribers in the EU. Approximately 19% of the total number of subscribers are now using FTTH/B (cfr. 16% in 2018), while cable access remains at 19%. Cable access is by far more present in the Serbian market, with 44% of the total fixed broadband subscribers, whereas DSL take-up equalled 39% at the end of 2019.

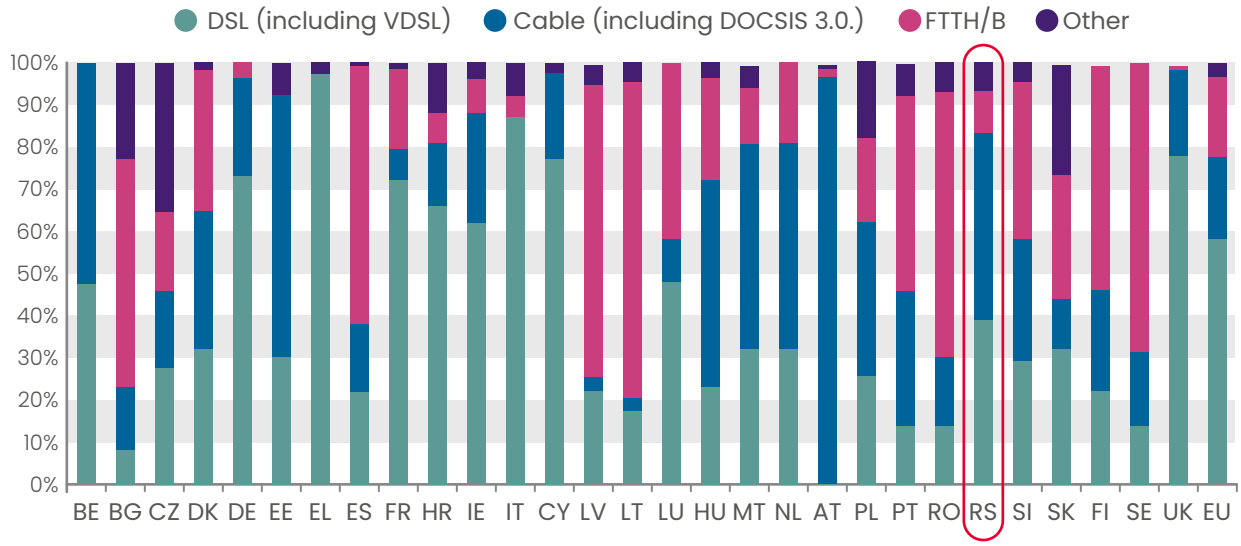
Figure 2.5. Fixed broadband user distribution in terms of technologies in the EU



Source: EC - Communications Committee – COCOM,
https://ec.europa.eu/digital-single-market/en/connectivity, as on 3 August 2020;

Figure 2.6 shows the usage of different broadband technologies in the EU Member States and the Republic of Serbia. DSL ranges from 8% to 97% and it generally has a lower rate in the Eastern 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 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, whereas cable access is the most used technology in Belgium, Hungary, Malta and the Netherlands. In Serbia in 2019, cable access was dominantly used, outnumbering the subscribers using DSL technology, whereas FTTH/B was used by 10% of the total fixed broadband subscribers.

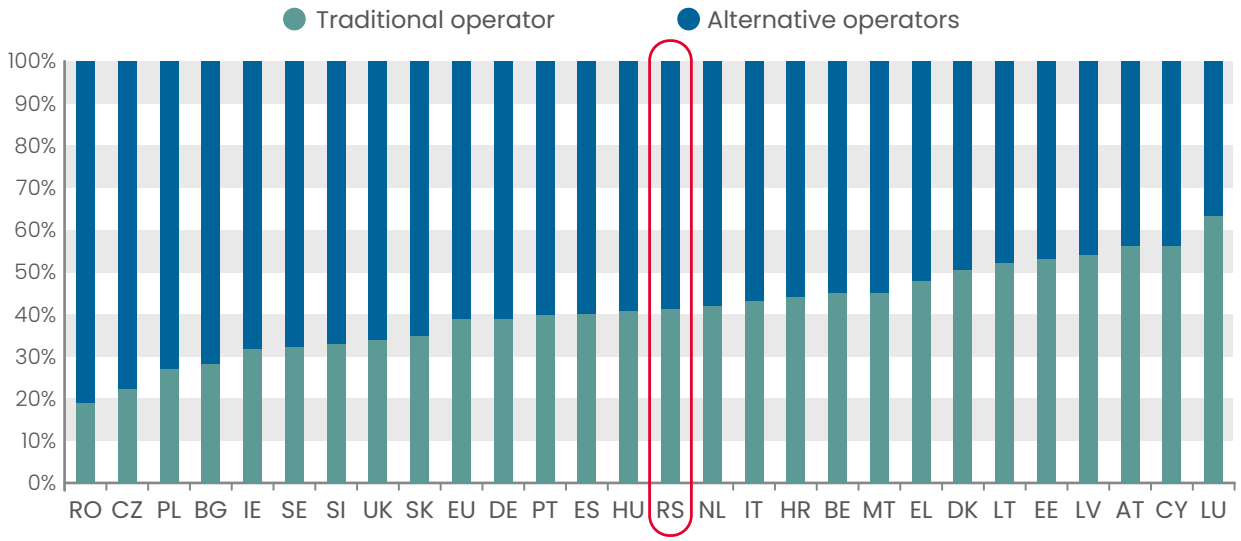
Figure 2.6 - Fixed broadband user distribution in terms of technologies



Source for the EU: EC - Communications Committee – COCOM,
https://ec.europa.eu/digital-single-market/en/connectivity, as on 3 August 2020
Source for Serbia: **RATEL**

The market share of the incumbent operators in the total number of fixed broadband subscribers remains high in the EU, the average being approximately 39%, by 1% lower than in 2018. Luxemburg has the incumbent with the largest market share of 63%, whereas in Austria, Cyprus, Latvia, Estonia, Lithuania and Denmark the incumbent operators have over 50% share. 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 slightly above the EU average, with 41% (Figure 2.7).

Figure 2.7 – The shares of the incumbent and alternative operators in the total number of fixed broadband subscribers

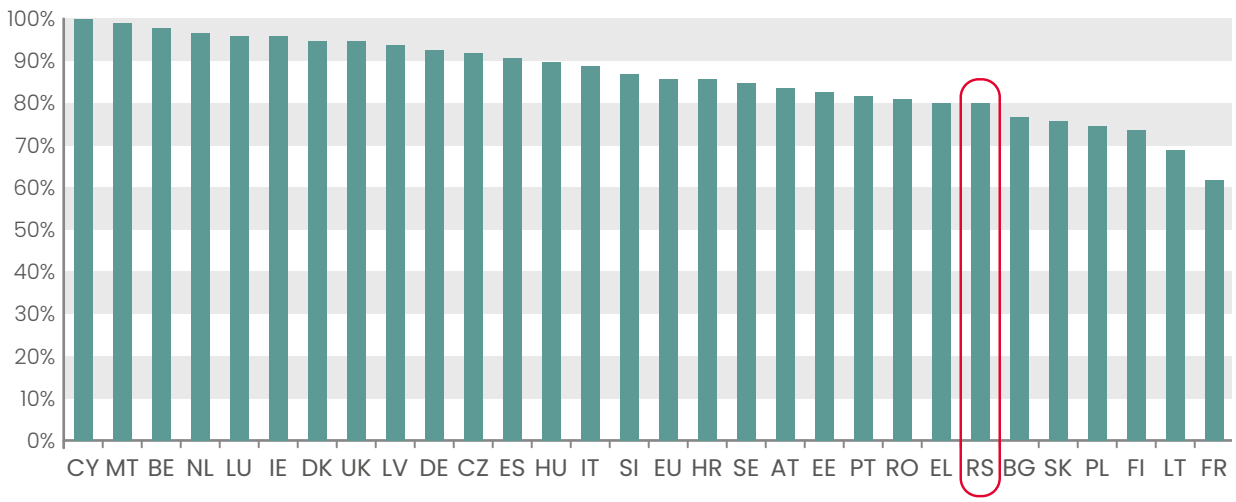


Source for the EU: EC - Communications Committee – COCOM, https://ec.europa.eu/digital-single-market/en/connectivity, as on 3 August 2020
Source for Serbia: **RATEL**

ANGA network coverage continues to grow in the EU. Around 86% of the total number of households in the EU have NGA network coverage, compared with 46% eight years ago, whereas the NGA includes FTTH, FTTB, VDSL and Cable DOCSIS3.0. By mid-2019, VDSL had the largest coverage among NGA technologies of 59%, followed by cable access and FTTP. NGA coverage has largely increased in rural areas where it grew by 50% in the past eight years, now reaching 59%.

Cyprus, Malta and Belgium are leaders in NGA coverage. In 13 Member States NGA is available in at least 90% of households, whereas in France and Lithuania this number remains below 70%. In Serbia the access is available in 68% of households.

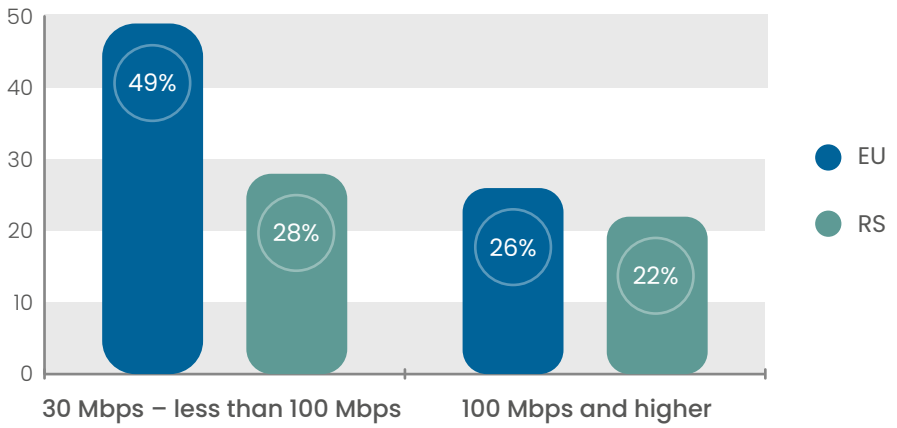
Figure 2.8 –NGA coverage in the total number of households



Source for the EU: EC - Communications Committee – COCOM, https://ec.europa.eu/digital-single-market/en/connectivity, as on 3 August 2020
Source for Serbia: **RATEL**

In the EU, 49% of the subscribers used Internet packages of at least 30 Mbps and less than 100 Mbps, whereas 26% of the subscribers had access to connections of 100 Mbps and higher. The leading countries in terms of ultra-high-speed Internet subscribers (100 Mb/s and higher) are Sweden, Romania, Portugal, Spain and Hungary, where more than 50% of users have access to such speeds, whereas the least users with connections at these speeds are in Croatia (6%), Cyprus (2%) and Greece (1%). In Serbia, 28% of the subscribers used Internet packages of 30 Mbps and less than 100 Mbps, whereas the biggest increase is seen in the number of subscribers with access to 100 Mbps and higher who equal 22% in 2019 compared to only 1.5% in 2018.

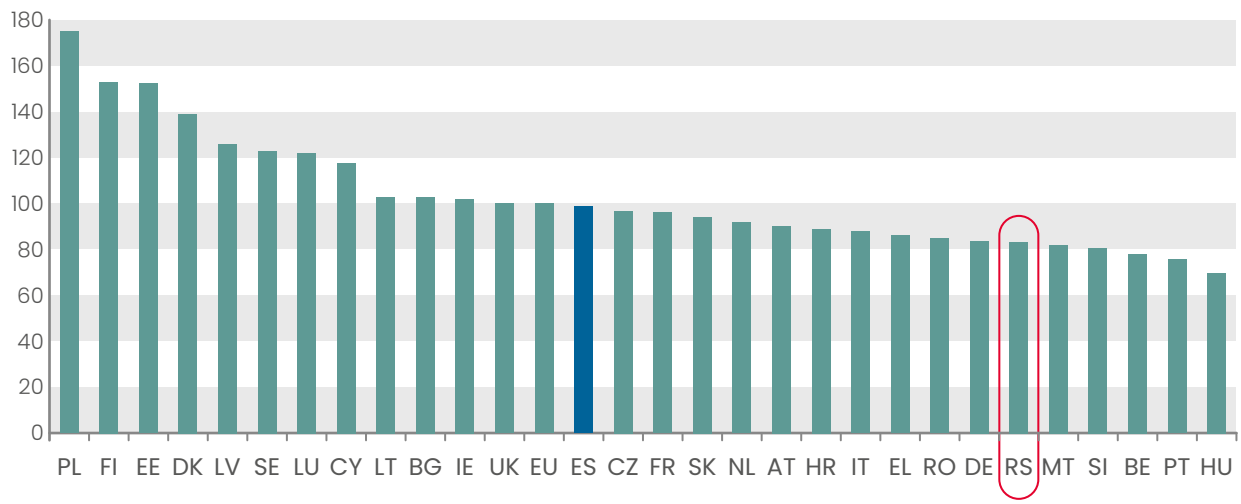
Figure 2.9 – Fixed broadband users share, according to connection speed



Source for the EU: EC - Communications Committee – COCOM, https://ec.europa.eu/digital-single-market/en/connectivity, as on 3 August 2020
Source for Serbia: **RATEL**

In addition to fixed broadband, mobile broadband is also largely used in the EU. Mobile broadband penetration rate in Poland, Finland, Estonia, Denmark, Latvia, Sweden, Luxemburg, Cyprus, Lithuania, Bulgaria and Ireland is over 100%. Hungary has the lowest penetration rate of 70%, although it should be noted that this is a significant increase from 59.2% in 2018. At the end of 2019, number of active mobile broadband users per 100 inhabitants was 86, which is still below the EU average (100).

Figure 2.10 - Mobile broadband penetration rate



Source for the EU: EC - Communications Committee – COCOM, https://ec.europa.eu/digital-single-market/en/connectivity, as on 3 August 2020
Source for Serbia: **RATEL**

3 THE DIGITAL ECONOMY AND SOCIETY INDEX (DESI)

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 5 components: Connectivity, Human capital, Use of Internet, Integration of digital technology and Digital public services (Figure 3.1).

Figure 3.1. – DESI components

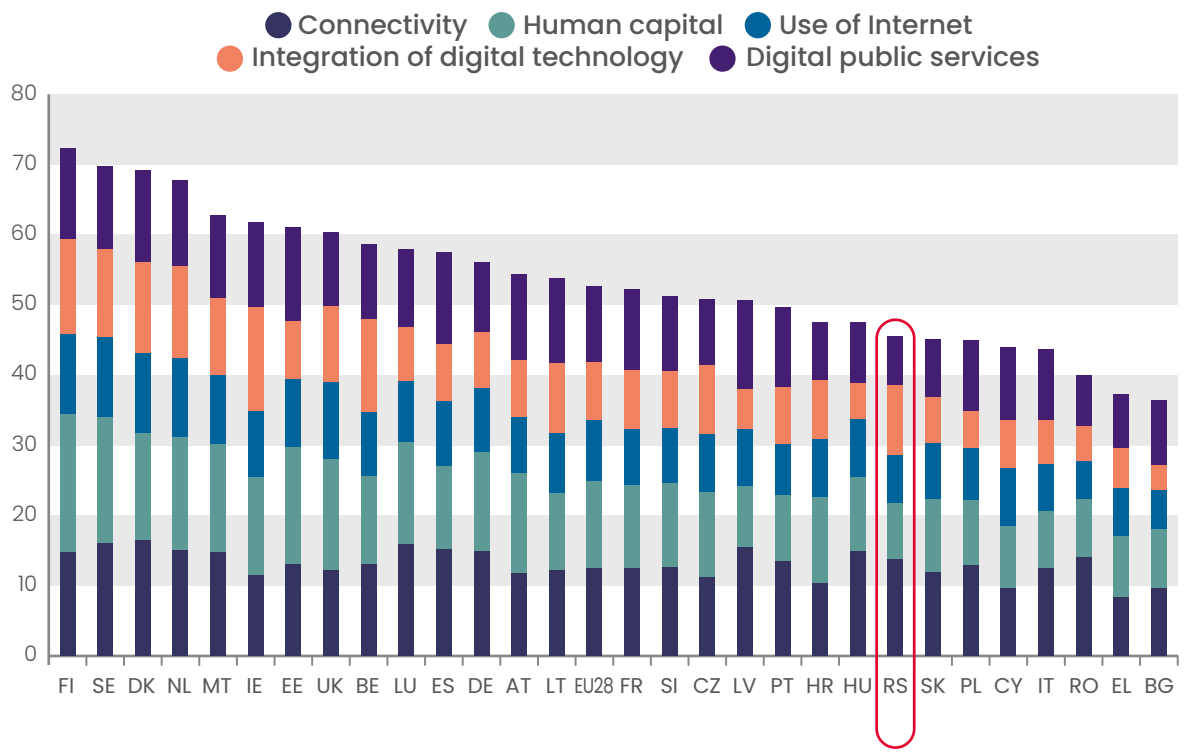
DESI is calculated for EU member states since 2014 and for Serbia since 2017, thus enabling Serbia to be positioned at the European digital performance map. 2019 index for Serbia has been calculated according to the EC methodology of June 2019.

The changes in the methodology in respect to the previous year mainly concern the Use of Internet, which now includes 5 new indicators and Human Capital which includes 4 new indicators, while there have been slight modifications of Digital Public Services (2

new indicators), Connectivity and Integration of Digital Technology (one new indicator each).

DESI by dimensions for all EU countries and Serbia is given in Figure 3.2.

Figure 3.2. 2019 DESI scores of the EU countries and Serbia, by dimensions*

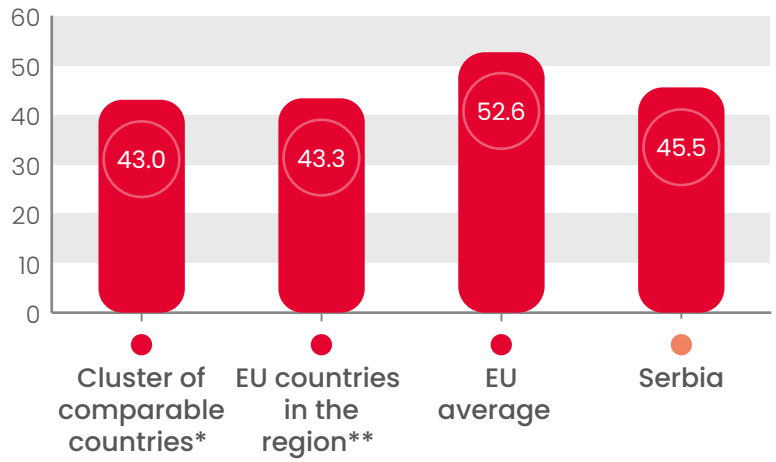


Source for EU countries https://digital-agenda-data.eu/charts/desi-composite, as on 2.9.2020
Source for Serbia: RATEL
*Values for Serbia and the EU countries are not fully comparable, since the overview of the EU countries is based on the new methodology published in June 2020, which includes less indicators for Use of Internet and Digital Public Services.

Finland, Sweden and Denmark were the most advanced digital economies in the EU in 2019, whereas Bulgaria, Greece and Romania are lagging behind.

Serbia is ranked 22nd on the list of the European countries, compared to the 25th place the previous year. It owes its better ranking to the results in the Connectivity and Digital Public Services. These results still place it in the cluster of the countries with a relatively low performance, such as: Romania, Bulgaria, Greece, Italy, Poland, Hungary, Cyprus and Slovak Republic. Serbia is close to the average of the EU countries in the region, as shown in Figure 3.3.

Figure 3.3. – Comparative DESI overview

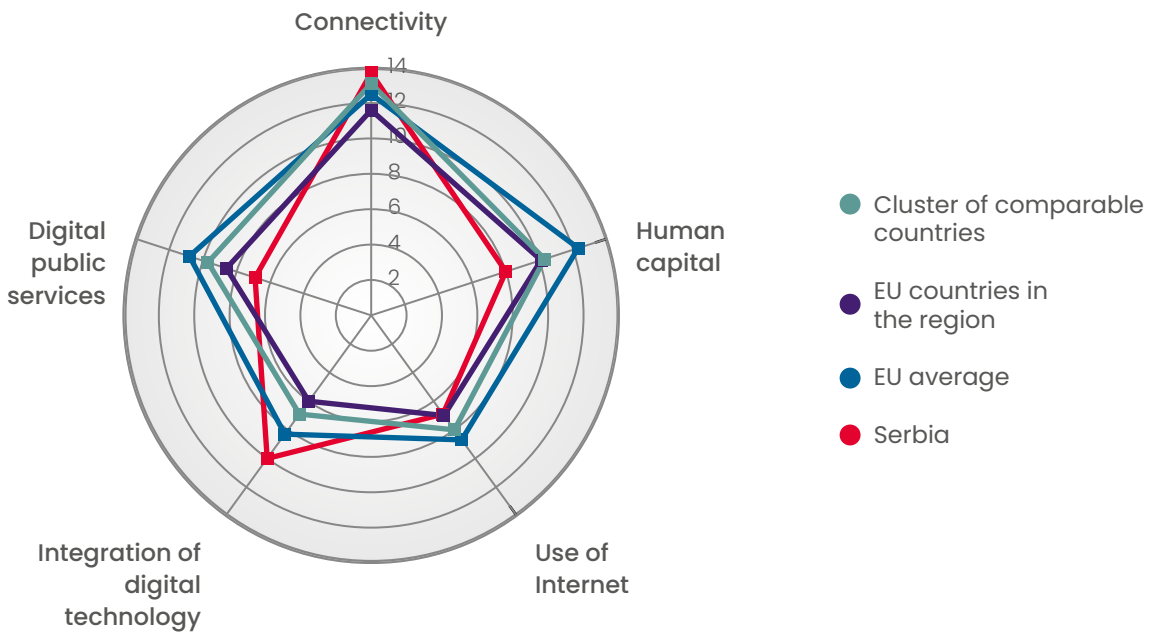


* Cluster of comparable includes countries at a similar level of digital development: Romania, Greece, Bulgaria, Italy, Poland, Hungary, Cyprus and Slovak Republic.

** EU countries in the region: Slovenia, Hungary, Romania, Bulgaria, Croatia and Greece.

Average DESI values by dimensions are given in Figure 3.4.

Figure 3.4. - Average DESI values by dimensions



Each of the five dimensions includes several sub-dimensions and the values of their indictors are calculation components of DESI. The index is a sum of weighted values for five main dimensions. Sub-dimensions also have weighted values, whereas individual indica-

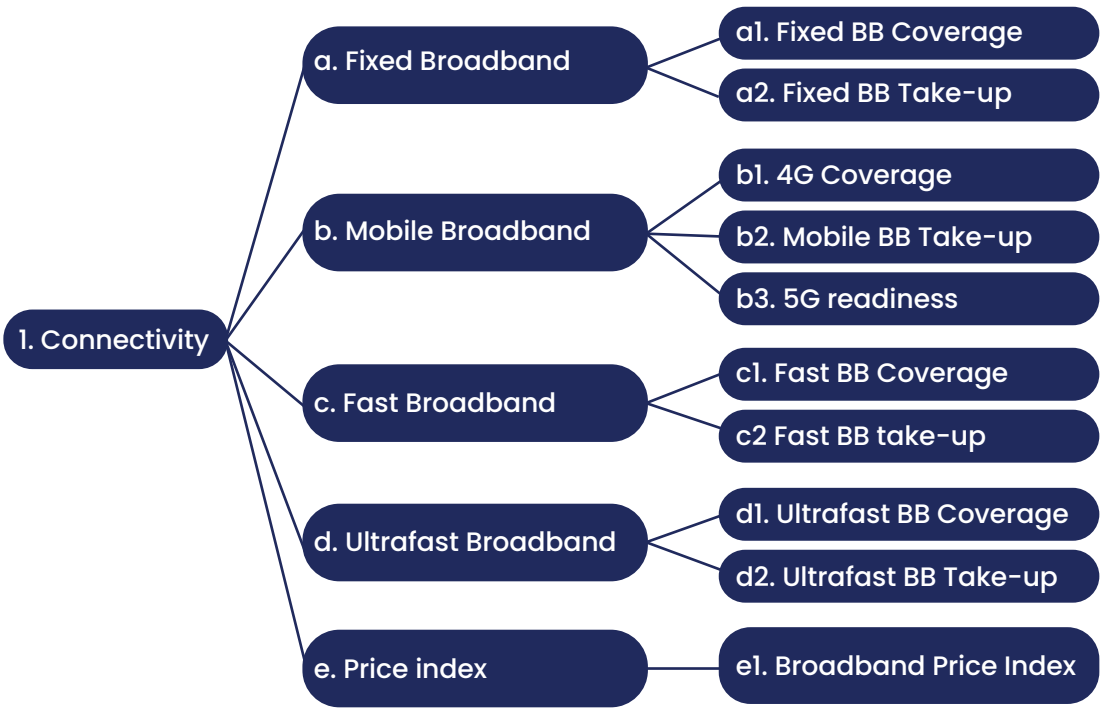
tors within sub-dimensions have equal value, i.e. the same weight. Biggest changes are evident in the dimensions Use of Internet and Digital public services. Weights attributed to the DESI dimensions and sub-dimensions are given below:

DESI Dimensions / Sub-dimensions	Ponder
1 Connectivity	**25%**
1 Connectivity	18.5%
1a. Fixed Broadband	35%
1b. Mobile Broadband	18.5%
1c. Fast Broadband	18.5%
1d. Ultrafast Broadband	9.5%
2 Human Capital	**25%**
2a. Internet User Skills	50%
2b. Advanced Skills and Development	50%
3 Use of Internet	**15%**
3a. Internet use	25%
3b. Activities online	50%
3c. Transactions	25%
4 Integration of Digital Technology	**20%**
4a. Business digitalization	60%
4b. e-Commerce	40%
5 Digital Public Services	**15%**
5a. e-Government	80%
5b. e-Health	20%

Connectivity Dimension

Connectivity is a necessary infrastructure of 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 3.5.

Figure 3.5. - Connectivity: Sub-dimensions and their indicators



The leading countries in this area are Denmark, Sweden and Luxemburg, whereas the countries with the lowest score in the EU are Greece, Cyprus and Bulgaria. The values for Connectivity dimension for the EU countries and Serbia are given in Figure 3.6, while the comparison between Serbia and the cluster of comparable countries and countries in the region is given in Figure 3.7.

Figure 3.6. – 2019 Values for Connectivity dimension for the EU countries and Serbia

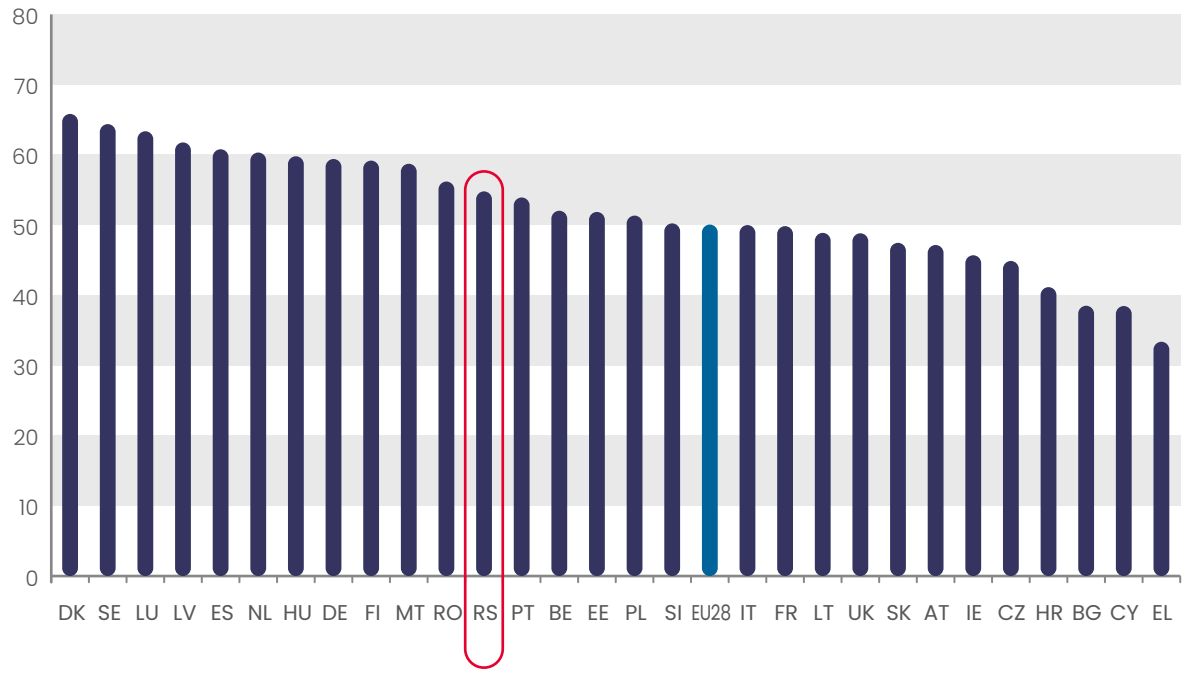
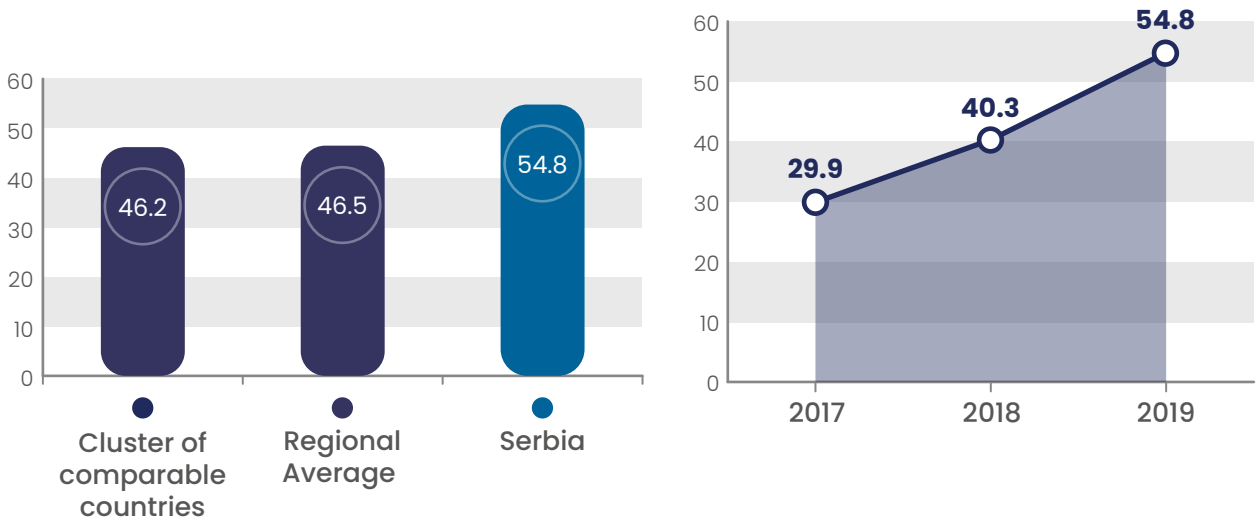


Figure 3.7. – Compared overview of values for Connectivity dimension



Serbia made significant progress in respect to the last year's score, which resulted in the rise on the list of European countries for this dimension. Almost all indicators in this dimension are higher in 2019, the biggest rise being the Internet take up of at least 100 Mbps. The values for each indicator of the Connectivity dimension for Serbia are given below.

Connectivity Indicators	Serbia	Min*	Max*
1a1 – Fixed Broadband Coverage - household penetration rate	75.5%	75%	100%
1a2 – Fixed Broadband Take-up- household penetration rate	65.3%	50%	100%
1b1 – 4G Coverage -% of populated areas coverage by 4G	96.1%	0%	100%
1b2 – Mobile Broadband Take-up - Number of mobile data subscriptions per 100 people	89.8	25	150
1b3 – 5G readiness assessment **	n/a	0%	100%
1c1 – Fast Broadband coverage- at least 30 Mbps	70.2%	0%	100%
1c2 – Fast Broadband take-up -% of households subscribing to broadband of at least 30 Mbp	33.5%	0%	100%
1d1 – Fixed Broadband Coverage - at least 100 Mbps	69.7%	0%	100%
1d2 – Fixed Broadband Take-up -% of households subscribing to broadband of at least 100 Mbps	14.8%	0%	100%
1e1 – The Fixed Broadband Price	89.3	0	100

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

** Decision on 5G spectrum auction has not been reached in 2019.

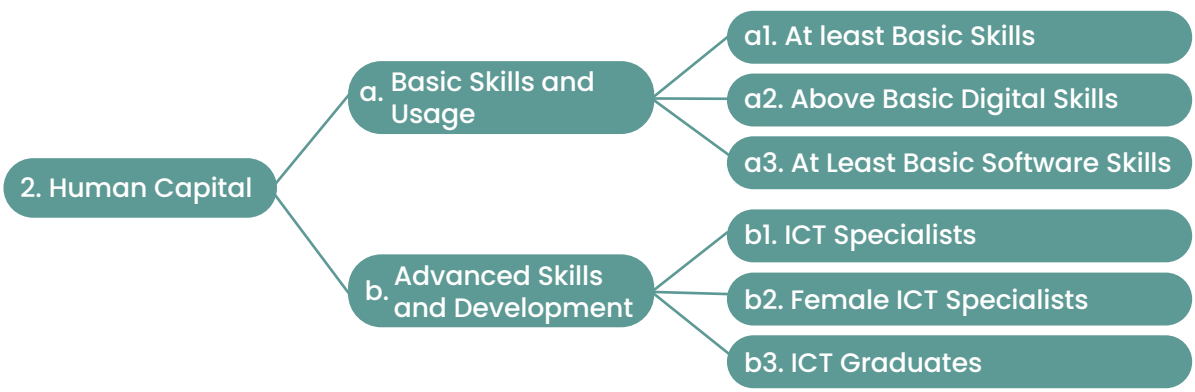
Source: **RATEL**

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 infrastructure for the digital economy and society.

Sub-dimensions and indicators under Human Capital dimension are given in Figure 3.8.

Figure 3.8. - Human Capital – sub-dimensions and indicators



The leading countries in this dimension are Finland, Sweden and Estonia, whereas the countries with the lowest score in the EU are Italy, Romania and Bulgaria. The values for Human Capital dimension in the EU and Serbia are given in Figure 3.9, whereas the comparison with the comparable countries cluster and countries in the region is shown in Figure 3.10.

Figure 3.9. - The values for Human Capital dimension in the EU and Serbia in 2019

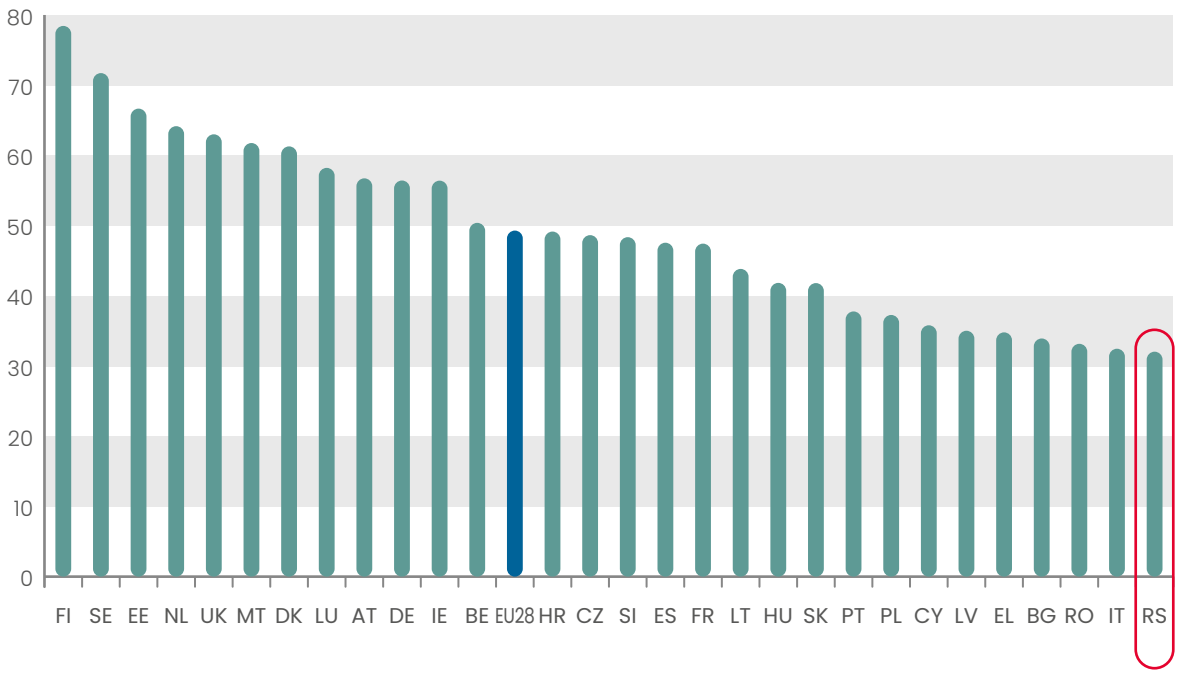
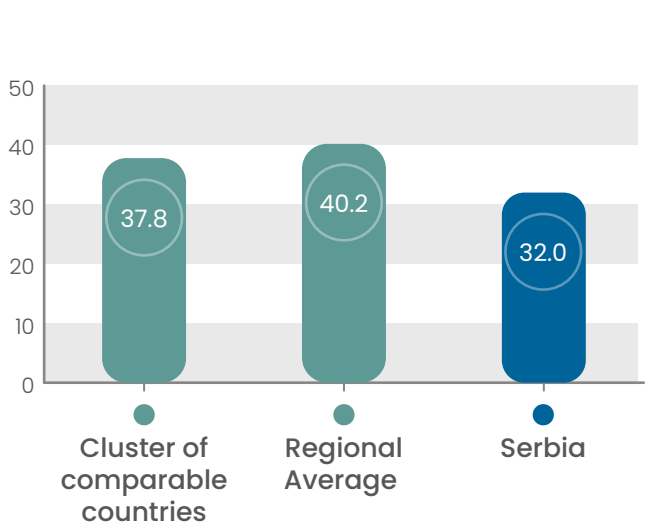
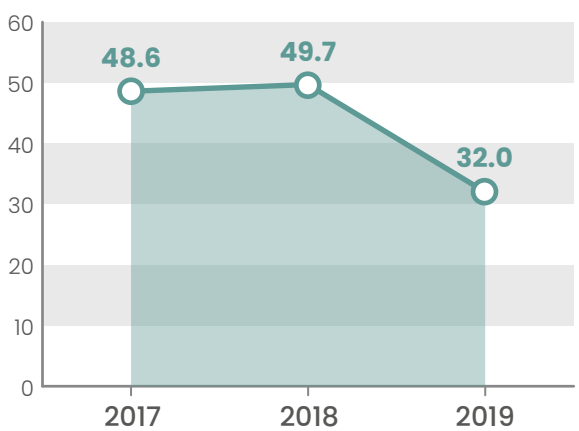


Figure 3.10. – Overview of compared values for the Human Capital dimension





Compared with the cluster of comparable countries, Serbia is the least successful in this dimension. Despite the progress made in several areas comparable with the previous year (with rise of "At least Basic Skills" and the number of ICT Specialists), the modifications made to the methodology, which involved excluding two earlier and including four new indicators, led to significantly lower results compared with the previous year. The values of individual indicators under Human Capital dimension for Serbia are given below.

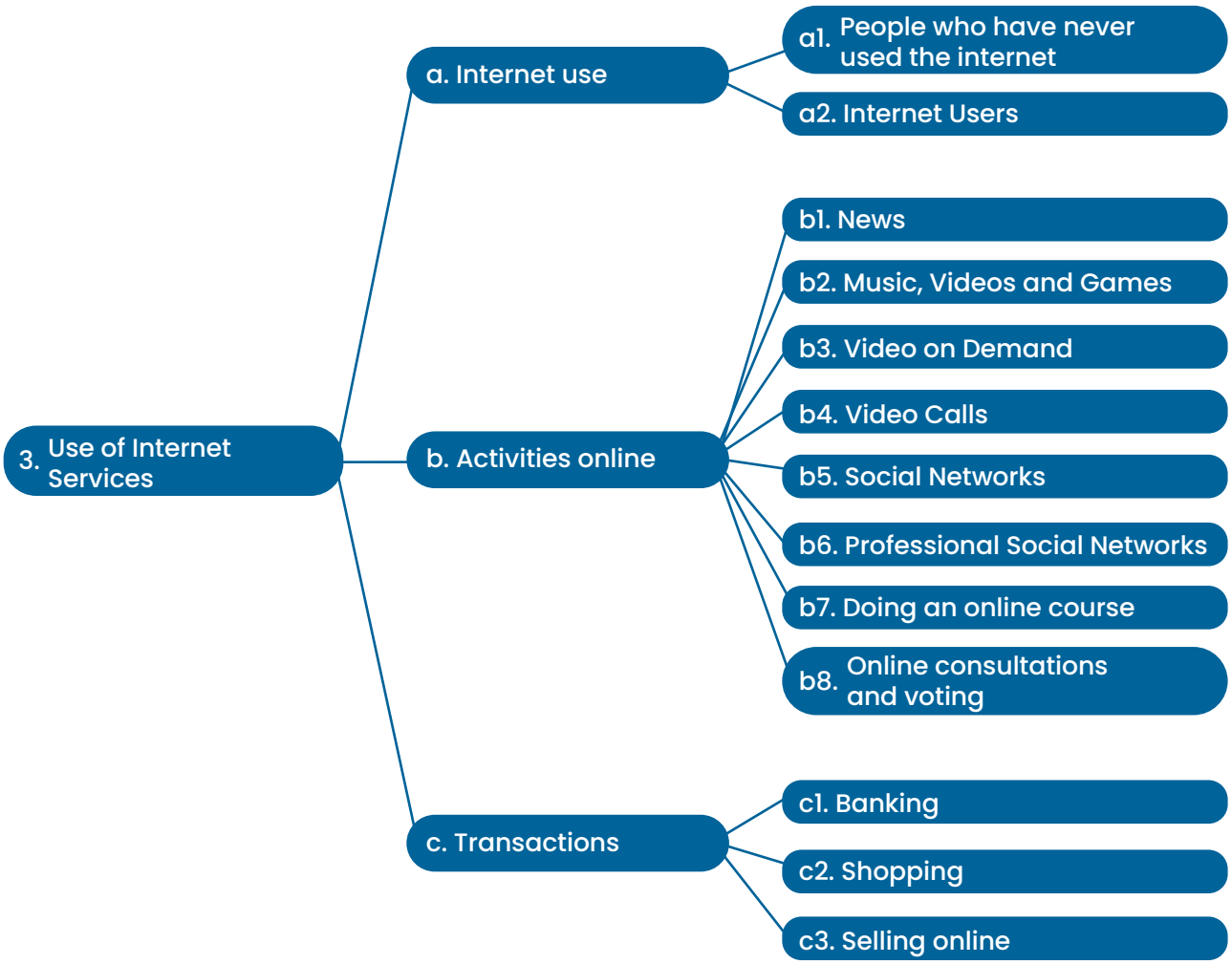
Human Capital Indicators	Serbia	Min	Max
2a1 – At least Basic Skills	46.0%	0%	100%
2a2 – Above Basic Digital Skills	20.1%	0%	66%
2a3 – At Least Basic Software Skills	4.4%	0%	100%
2b1 – ICT Specialists	2.6%	0%	7%
2b2 – Female ICT Specialists	0.6%	0%	4%
2b3 – ICT Graduates	6.2%	0%	10%

Source: **RATEL, Statistics Office**

Use of Internet Services Dimension

This dimension measures the usage of online content (music, films, video games, social networks) modern communications (video calls) and e-commerce. These activities are key drivers of broadband networks and services development. Sub-dimensions and indicators under Use of Internet Services dimension are given in Figure 3.11.

Figure 3.11. Use of Internet Services: 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 Romania, Bulgaria and Italy. The values for the Use of Internet Services 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 Use of Internet Services dimension in the EU and Serbia for 2019

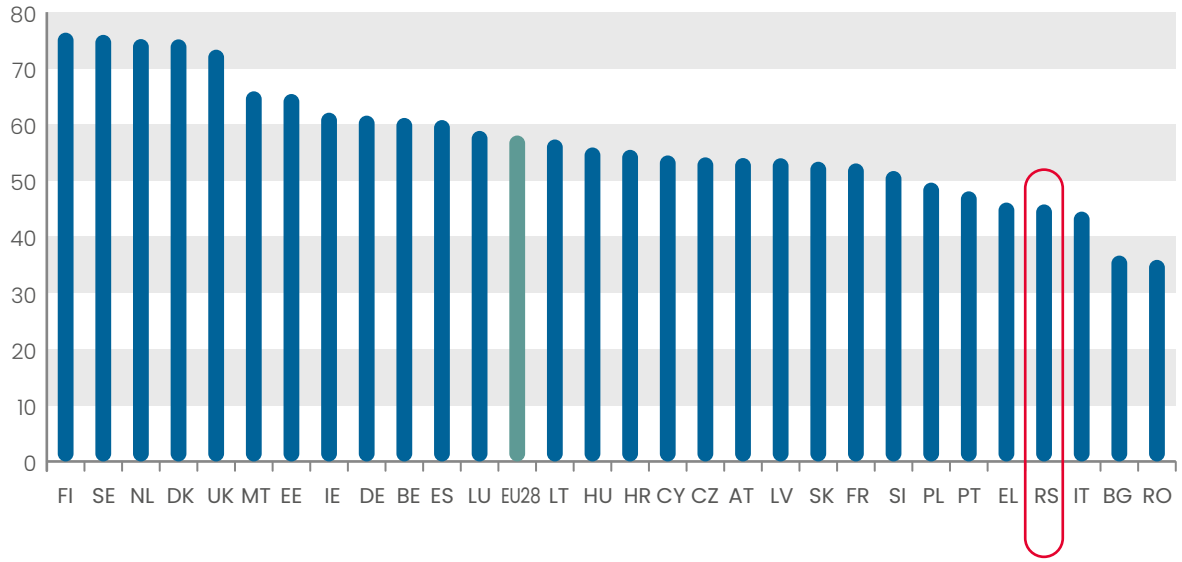
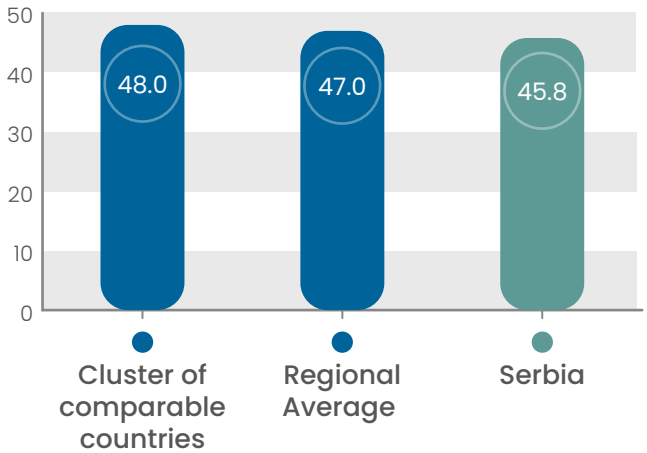
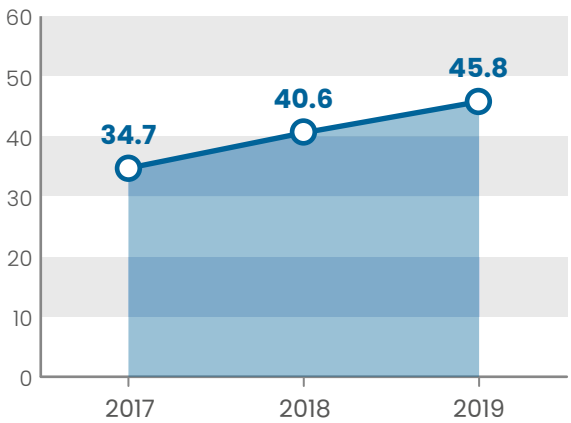


Figure 3.13. - Overview of compared values for the Use of Internet Services dimension





Even though Serbia achieved better results in respect to the previous year, it remained among the lowest ranked countries in this dimension. This is mainly due to low values for the Use of Internet indicator (in particular, a large percentage of people have never used the Internet) and the online Transactions indicator (a small percentage of people use e-banking or shopping online). The values of individual indicators for Serbia for 2018 are given below.

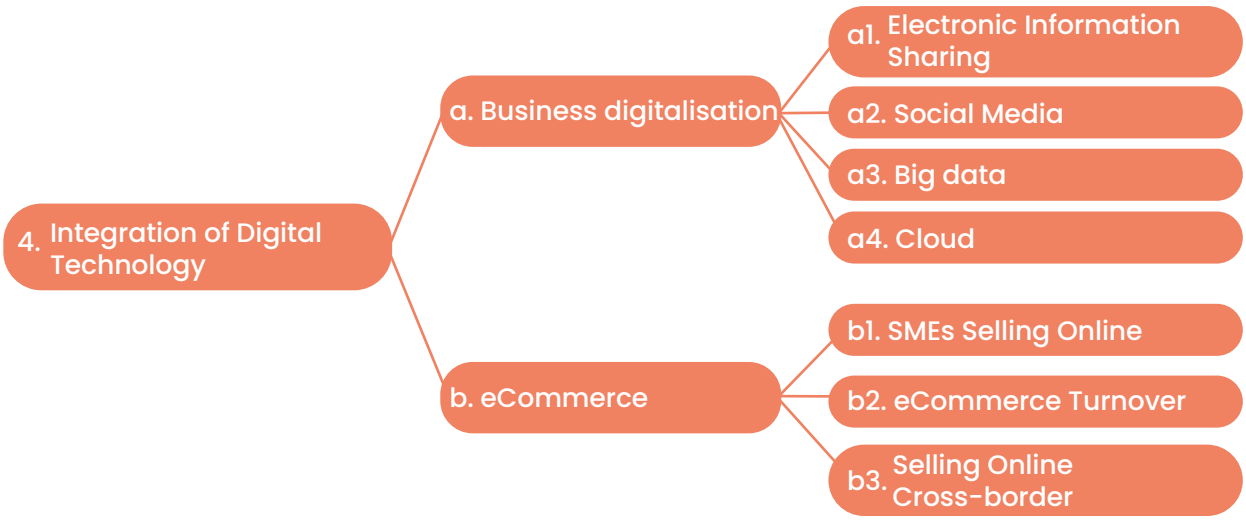
Use of Internet Indicators	Serbia	Min	Max
3a1 – People who never used the internet	19.4%	0%	45%
3a2 – Internet Users	77.4%	40%	100%
3b1 – News (16.6%), 3b5 Social Networks	69.9%	33%	100%
3b2 – Music, Videos and Games	74.6%	50%	100%
3b3 – Video on Demand	27.7%	0%	75%
3b4 – Video Calls (e.g. *Skype*)	81.6%	20%	100%
3b5 – Social Networks	70.8%	40%	100%
3b6 – Professional Social Networks	70.8%	0%	40%
3b7 – Doing an online course	6.7%	0%	30%
3b8 – Online consultations and voting	3.2%	0%	40%
3c1 – Banking	23.1%	0%	100%
3c2 – Shopping	43.9%	0%	100%
3c3 – Statistics Office	15.0%	0%	60%

Source: **Statistics Office**

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 3.14.

Figure 3.14. - Integration of Digital Technology - sub-dimensions and indicators



The leading countries in this dimension are Ireland, Finland and Belgium, whereas the countries with the lowest score in the EU are Bulgaria, Romania and Hungary. The values for Integration of Digital Technology 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 - The values for the Integration of Digital Technology dimension in the EU and Serbia for 2019

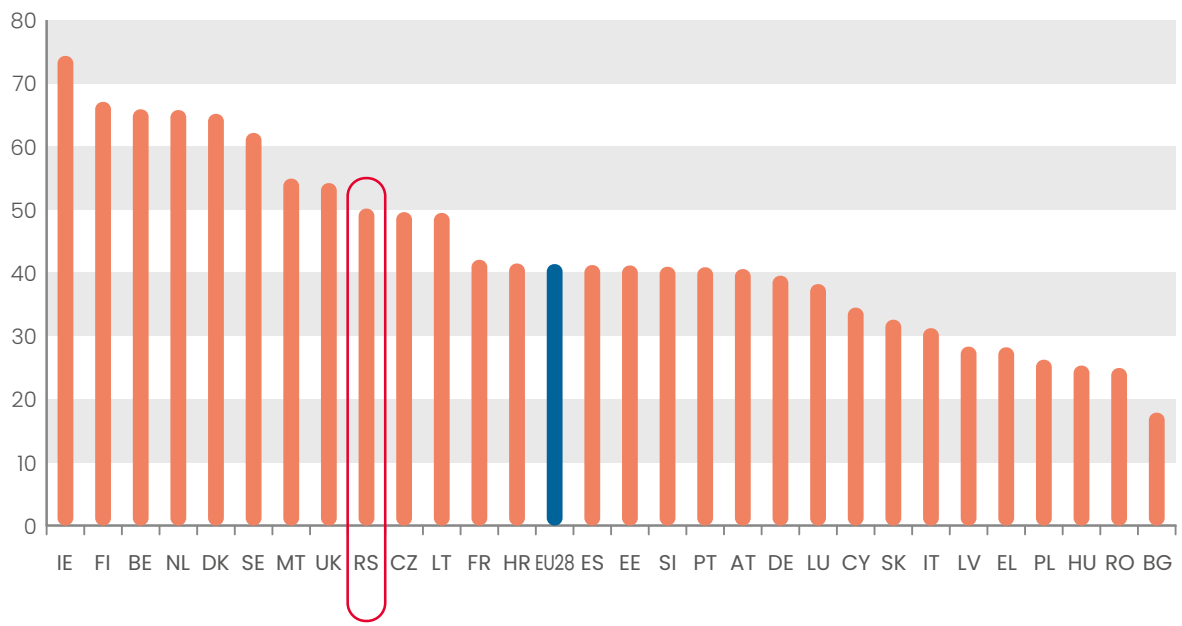
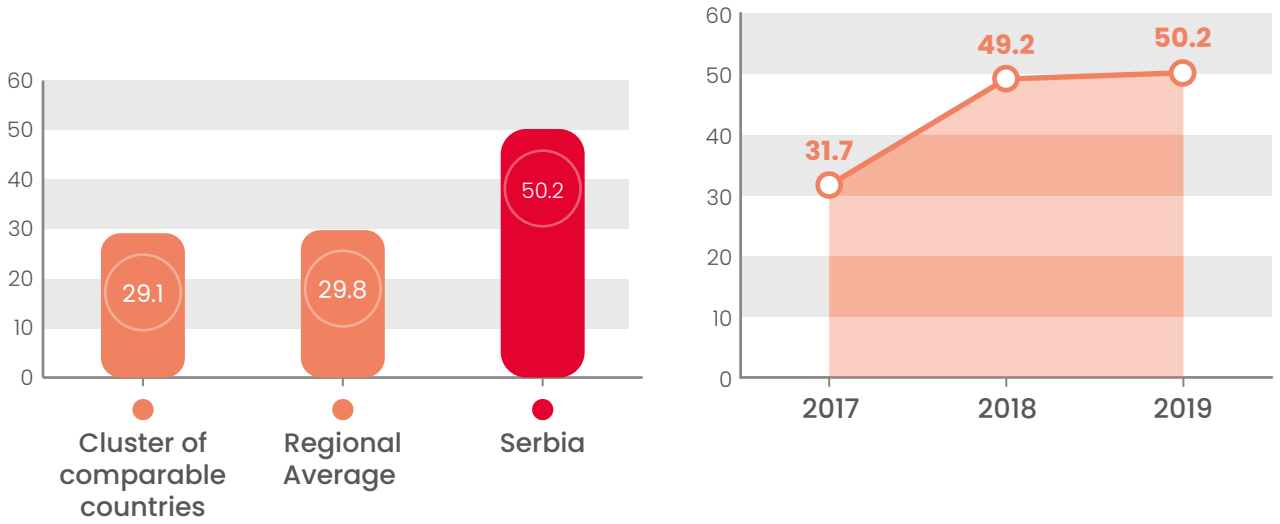


Figure 3.16 - Overview of compared values for the Integration of Digital Technology dimension



Serbia's score in the Integration of Digital Technology dimension is above average, partly due to better performance in 2019 and partly as a consequence of the latest methodology applied for the EU countries which now also includes Big data indicator. The values of individual indicators under Digital Technology dimension for Serbia are given below.

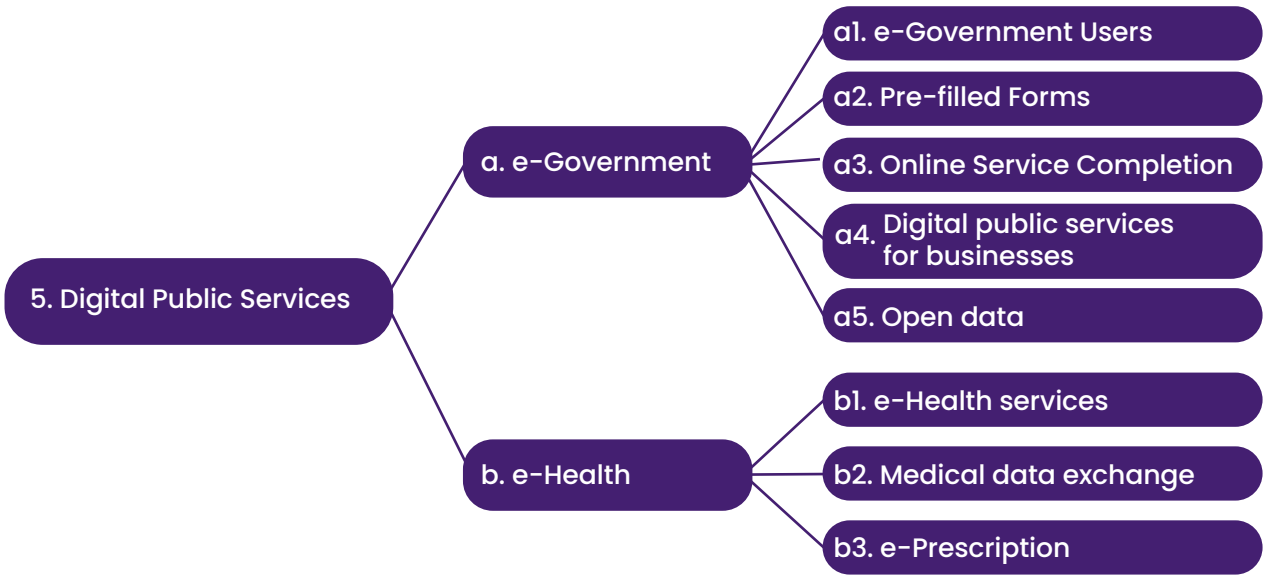
Digital Technology dimension – indicators	Serbia	Min	Max
4a1 – Electronic Information Sharing (ERP)	28.7%	0%	60%
4a2 – Social Media	20.1%	0%	50%
4a3 – Big data	9.5%	0%	33%
4a4 – Cloud	21.9%	0%	50%
4b1 – SMEs Selling Online (min 1% turnover)	27.4%	0%	33%
4b2 – eCommerce Turnover	26.8%	0%	33%
4b3 – Selling Online Cross-border	8.3%	0%	25%

Source: **Statistics Office**

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 3.17. Pre-filled forms, online service completion and open data are composite indicators, consisting of several sub-indicators.

Figure 3.17. - Digital Public Services dimension



The leading countries in this dimension are Estonia, Spain and Denmark, whereas the countries with the lowest score in the EU are Romania, Greece and Slovakia. The values for Digital Public Services dimension in the EU and Serbia are given in Figure 3.18, whereas the comparison with the comparable countries cluster and countries in the region is shown in Figure 3.19.

Figure 3.18. - The values for the Digital Public Services dimension in the EU and Serbia for 2019

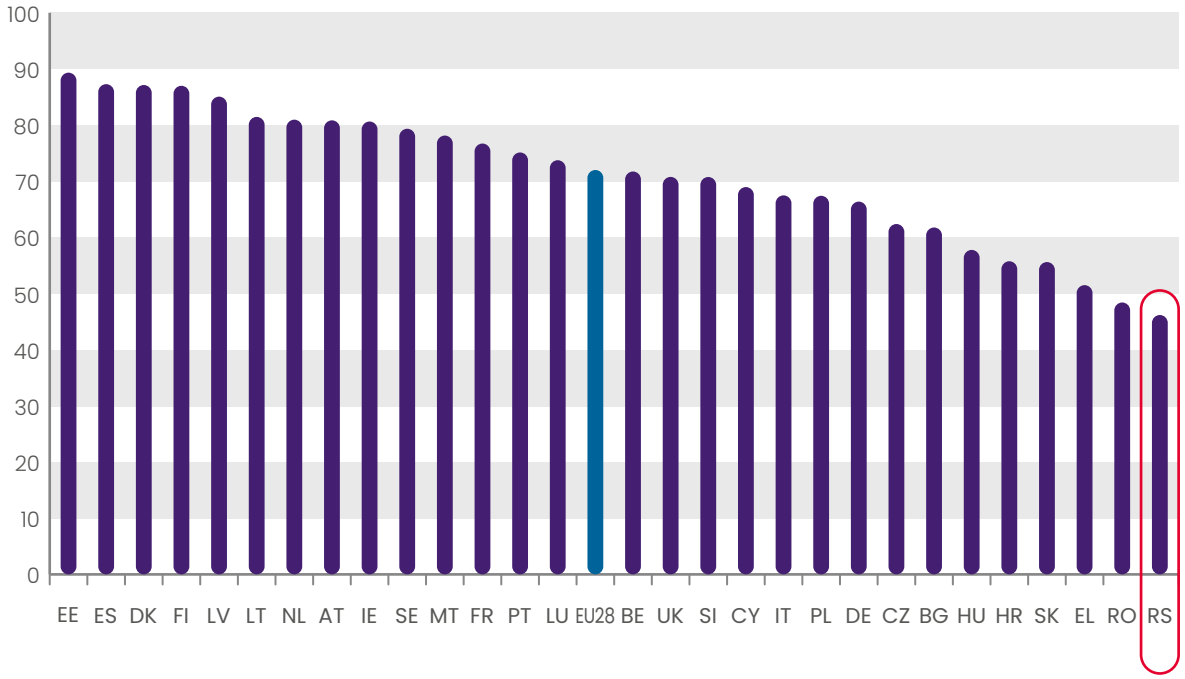
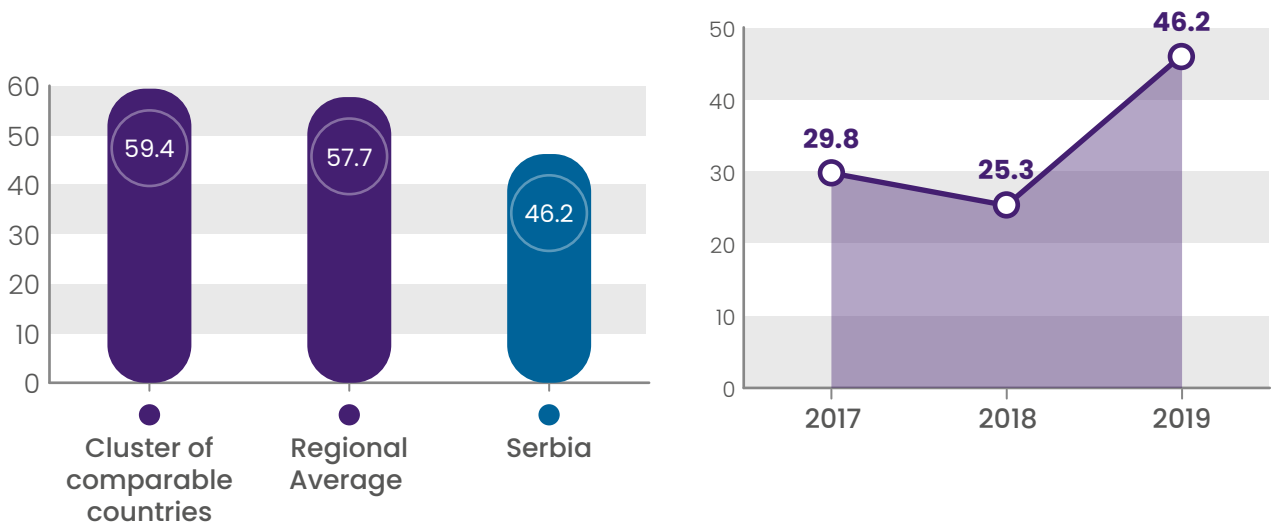


Figure 3.19. - Overview of compared values for the Digital Public Services dimension



Despite significantly improved results in the Digital Public Services dimension, Serbia remains the least successful country in this dimension compared with the EU countries. This is due to low values of e-Government-related indicators, indicating the level of sophistication of public administration services available online, and also due to low rate of online medical service usage.

Serbia is below the EU average for most indicators in this dimension, except for the Open data indicator where it scored at the level of EU average. 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
5a1 – e-Government Users (submitting filled out forms via Internet)	16.5%	0%	100%
5a2 – Pre-filled Forms	35	0	100
5a3 – Online Service Completion	71	40	100
5a4 – Digital public services for businesses	68	20	100
5a5 – Open data	64.9%	0%	100%
5b1 – e-Health services	10.2%	0%	100%
5b2 – Medical data exchange	36.5%	0%	100%
5b3 – e-Prescription	100%	0%	100%

Source: **RATEL, Statistics Office**

4 PUBLIC FIXED TELECOMMUNICATIONS NETWORKS AND SERVICES

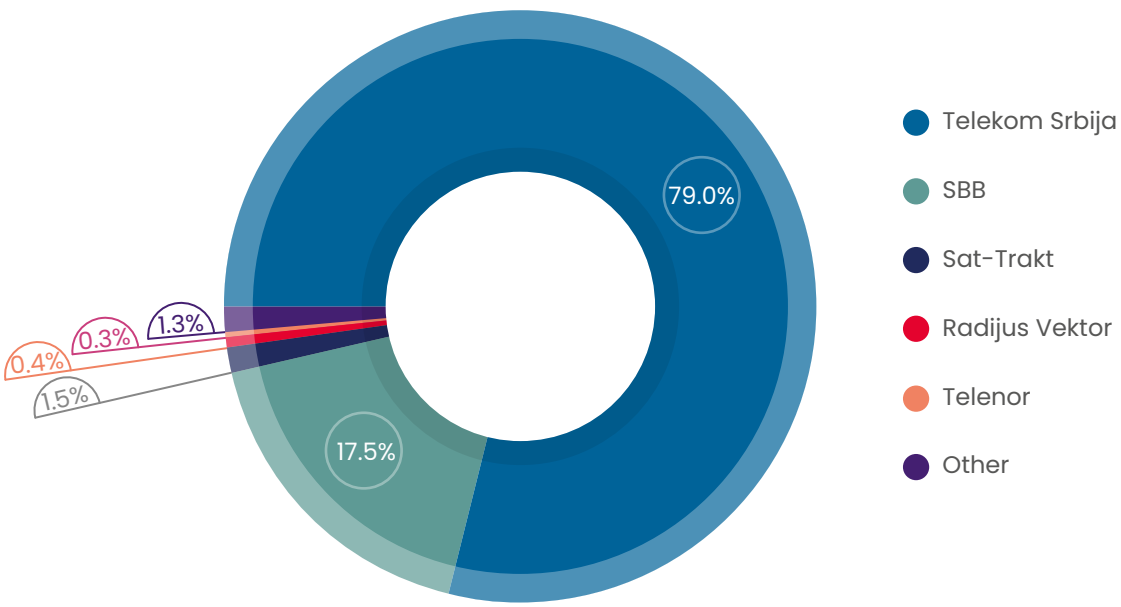
At the end of 2019, there were 41 operators registered for the public telephone service provision over fixed-line network.

Pursuant to Art. 149 of the Law on Electronic Communications, since 1 January 2012 the provision of public fixed telecommunications network and services has been under the general authorization regime. Hence, in addition to the above licence holders, in 2019 public voice service via fixed network was also provided by another 38 operators, whereas other registered operators did not provide services in 2019.

In 2019, Telekom Srbija had approximately 4% of subscribers less than in the previous year, but it remained the biggest public fixed telecoms operator and its business activities had the largest impact on the fixed telephony market in 2019. 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 an increase of 14% 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.

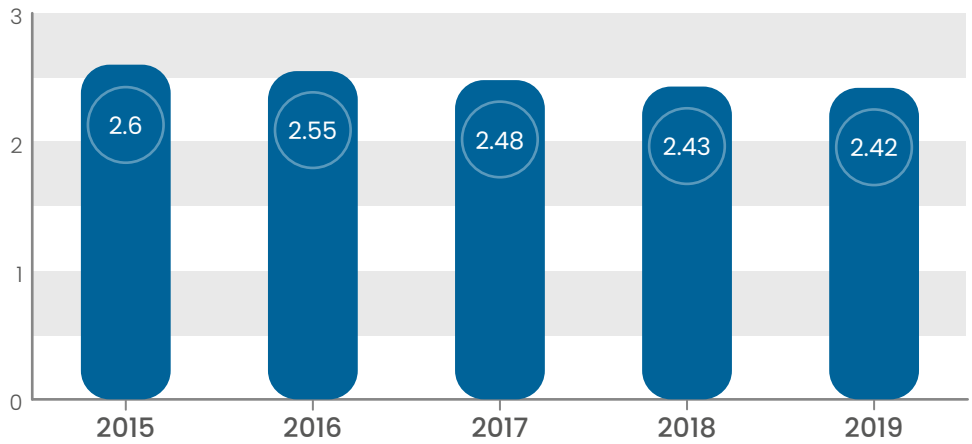
Figure 4.1. Market shares of pubic fixed telecom service operators via fixed network



Source: **RATEL**

The number of fixed line subscribers continued to decrease, amounting to 2.42 million at the end of 2019. The number of subscribers includes users of electronic communications services provided at a fixed location via public mobile networks (Cellular Local Loop - CLL) by Telekom Srbija and Vip mobile, which take up 0.5% of the total number of subscribers in 2019. Residential users are still dominant, with 88% share in the total number of users. In 2019, the digitalization rate was 99.97% in Telekom Serbia's network, whereas all other operators have a 100% digitalization rate. The number of payphones continued to decrease, amounting to 2,118 in 2019.

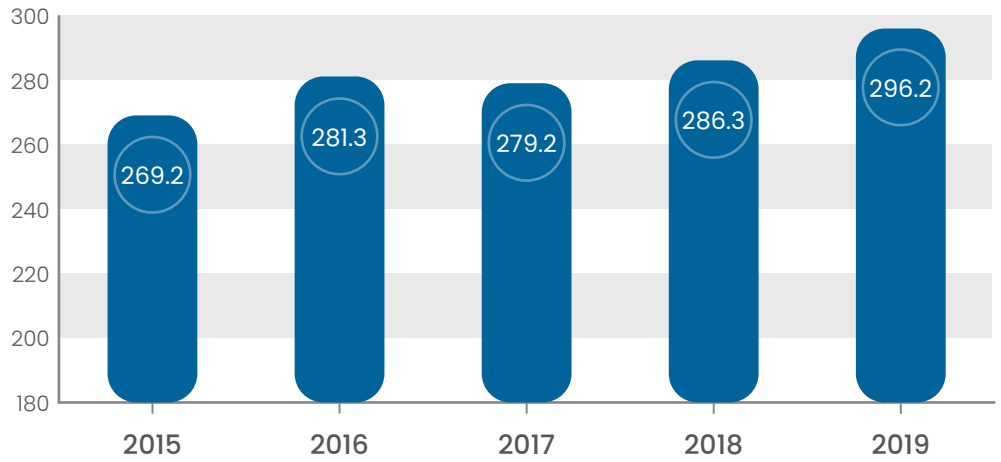
Figure 4.2. – Number of fixed network subscribers (million)



Source: **RATEL**

The share of business subscribers in 2019 was approximately 12%. The trend over the past years is shown in Figure 4.3.

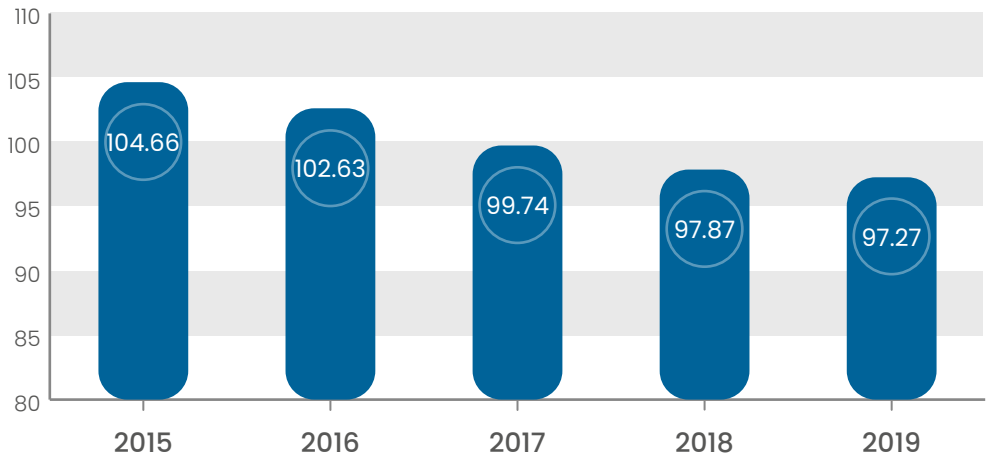
Figure 4.3. Number of business subscribers (in thousands)



Source: **RATEL**

Fixed telephony penetration rate, in terms of households, was 97.27% in 2019, as given in Figure 4.4.

Figure 4.4. – Fixed line penetration rate –households

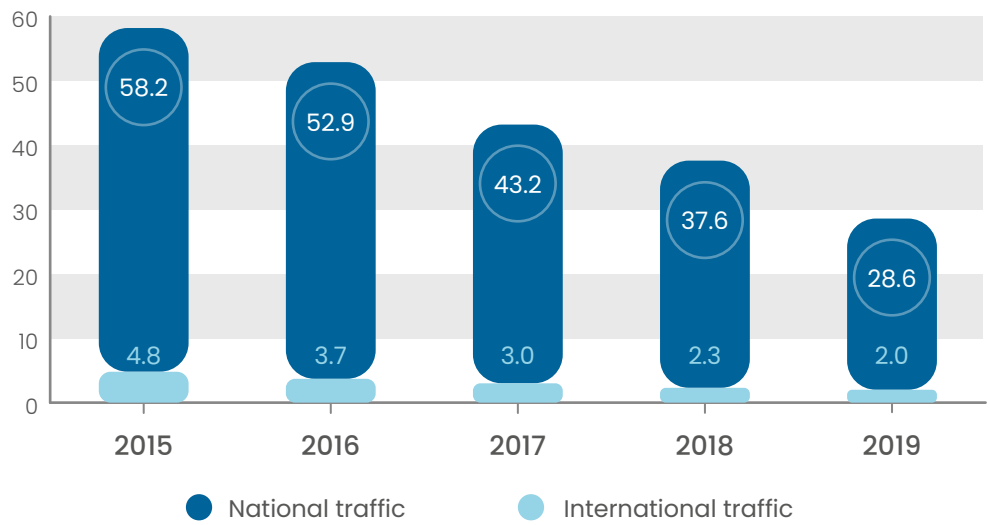


Source: **RATEL**

The number of ISDN subscribers in 2019 was approximately 23 thousand, which is by 15% less year on year. 7% 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 2019 decreased by approximately 23% year on year, the national traffic being estimated to 2.9 billion of minutes and the international traffic to 198 million of minutes. As shown in Figure 4.5, the downward trend continued, mainly due to other types of services available, such as mobile telephony or VoIP applications. The biggest fall was seen in traffic made within the home network, by almost 24%. International traffic, with 13% of minutes less than in the previous year, continues to drop due to the increasing trend of using VoIP applications.

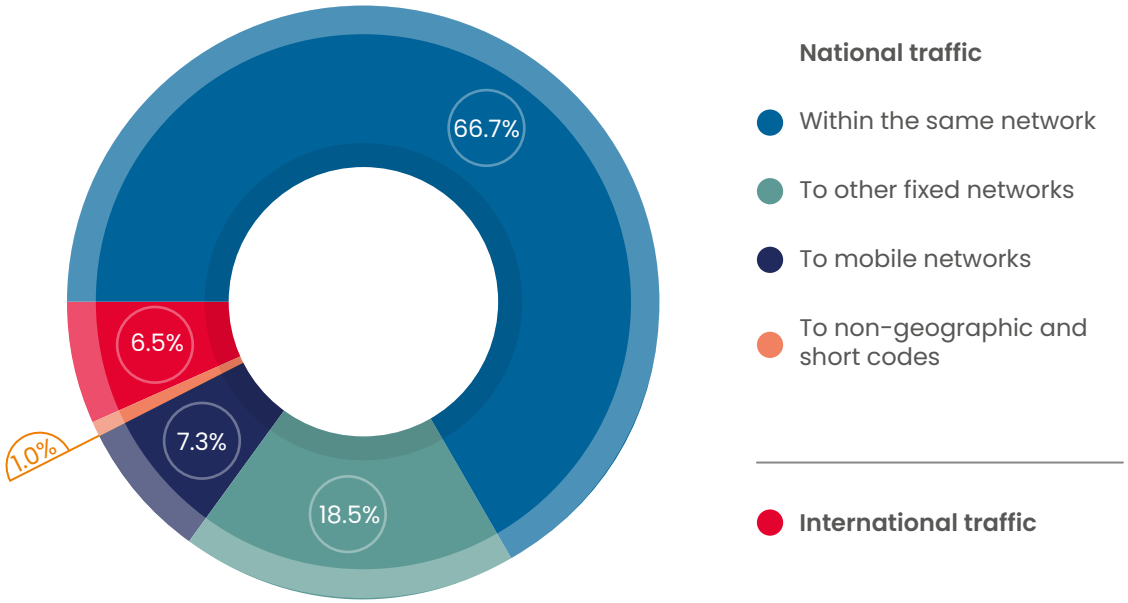
Figure 4.5. – Total traffic (in hundreds million minutes)



Source: **RATEL**

Despite a slight decrease over the years, the biggest share in the total traffic still goes to the traffic made within the same network (66.7%), whereas the smallest share goes to the traffic made to non-geographic numbers and short codes (1%). Fixed network traffic distribution in 2019 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 2019



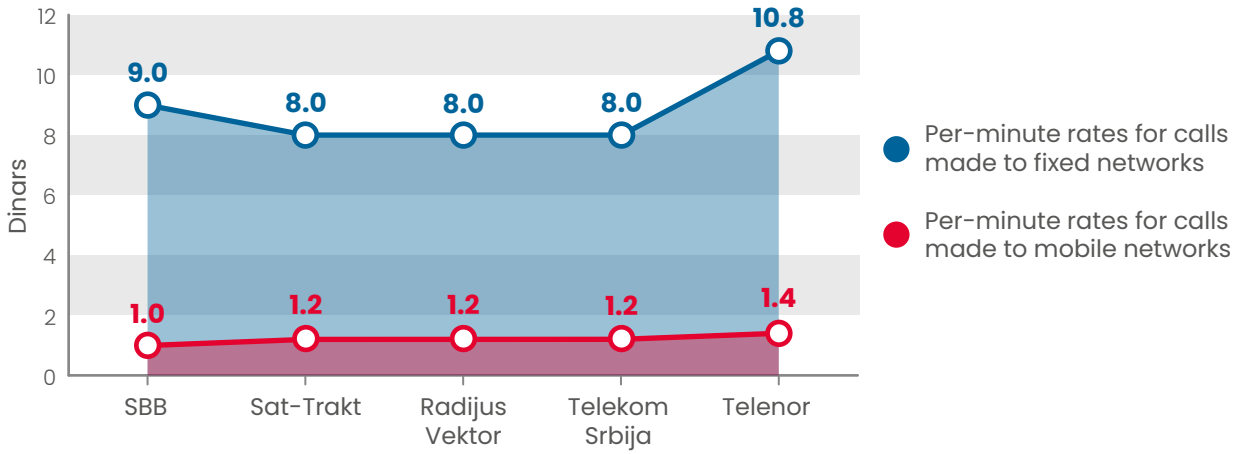
Source: **RATEL**

The average duration was 3.75 minutes for a call made within the same network, 1.66 minutes for a call made to mobile network and 4.56 minutes for an international call.

The total number of VoIP operators at the end of 2019 was approximately 24.7 thousand, which is a 34% decrease year on year. There were 5.8 million of minutes of traffic and there were 116 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 1.4 dinars per minute for fixed-line calls, and between 8 and 10.8 dinars per minute for the calls made to mobile networks.

Figure 4.7. Fixed-line calls and fixed-to-mobile telephone service rates in 2019, VAT included (RSD)

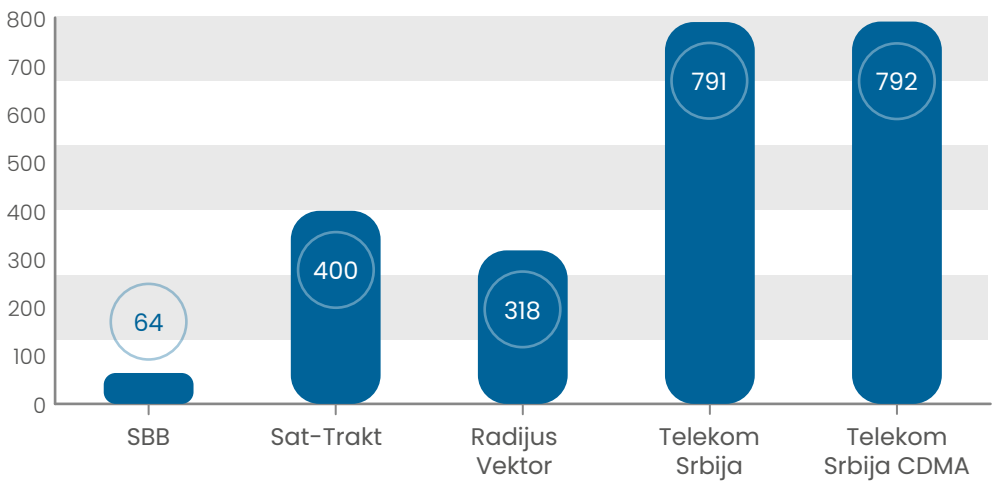


Source: **RATEL**

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.

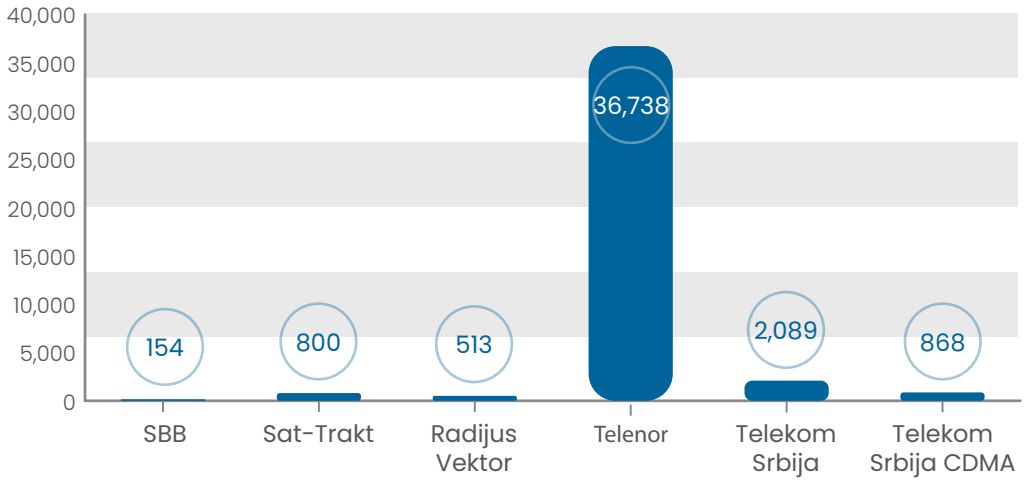
Average monthly bills charges by the operators with most users ranged between 64 and 792 dinars for residential users and between 154 and 36,738 dinars for business users. Average monthly bills charged to residential and business users are given in Figure 4.8 and 4.9.

Figure 4.8. Average monthly bills charged to residential users in 2019 (in dinars)



Source: **RATEL**

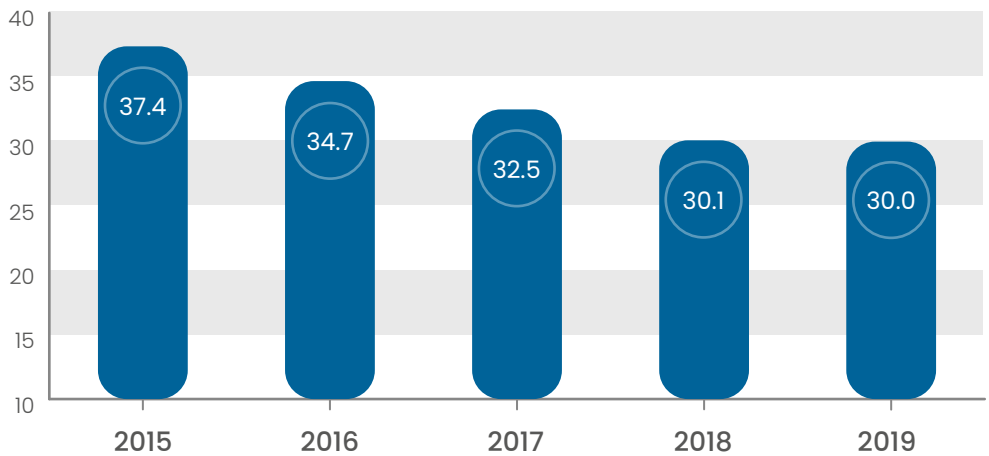
Figure 4.9. Average monthly bills charged to business users in 2019 (in dinars)



Source: **RATEL**

The total revenues from fixed telephone services provided by all operators in the territory of the Republic of Serbia in 2019 were somewhat lower compared to the previous year, amounting to 30 billion dinars, including the revenues made from VoIP services in the amount of 3.5 billion dinars. The investments made in the fixed telephony services in 2019 amounted to approximately 11 billion dinars, which is approximately at the same level of the previous year.

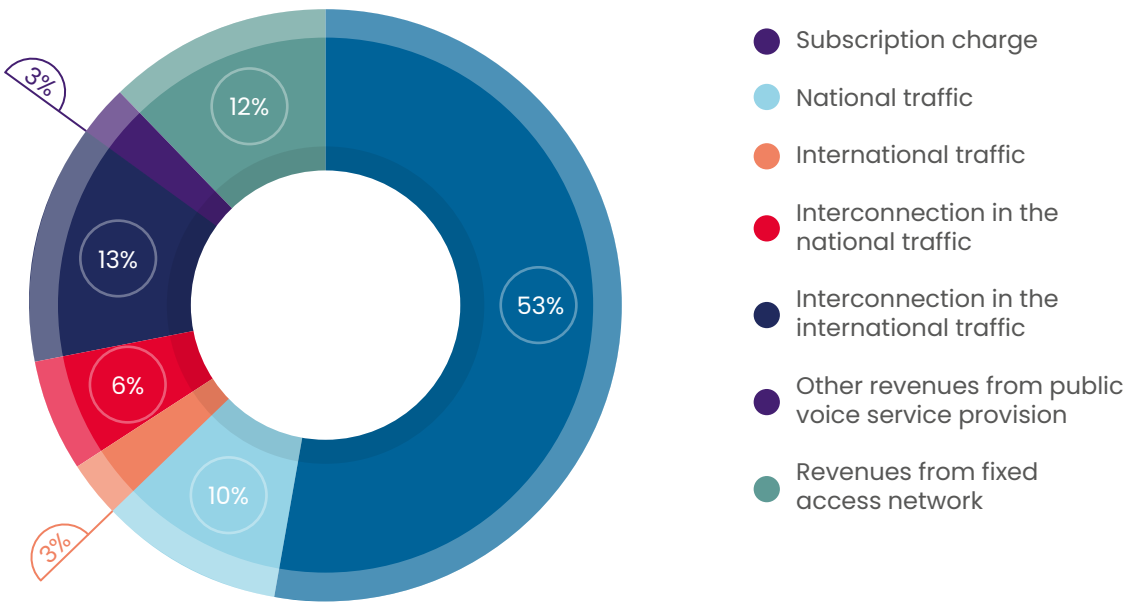
Figure 4.10. Revenues from fixed telecom networks and services (billion dinars)



Source: **RATEL**

Despite being lower that in the previous year, the subscription charges, in the amount of 13.9. billion dinars, still have the largest share in the total revenues, accounting for almost one half of total fixed network service revenues in 2019, without revenues from VoIP. The revenues made from the national traffic, in the amount of 2.7 billion and the international traffic, in the amount of 0.9 billion, are lower compared with the previous year and take up a smaller share in the total revenues. Reduced revenues from the national and international traffic are a result of a drop in the number of subscribers and minutes of traffic made. The revenues from interconnection in the national and international traffic also dropped slightly.

Figure 4.11. Structure of revenues from fixed telecom network in 2019

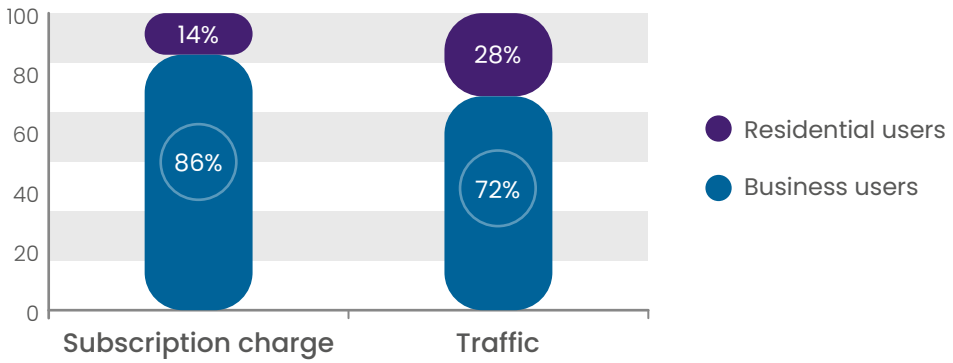


Source: **RATEL**

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.

The share of residential and business users in the revenues from subscription charge and traffic made has not significantllly changed, as shown in Figure 4.12.

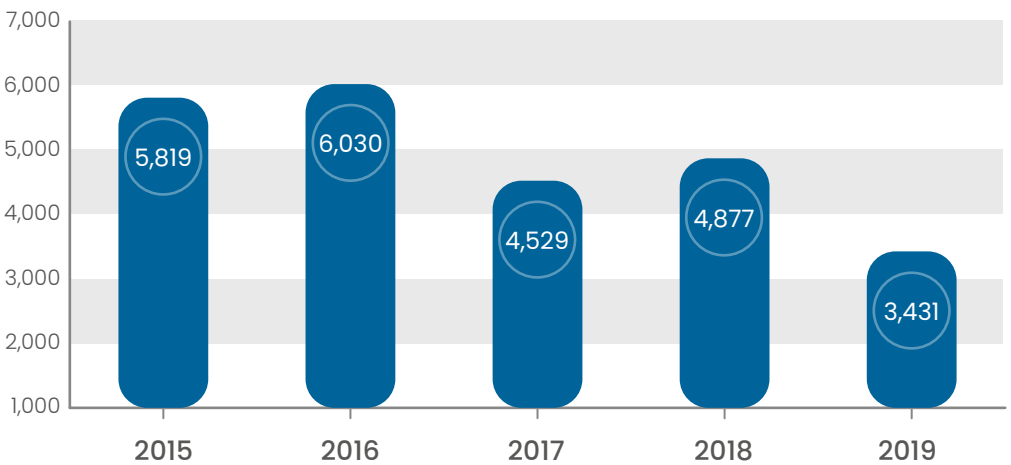
Figure 4.12. Share of residential and business users in the revenues made from subscription charge and traffic made



Source: **RATEL**

The interest for the number portability service on public fixed telephone networks, showed a slight decrease. In the sixth year of number portability being available on fixed networks, the monthly average of ported numbers was 3,431.

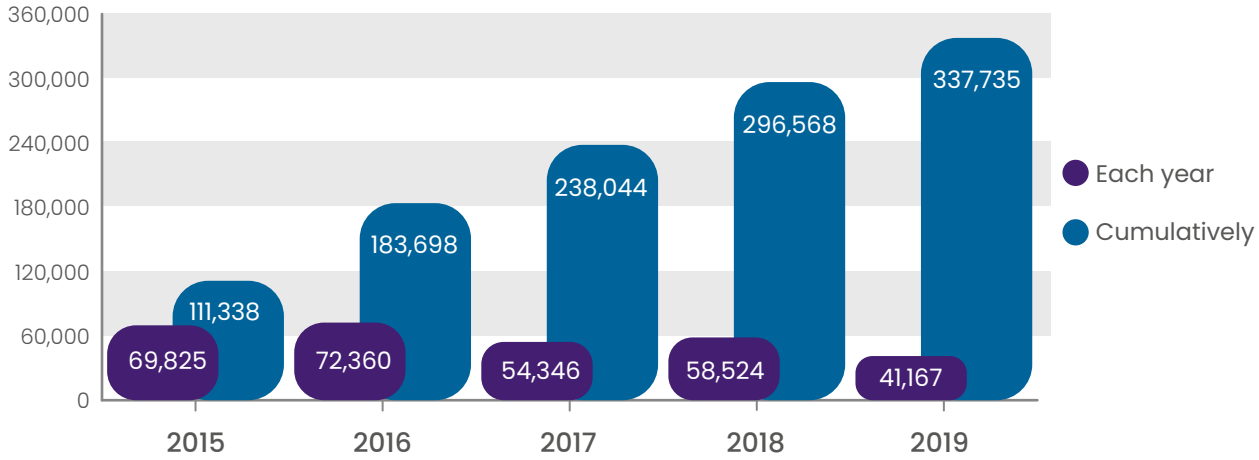
Figure 4.13. Monthly average of ported numbers each year



Source: **RATEL**

During 2019 there were 41,167 fixed line subscribers who changed the operator while keeping the same number, so that the total of ported numbers amounted to 337,735 at the end of 2019 (Figure 4.14).

Figure 4.14. Portings made each year and in total



Source: **RATEL**

Leased Lines

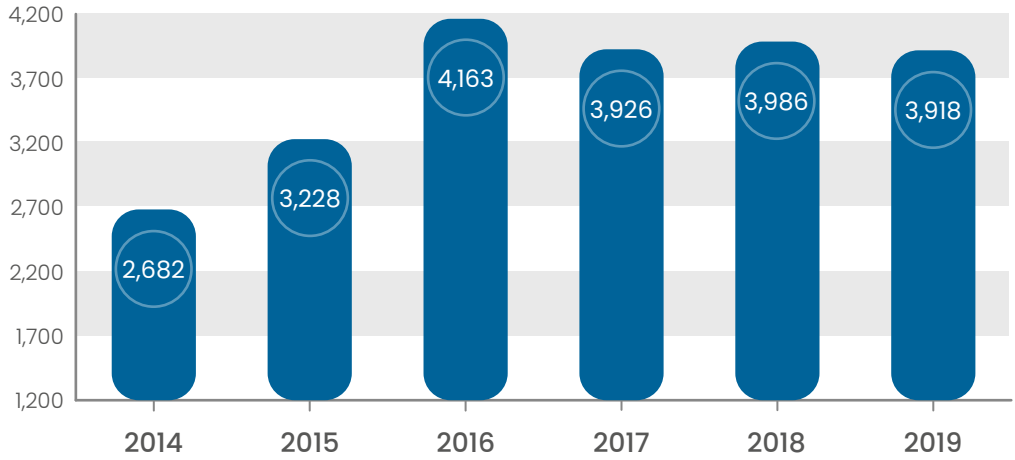
Leased lines are a significant factor in the overall market of electronic communications, since leased lines, as transmission infrastructure, are essential means of service provision for some operators. Also, big business users (as end-users) use leased lines as a means of connecting remote branches which are used for different types of data transmission.

Leased lines are a particular type of closely defined and transparent transmission capacities, which do not require any additional synchronisation to be made by the users (operators) when leasing lines. Leased line may be defined as a fixed "leased" 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 31 operators in Serbia in 2019 and the total number of national and international leased lines was 3,918, while national lines accounted for 97% of the total in 2019.

Figure 4.15. Total number of leased lines over years

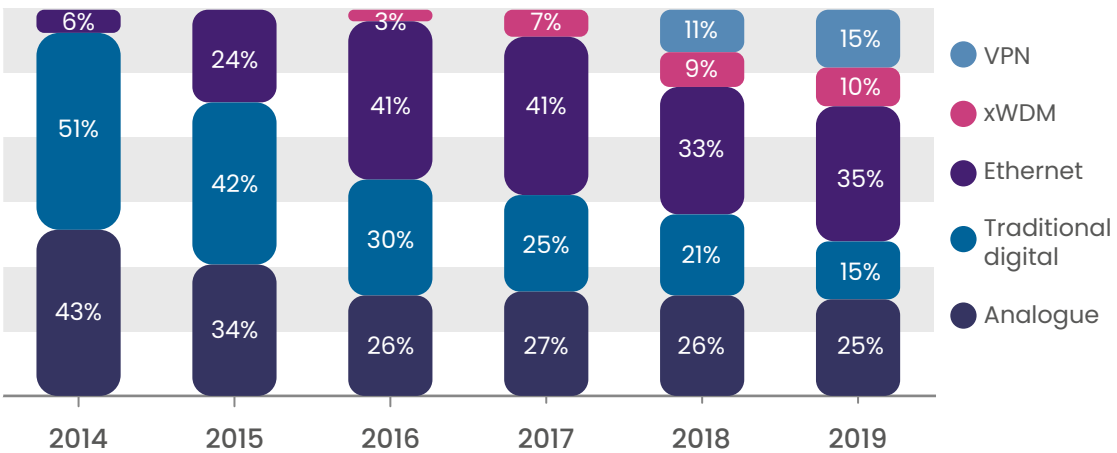


Source: **RATEL**

As for technologies, most national leased lines are Ethernet based (35% in 2019). The share of traditional digital lines is decreasing and the number of xWDM based lines enabling symmetrical high-speed data transmission rates (up to 40 Gbps) is increasing. Since 2018, data on VPN end-user service are being collected which present, in terms of high-quality access provision, an equivalent to the traditional leased lines service, with an 11% share in the total number of lines.

Analogue leased lines account for 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. Therefore, a continued drop may be expected as the contracts come to expire.

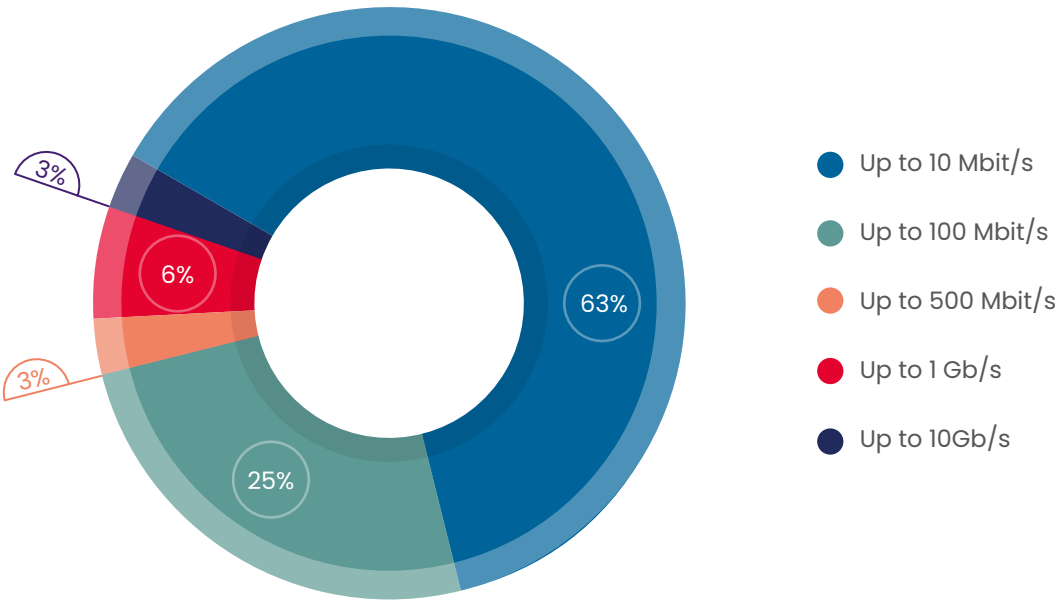
Figure 4.16. Distribution of national leased lines according to access type



Source: **RATEL**

In terms of speed, the most common national line transmission technologies in 2019 are Ethernet 10 Mbit/s lines with 63% share, followed by Ethernet 100 Mbit/s lines with 25% share, Ethernet 500 Mbit/s to 10 Gb/s lines with 3% share and 1Gb/s with 6% share.

Figure 4.17. Distribution of Ethernet national leased lines according to speed in 2019

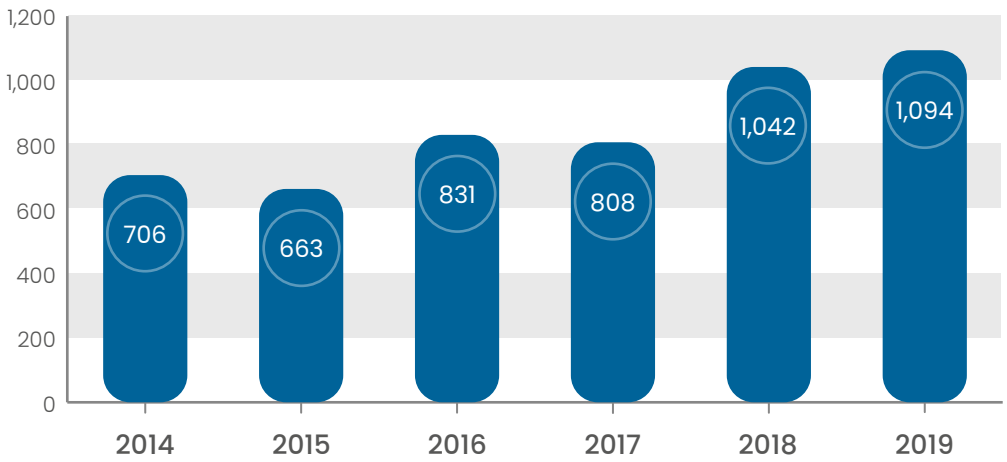


Source: **RATEL**

Leased line is a service designed for business users (companies, organizations, institutions and public institutions) that need to connect several units at different locations, in order to ensure an uninterrupted data transmission. In addition the service is intended for operator users, to build and connect their own network, to connect it to networks of other operators and to provide retail service to their end users.

The total revenues made from national and international leased lines in 2019 were only slightly higher, somewhat over a billion dinars. The share of revenues made from international lines in the total revenues is 10%.

Figure 4.18. Revenues made from leased lines in 2019 (million dinars)



Source: **RATEL**

5 PUBLIC MOBILE TELECOMMUNICATIONS NETWORKS AND SERVICES

Mobile telephony services in the Republic of Serbia were provided by the following three operators in 2019:

- **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[5];
- **Telenor Ltd., Belgrade**, 100% owned by PPF TMT Bidco 1 B.V., the Netherlands;
- **Vip mobile Ltd.**, 100% in the ownership of Mobilkom CEE Beteiligungsverwaltung GmbH, Austria.

Based on the individual licences for RF usage issued upon public bidding procedure, all three operators are using the following RF bands on technologically neutral basis:

- 791-821/832-862 MHz;
- 890-915/935-960 MHz;
- 1710-1780/1805-1875 MHz;
- 1900-1915 MHz (this band remains unused by the operators);
- 1920-1965/2110-2165 MHz.

Operators are using GSM (2G), UMTS (3G) and LTE (4G) technology.

The licences 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 addition to network operators, two virtual mobile operators were also registered, **Mundio Mobile d.o.o. and Globaltel d.o.o.**

4G network was launched in 2015 in the Republic of Serbia. In the beginning of 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 mobile 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.

5 Source: www.mts.rs

The requirements were thus met for the 4G mobile technology to be launched, enabling better coverage and faster Internet on the territory of the Republic of Serbia. 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 mobile 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.

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.

Vip mobile Ltd. is a member of the Telekom Austria Group, present in 7 European countries, including the following countries in the region: Croatia, Bulgaria and North Macedonia. Vip mobile 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 Vip mobile 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. 2019

		Telekom Srbija	Telenor	Vip mobile
I				
1.	Total number of active sites with mobile telephony base stations	2700	2159	2106
2.	Raw land sites (RL) (freestanding land polls) with base stations	1576	1231	1244
3.	Rooftop sites (RT) (antenna systems on buildings and masts on building) with base stations	1073	879	833
4.	Indoor sites with base stations	42	28	24
5.	RT = indoor sites	9	21	5
II				
6.	ADAS indoor	3	1	2
7.	DAS indoor	44	47	26
8.	ADAS + DAS indoor	4	1	1
III				
9.	GSM base station sites (all frequency ranges)	2113	2105	2095
10.	GSM1800 network base stations	2	8	761
11.	GSM900 network base stations	1941	2052	786
12.	GSM900+GSM1800	170	45	550
IV				
13.	UMTS network base stations	2626	2149	2091
14.	UMTS2100 network base stations	2594	58	2085
15.	UMTS900 network base stations	17	325	4
16.	UMTS900 + UMTS2100 network base stations	15	1766	2
V				
17.	LTE network base stations	2584	2032	2074
18.	LTE800 network base stations	1461	831	842

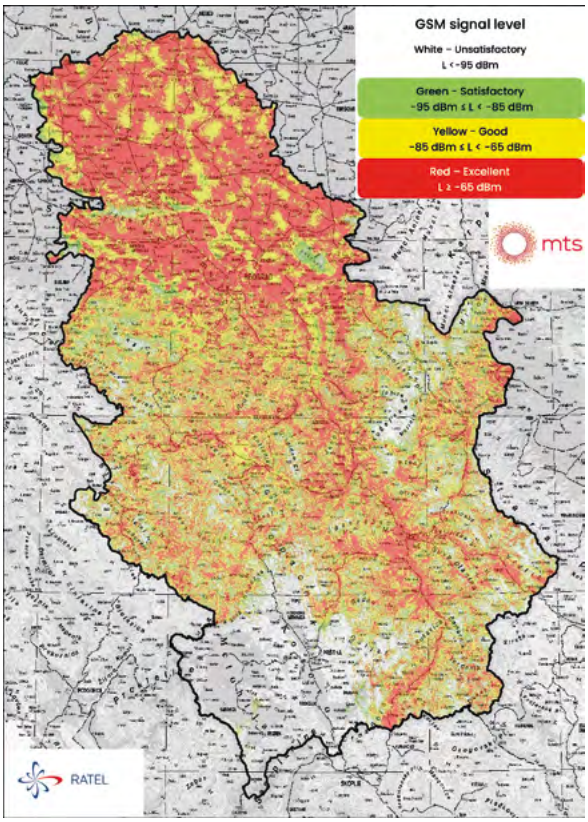
		Telekom Srbija	Telenor	Vip mobile
19.	LTE1800 network base stations	265	50	439
20.	LTE800 + LTE1800 network base stations	858	1151	793
VI				
21.	Indoor repeater sites	593	264	291
22.	Indoor GSM repeater sites	75	4	30
23.	Indoor UMTS repeater sites	275	24	130
24.	Indoor dual repeater sites (GSM + UMTS)	187	209	4
25.	Indoor LTE repeater sites	3	3	0
26.	Indoor dual/triple repeater sites (LTE+GSM/UMTS)	53	24	127
VII				
27.	Outdoor repeater sites (only remote if different from donor)	18	20	0
VIII				
28.	WiFi sites	1229	15	0
29.	Indoor" WiFi sites	438	0	0
30.	OutdoorWiFi sites	545	14	0
31	*Indoor + outdoor WiFi sites*	246	1	0
IX				
32.	GSM900 base radio stations	2111	2118	1336
33.	GSM1800 base radio stations	172	53	1311
34.	UMTS900 base radio stations	32	2102	6
35.	UMTS2100 base radio stations	2608	1859	2087
36.	LTE800 base radio stations	2319	1987	1635

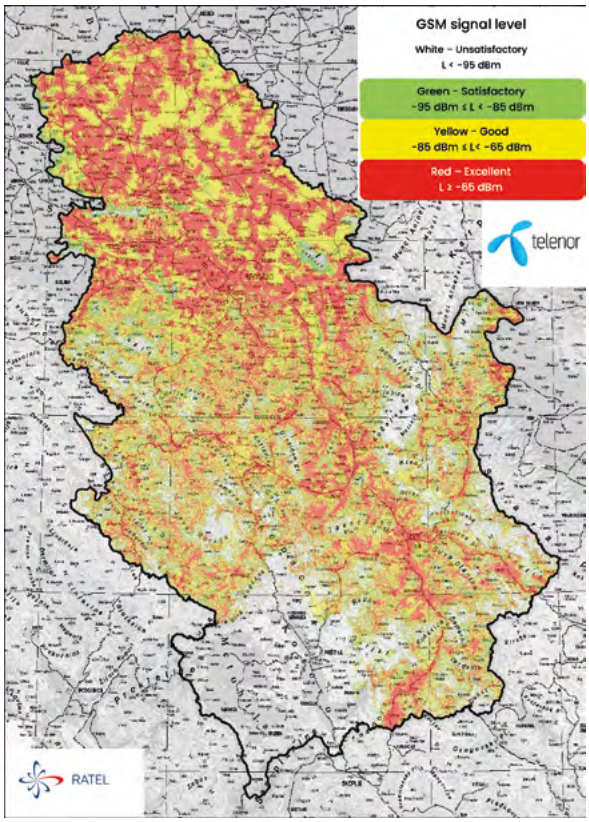
		Telekom Srbija	Telenor	Vip mobile
37.	LTE1800 base radio stations	1123	1221	1232
38.	WiFi AP	2825	15	0
39.	Indoor WiFi AP	1849	1	0
40.	Outdoor WiFi AP	976	14	0
41.	Indoor repeaters	841	301	291
42.	Outdoor repeaters	18	21	0
X				
43	Optic to the base stations	1432	654	540
44	Single microwave connection to optical transmission point	864	834	636
45	Multiple microwave connection to optical transmission point	404	671	930

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

	Telekom Srbija	Telenor	Vip mobajl
Percentage of territory covered by GSM network signal	91.16%	86.40%	88.01%
Percentage of population covered by GSM network signal	99.16%	98.64%	98.91%
Percentage of territory covered by UMTS network signal	76.60%	87.95%	74.94%
Percentage of population covered by UMTS network signal	96.59%	98.88%	96.54%
Percentage of territory covered by LTE network signal	78.99%	72.31%	72.86%
Percentage of population covered by LTE network signal	96.86%	95.89%	95.65%

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





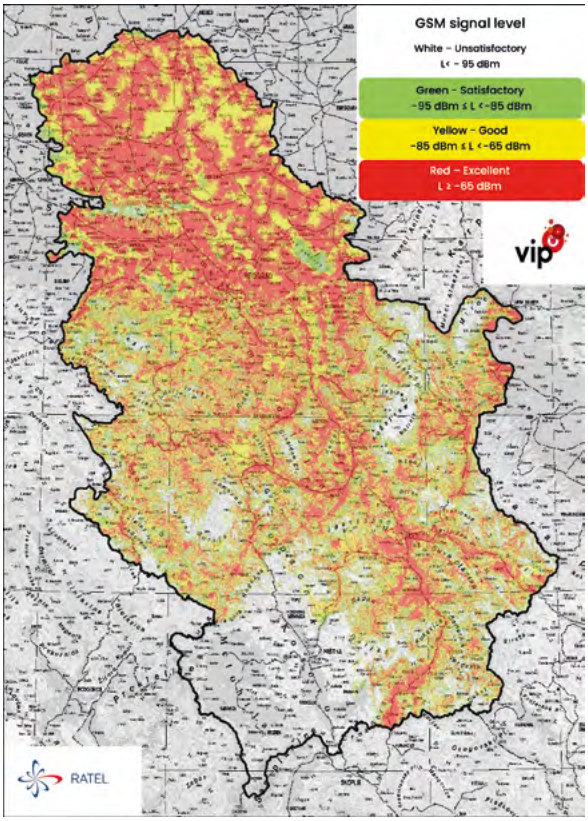
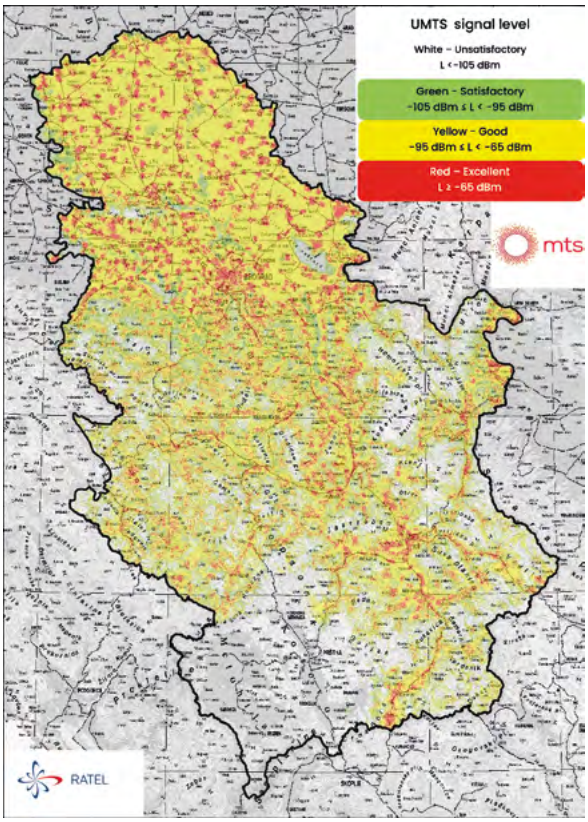
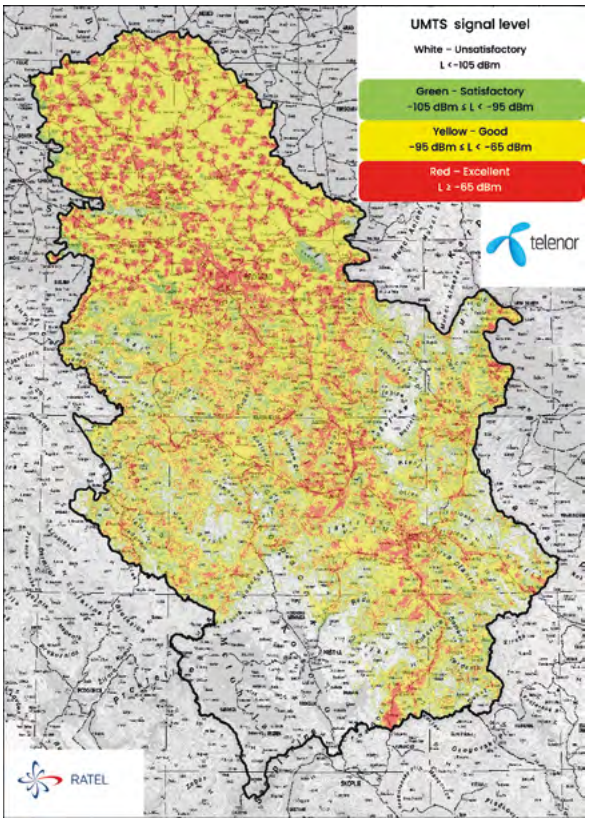


Figure 5.2. Graphic presentation of mobile telephony signal coverage for UMTS technology





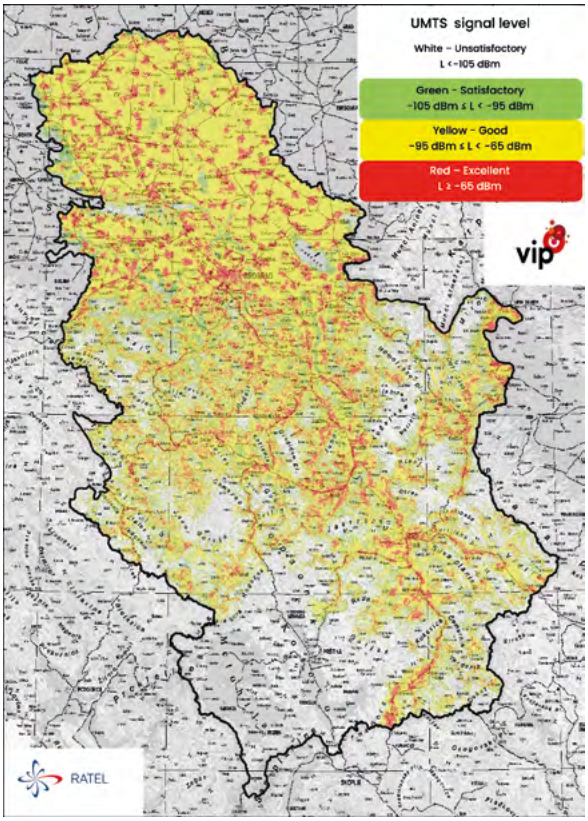
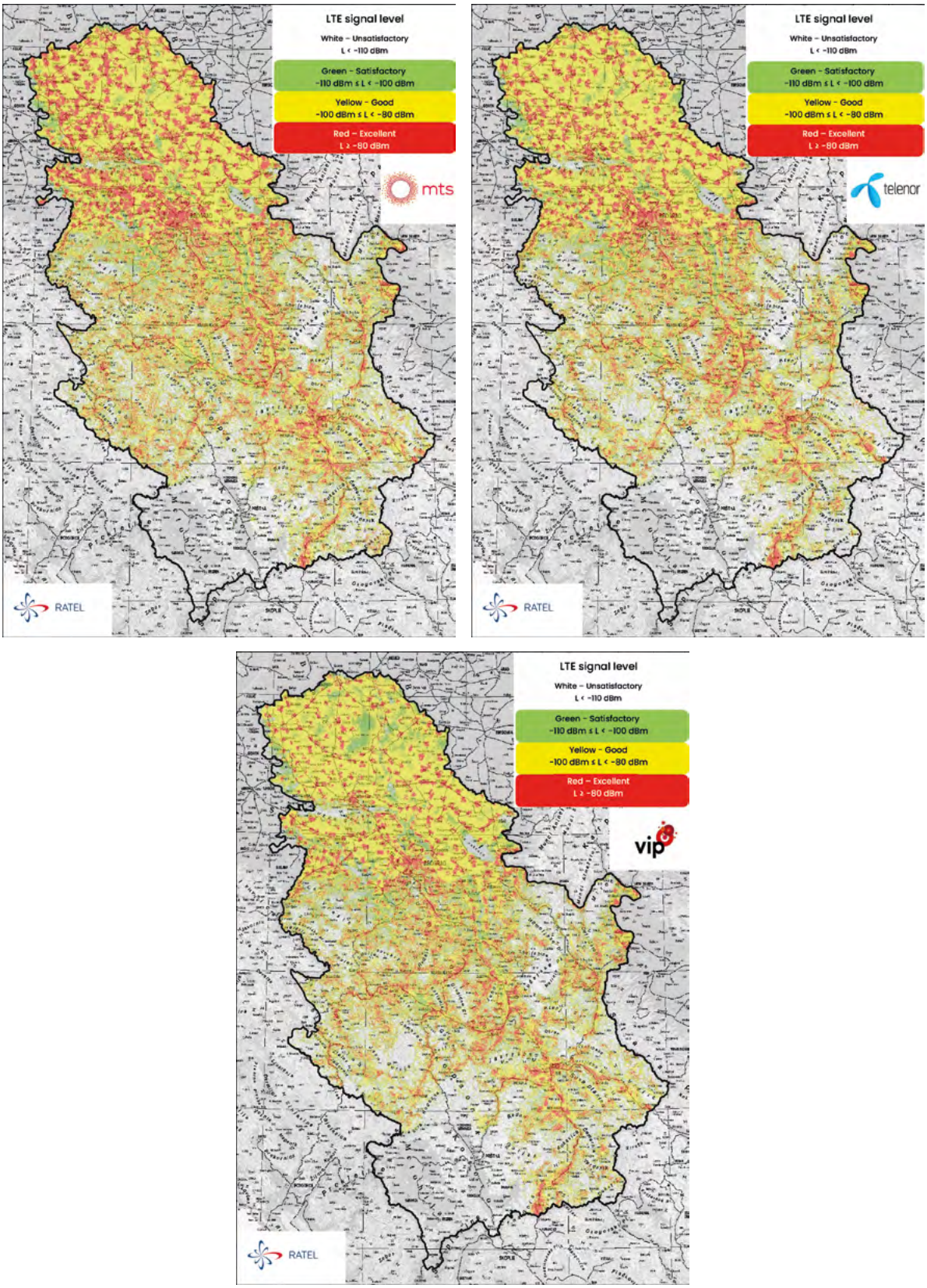
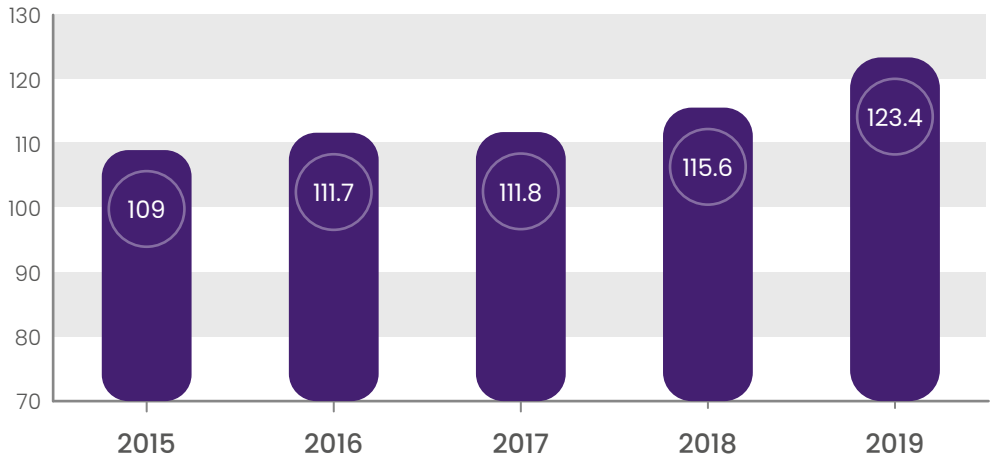


Figure 5.3. Graphic presentation of mobile telephony signal coverage for LTE technology



The revenues from mobile networks in 2019 amounted to around 123.4 billion dinars or 1.05 billion euros. Observed in the national currency (RSD) the revenues increased by 6.7% year on year.

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



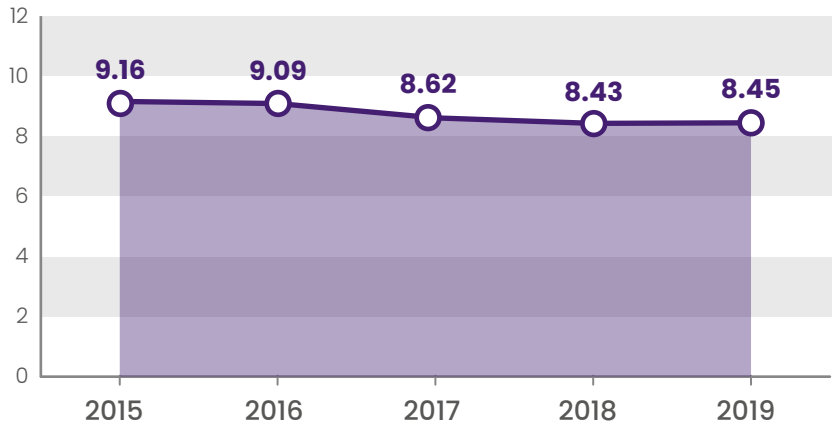
*includes revenues from mobile data traffic, amounting to 6 billion RSD in 2019.
Source: **RATEL**

Investments in this market segment increased by 50% compared with the previous year, amounting to 25.5 billion dinars.

The total number of mobile users increased by 0.3% year on year, amounting to 8,453,887 at the end of 2019. This slight increase in the total number of users in 2019 is a result of the rise in the number of postpaid users, which is sufficient to make up the drop in the number of prepaid users.

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

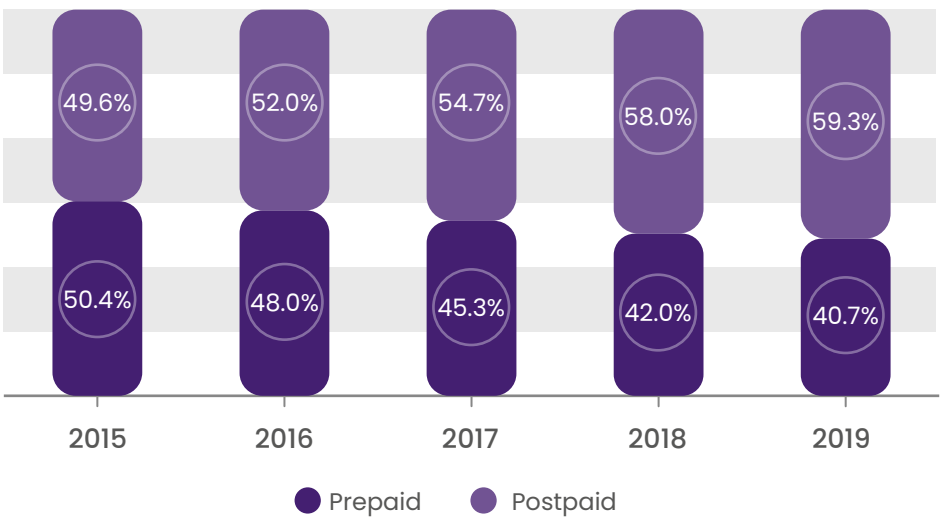
Figure 5.5. Total number of active mobile telephony users (million)



Source: **RATEL**

The total number of users involves postpaid and prepaid users active in the last three months of a particular year. Distribution between prepaid and postpaid users is given in Figure 5.6. In 2016 the number of postpaid users is higher than the number of prepaid users and the trend continued in 2017, 2018 and 2019. Number of postpaid users reached a 59.3% share in 2019.

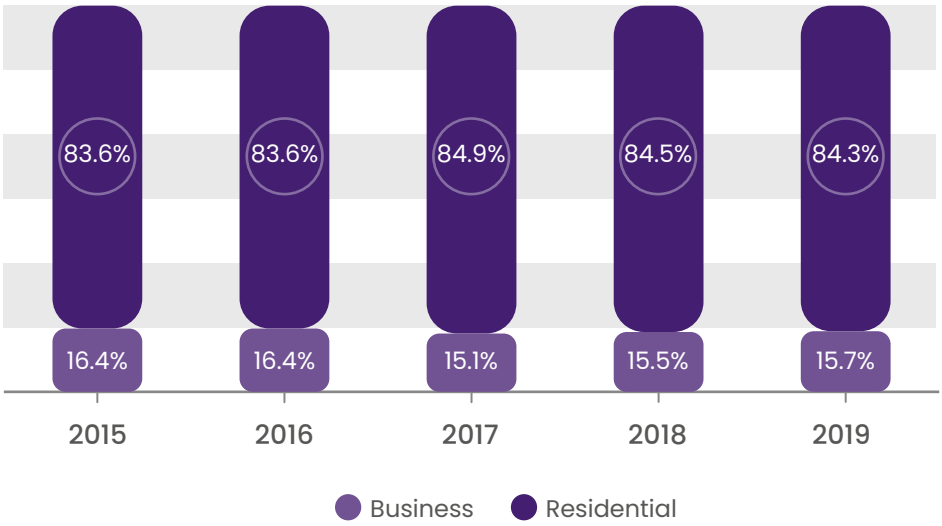
Figure 5.6. Prepaid/postpaid users ratio



Source: **RATEL**

Residential and business ratio is given in Figure 5.7. Residential users are dominant in user structure over the years. In 2019 the share of residential users in the total number of users was 84.3%.

Figure 5.7. Residential/business users ratio

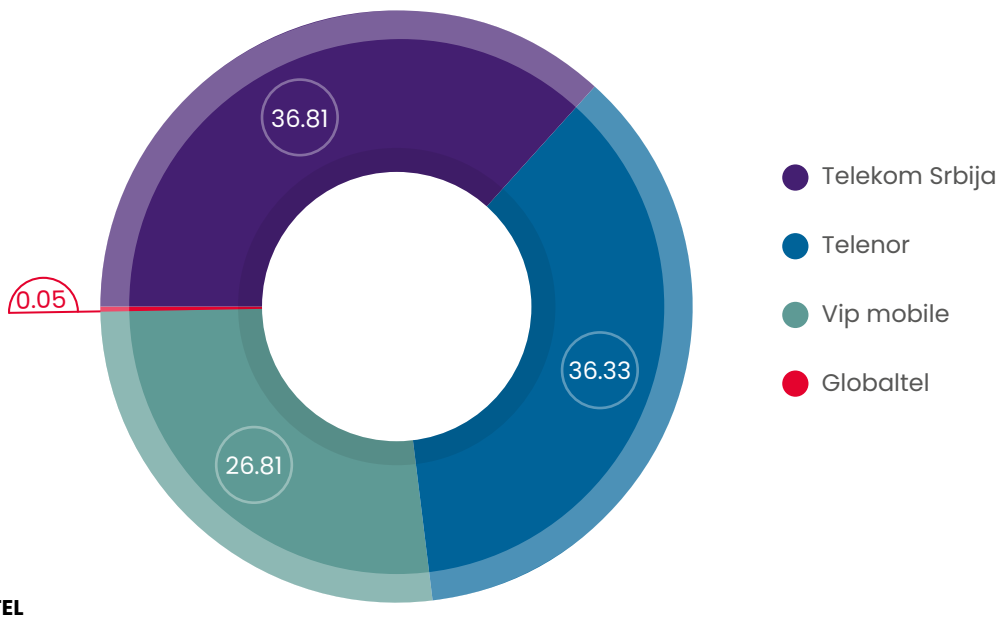


Source: **RATEL**

The number of mobile network users is again higher than the number of inhabitants in 2019, the mobile penetration rate being 121.4%, which means that some users are using more than one SIM card.

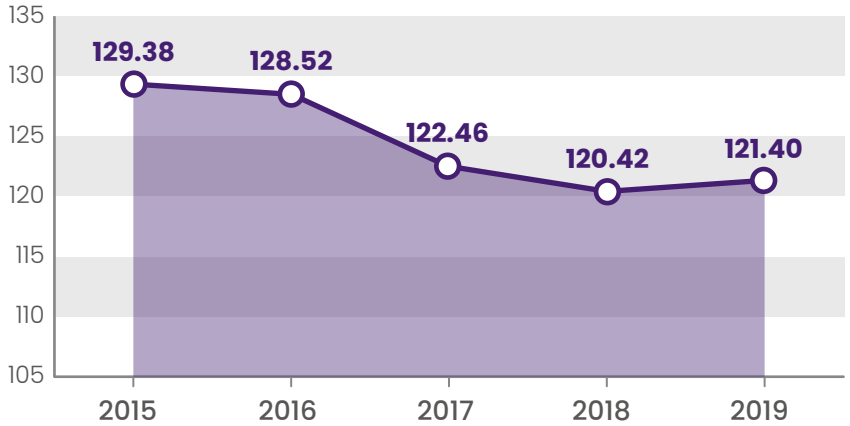
Based on the available data, Figures 5.8-5.13 show the market share of mobile operators and MVO in the total number of users, outgoing traffic, number of sent SMS and MMS messages and data transmission volume.

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



Source: **RATEL**

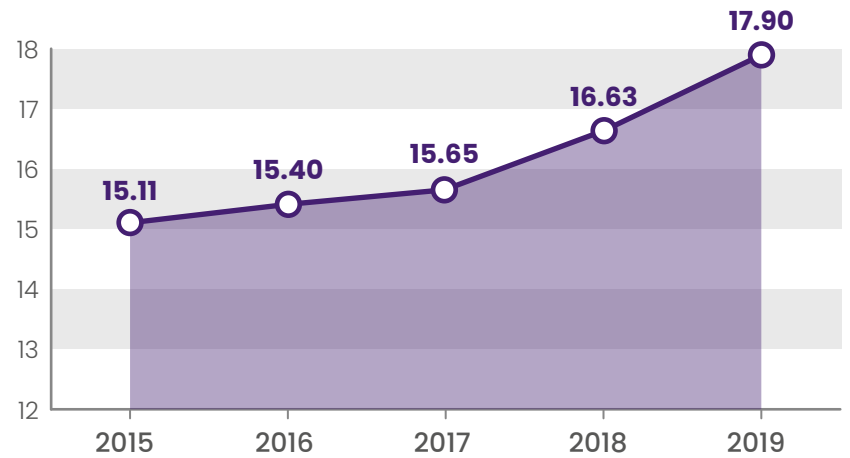
Figure 5.9. Mobile penetration rate



Source: **RATEL**

The minutes of calls made from mobile networks have been constantly increasing year after year. In 2019, the total outgoing traffic on the mobile network amounted to 17.90 billion minutes, which is an increase of 7.6% compared with the previous year when it amounted to 16.63 billion minutes. The annual average of traffic per user in 2019 was 2.118 minutes or approximately 5 minutes and 48 seconds a day.

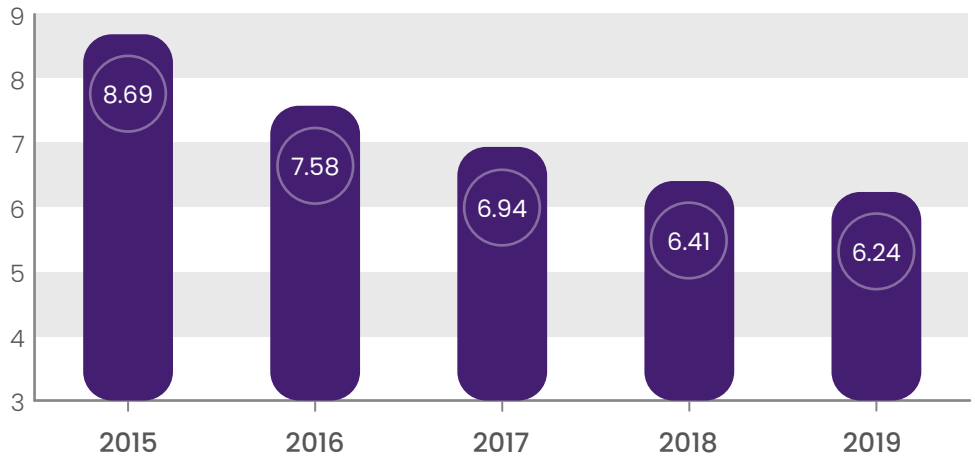
Figure 5.10. Total outgoing traffic (billion minutes)



Source: **RATEL**

The number of sent text messages continued to decrease. In 2019, the total of 6.24 billion SMS messages were sent, which is a decrease by 2.7% compared with 2018 when 6.41 billion SMS messages were sent. The average number of text messages sent in 2019 per user was 738, or 2 SMS messages a day. In 2019, residential users accounted for 89.1% of SMS messages.

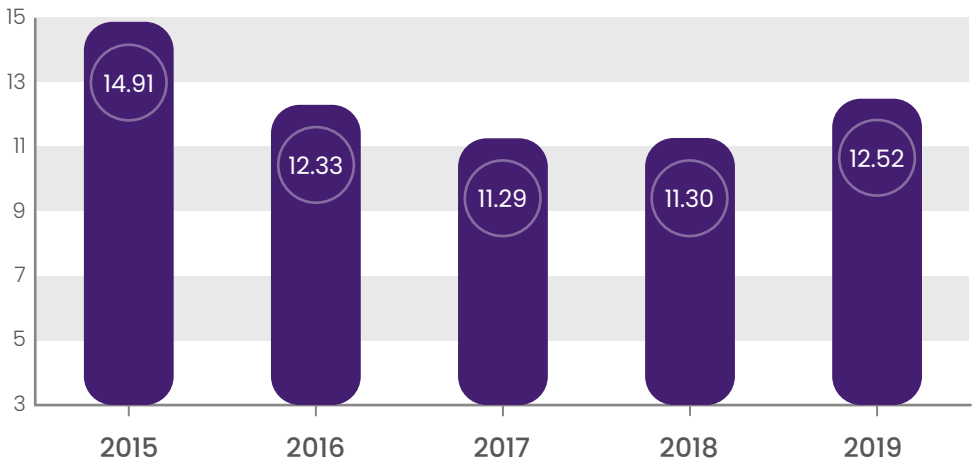
Figure 5.11. Number of sent text (SMS) messages (billion)



Source: **RATEL**

Unlike the previous years, the number of MMS messages showed an increase for a second year in a row. In 2019, 12.52 million MMS messages were sent, which is a 10.8% increase in respect to 2018. In 2019, residential users accounted for 86.1% of MMS messages..

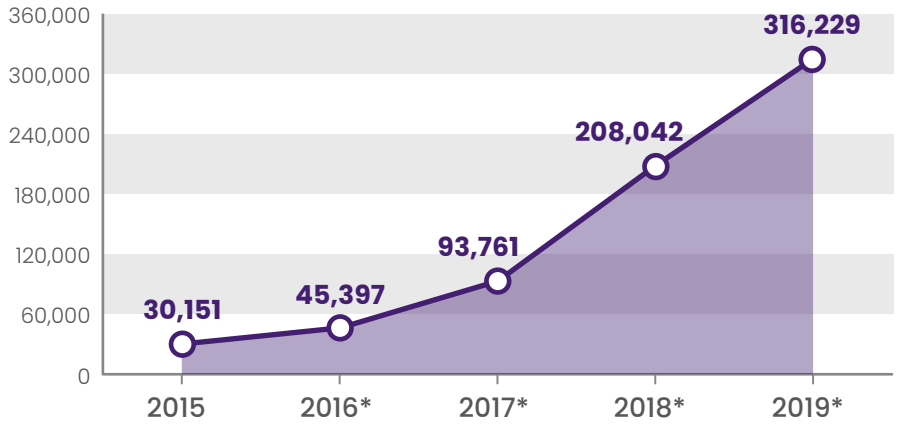
Figure 5.12. Number of MMS messages sent (million)



Source: **RATEL**

Data traffic has been constantly growing during the observed period (Figure 5.13). During the analysed five-year period, the average annual growth rate of the transmitted data was around 60%.

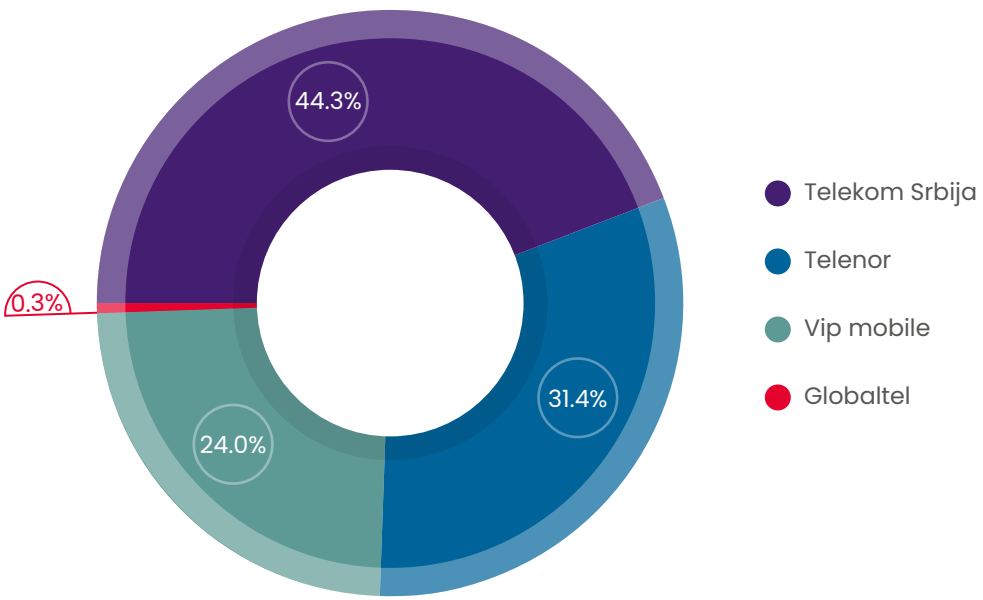
Figure 5.13. Data traffic in TB (GPRS+UMTS+LTE)



*As of 2016 data traffic over LTE network is also included.
Source: **RATEL**

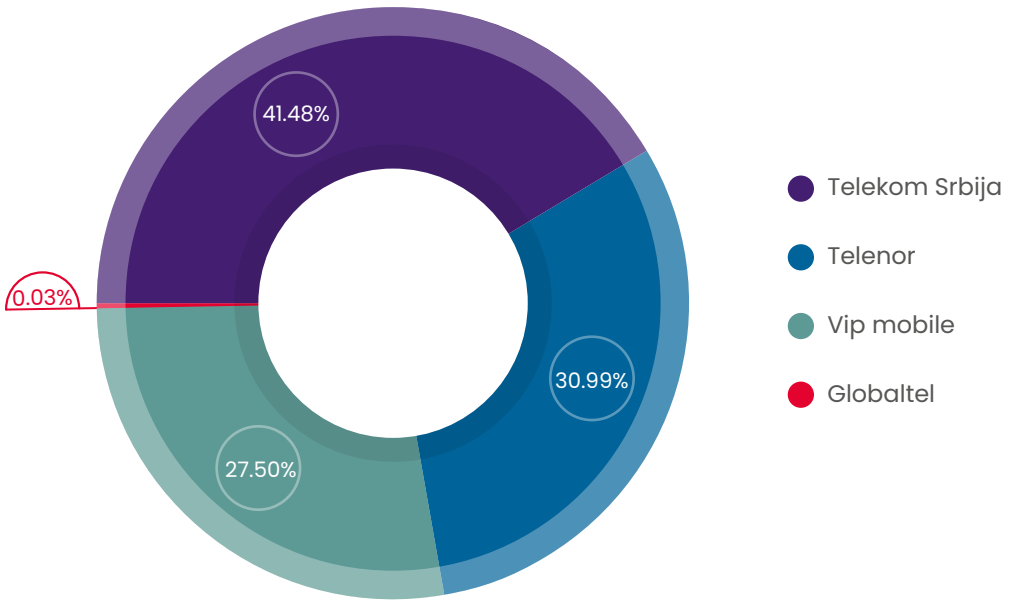
Figures 5.14– 5.18 show market share of the mobile operators and MVOs in terms of total number of users, outgoing traffic, number of text and multimedia messages (SMS and MMS) sent and the volume of data traffic made.

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



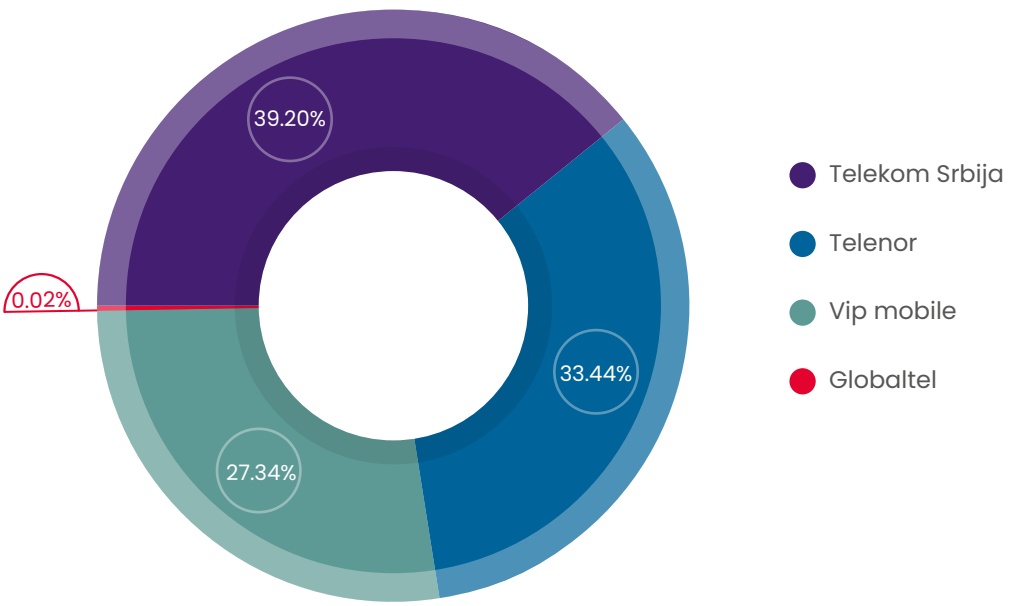
Source: **RATEL**

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



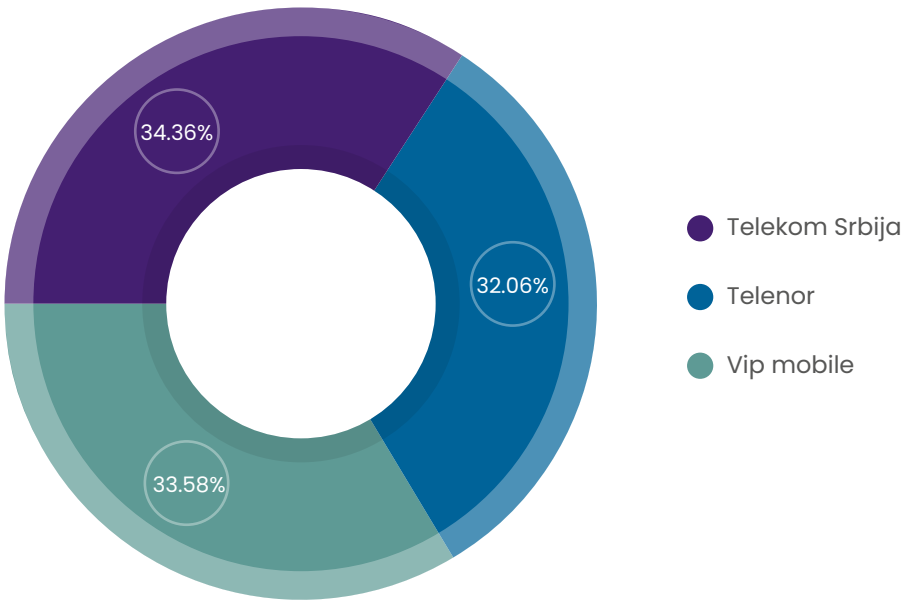
Source: **RATEL**

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



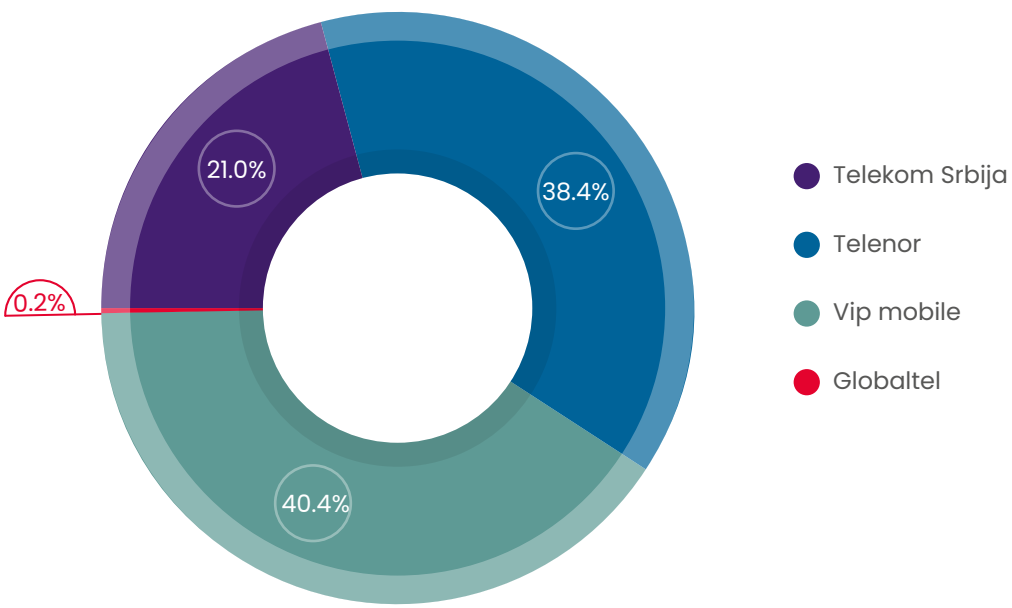
Source: **RATEL**

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



Source: **RATEL**

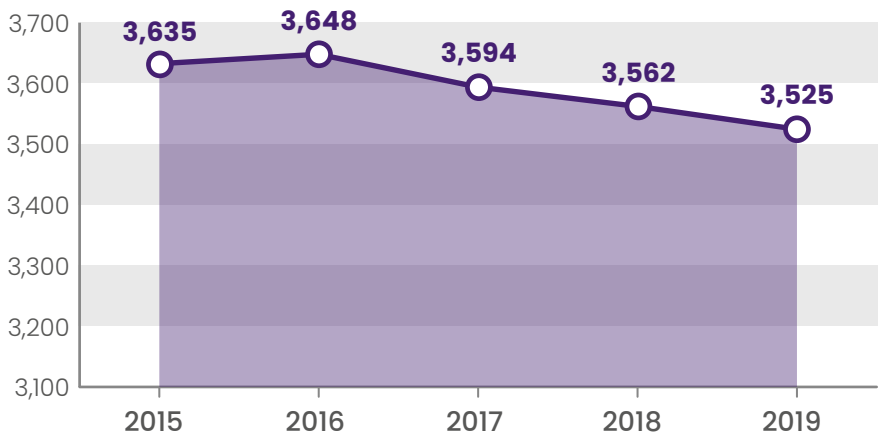
Figure 5.18. Share in data traffic (GPRS+UMTS+LTE) (%)



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

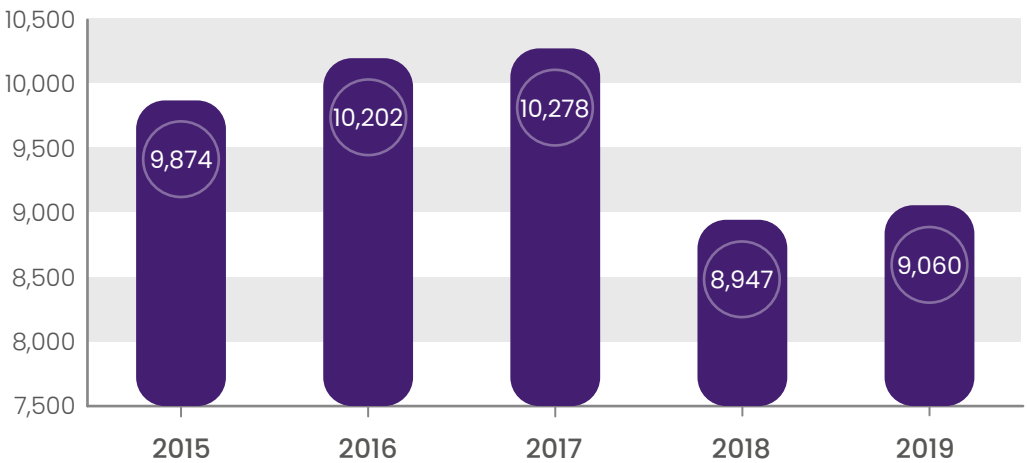


Source: **RATEL**

The value of HHI for 2019 was the lowest in the last five years, indicating a lower market concentration and increase in the level of competition.

The average number of ported mobile numbers increased by 1.3% in respect to the previous year, with an average number of 9.060 ported numbers per month in 2019.

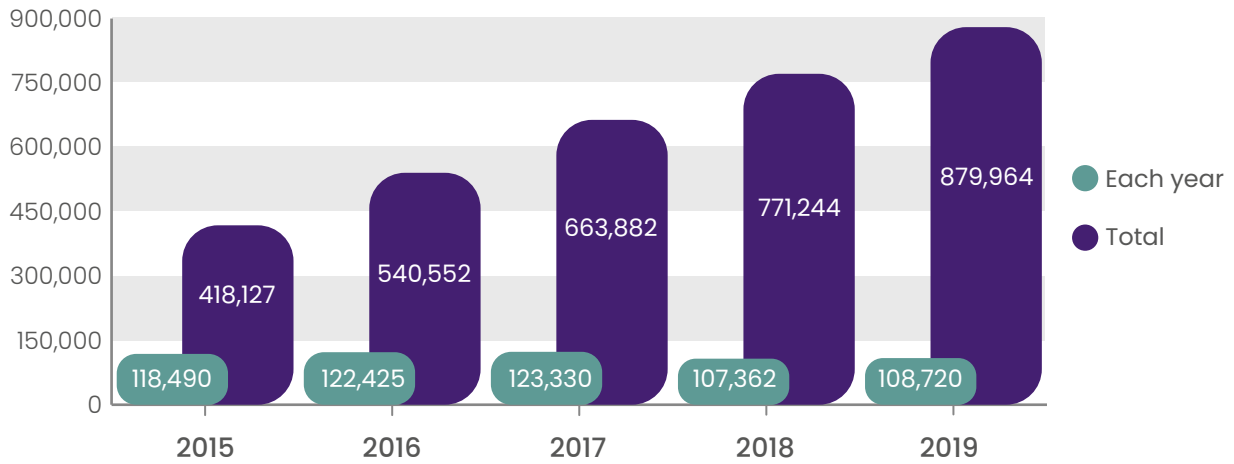
Figure 5.20. Average number of portings on mobile network a month for each year



Source: **RATEL**

In 2019 there were around 108,720 number portings on mobile networks, thus reaching the total of 879,964 portings made since the beginning of number portability service.

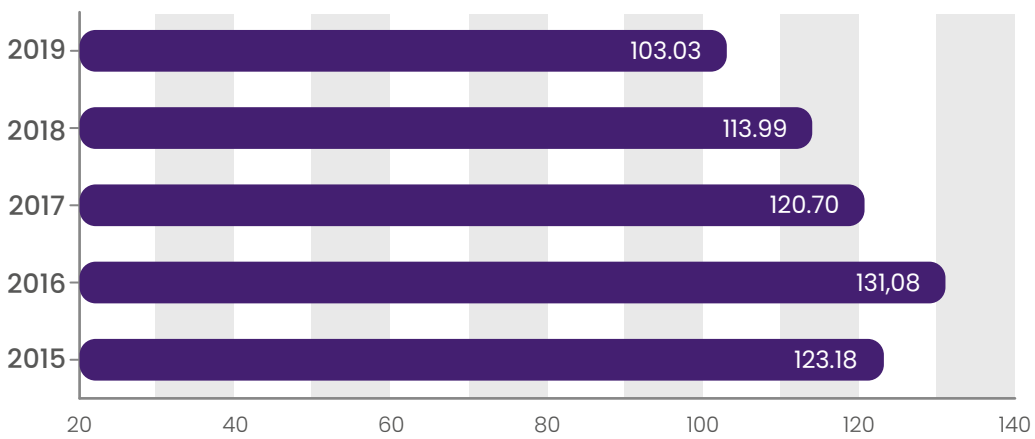
Figure 5.21. Number of portings on mobile network each year and in total



Source: **RATEL**

In addition to national traffic, the users also use roaming traffic abroad. Voice traffic abroad has been growing until 2016, in the past three years there was a drop, mainly due to the use of VoIP applications.

Figure 5.22. Number of roaming minutes (million)

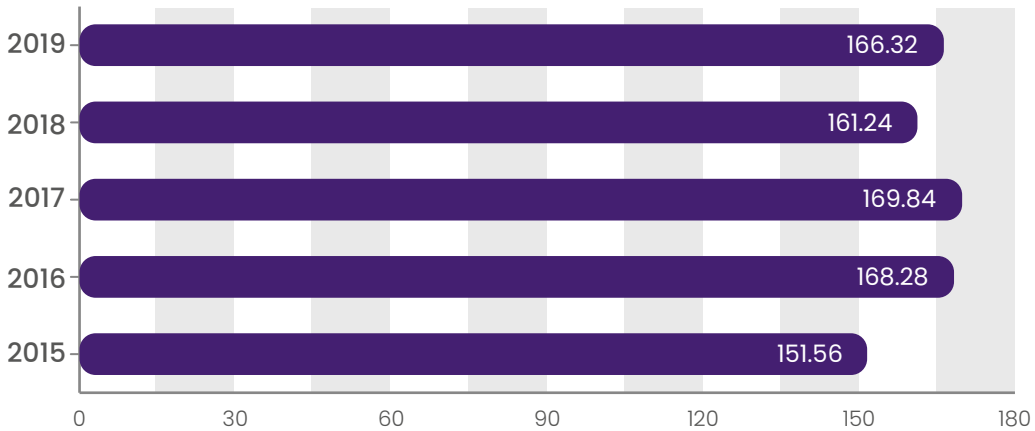


Source: **RATEL**

In addition to voice traffic, the users also use mobile internet abroad and according to the available data for 2019, there were 1,795 TB of roaming mobile internet traffic made. In addition, 43 million text (SMS) messages were sent.

Beside the users of the national networks, the traffic in the territory of Serbia generated by foreign network subscribers has been showing an increase in voice service usage over the past years, with the exception of a slight drop in 2018, while in 2019 the growth trend is back.

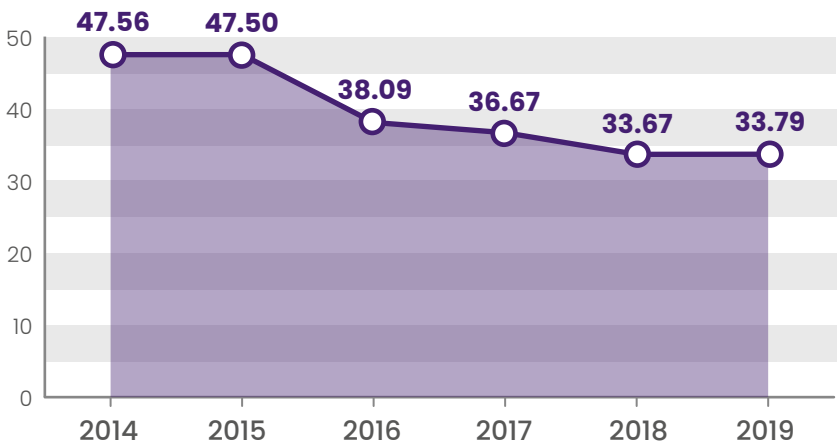
Figure 5.23. Number of roaming minutes made by foreign subscribers (million)



Source: **RATEL**

The revenues made from roaming, which include revenues made from outbound roaming and revenues made from inbound roaming, that have been dropping for three years showed a slight increase in 2019.

Figure 5.24. Roaming revenues (mil. EUR)



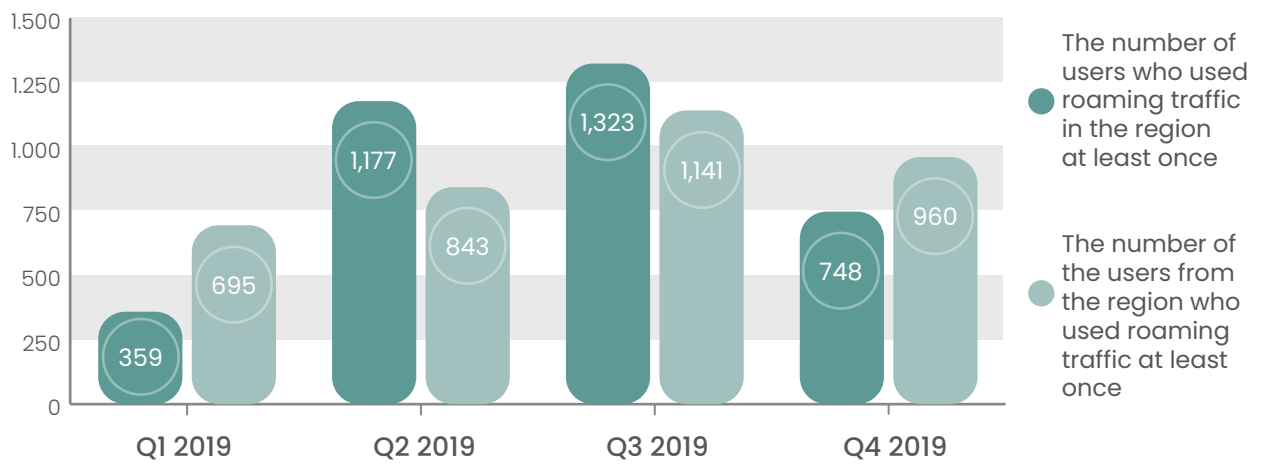
Source: **RATEL**

6 REGIONAL ROAMING

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 is to last 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 that in the third quarter, during the holiday season, mobile operators' service users travelled to the region and used roaming services more than the visiting users from the region. Also, during the second quarter a significant number of users using roaming in the region was noted, higher than the number of the visitors from the region. During other quarters, the situation is opposite.

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)



Source: **RATEL**

Comparative data for all four quarters of 2019 are given below.

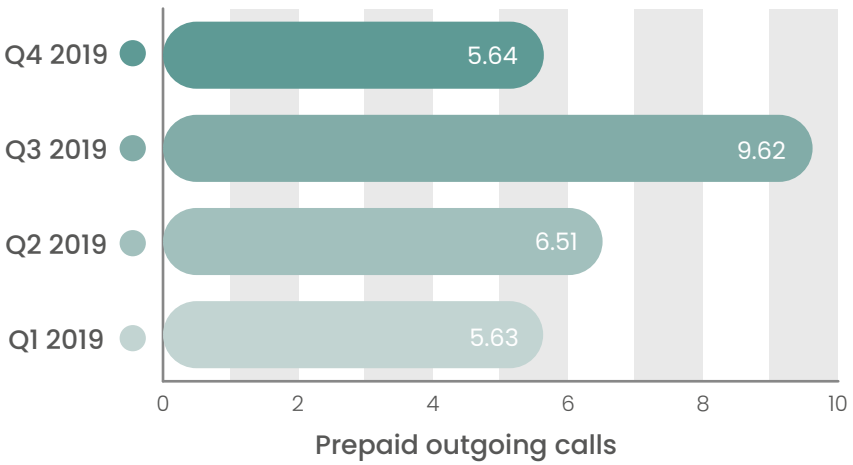
The overview shows the trend of the traffic made from the regulated retail roaming services by mobile operators' service users going to the region.

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 second quarter. The traffic trend is in line with the trend of the number of users in roaming.

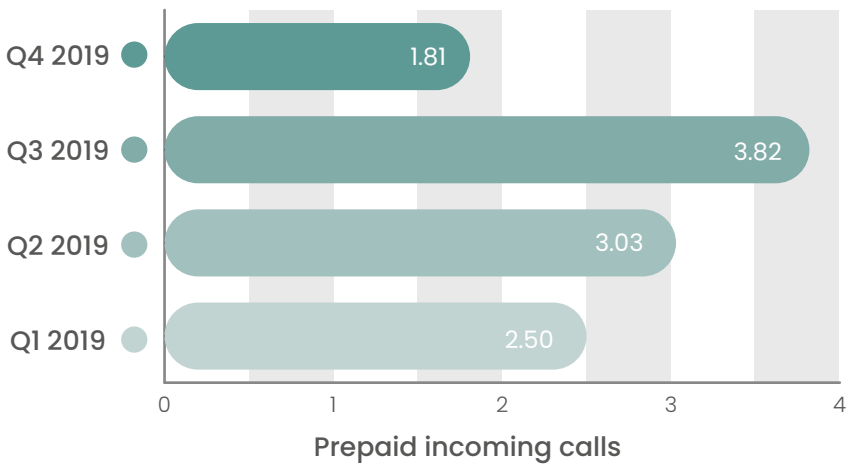
The data on voice service show that prepaid users generate more outgoing calls minutes compared to incoming calls, which indicates active usage of roaming voice services during all four quarters in 2019 (Figures 6.2 and 6.3)

Figure 6.2. Roaming outgoing calls made by prepaid users in the region (million minutes)



Source: **RATEL**

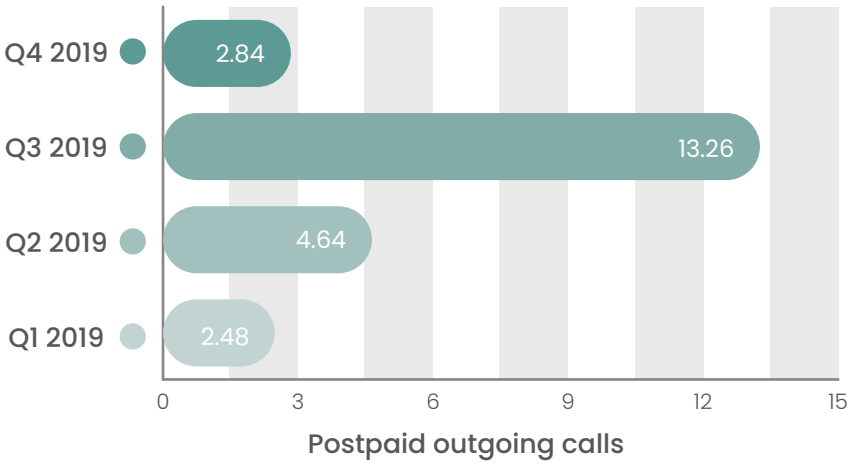
Figure 6.3. Roaming incoming calls made by prepaid users in the region (million minutes)



Source: **RATEL**

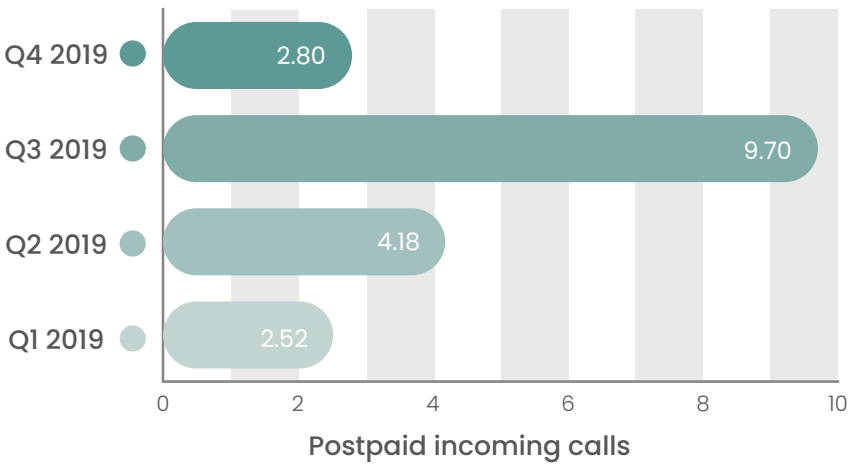
Comparable quarterly data show that postpaid users are actively using roaming voice services, meaning that they generate more outgoing calls minutes compared to incoming calls during three observed quarters of 2019, with the exception of the first quarter when incoming calls were slightly prevailing (Figures 6.4 and 6.5).

Figure 6.4. Roaming outgoing calls made by postpaid users in the region (million minutes)



Source: **RATEL**

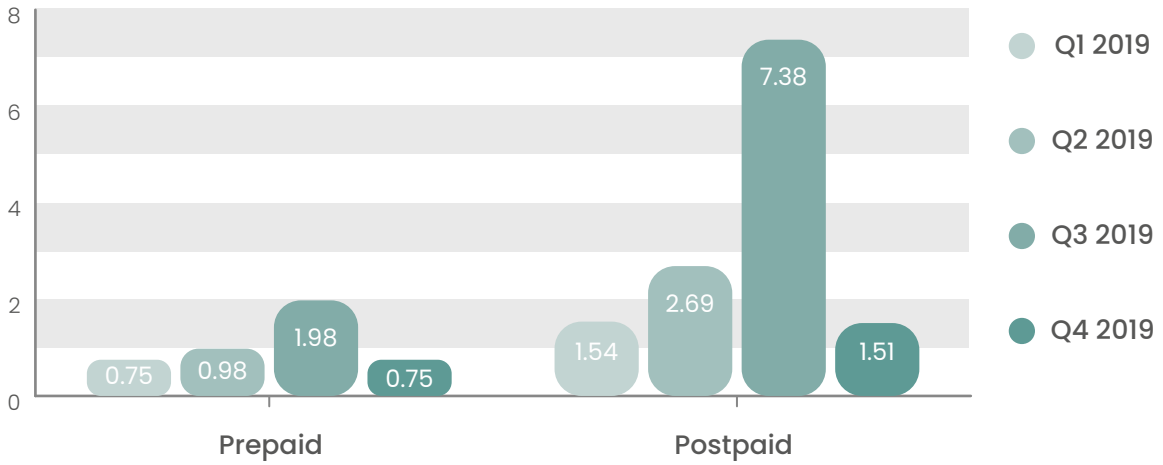
Figure 6.5. Roaming incoming calls made by postpaid users in the region (million minutes)



Source: **RATEL**

The data show that postpaid users send more text messages (SMS) in roaming than the prepaid users, because more postpaid users are using roaming than the prepaid ones (Figure 6.6).

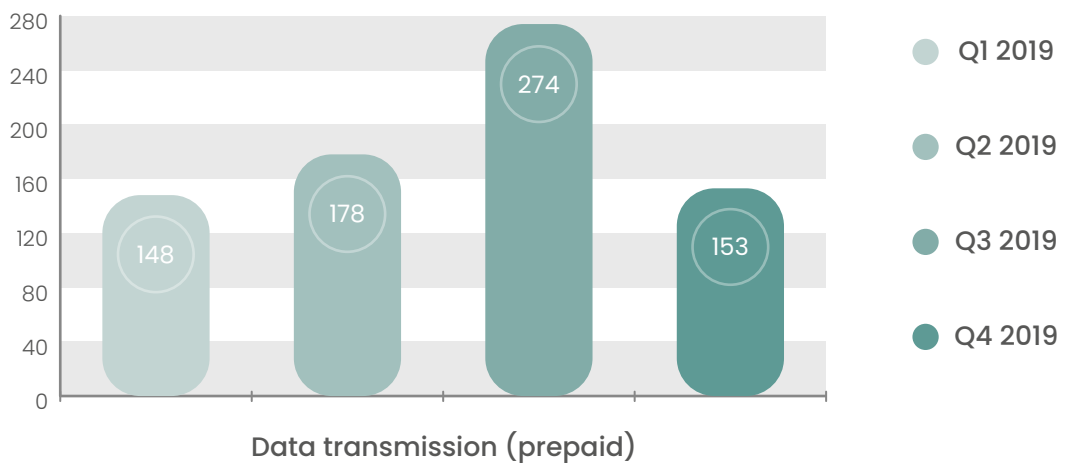
Figure 6.6. Number of roaming SMS messages in the region (million)



Source: **RATEL**

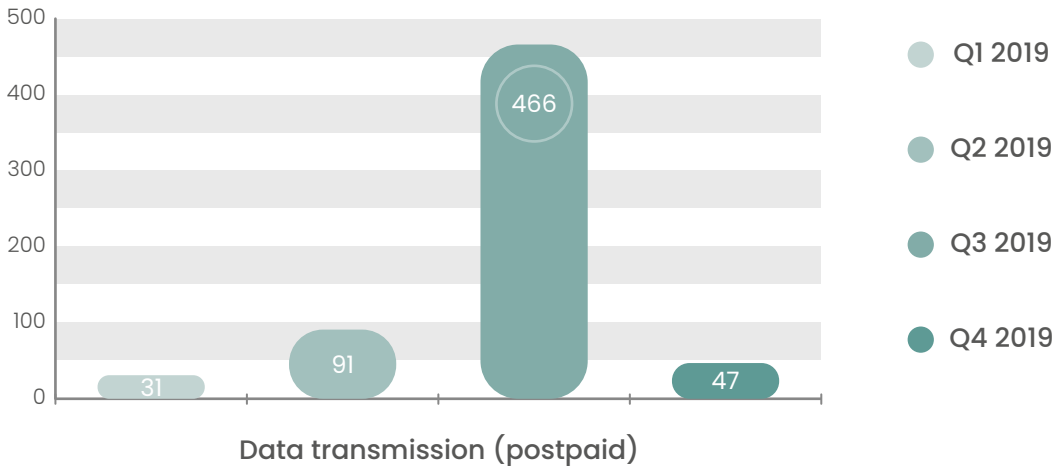
Roaming data transmission is a service also used the most during the third quarter, and the second quarter of 2019, which is in line with the trend followed by both groups of users, observed according to the comparative quarterly data (Figures 6.7. and 6.8).

Figure 6.7. Roaming data traffic made in the region - prepaid (TB)



Source: **RATEL**

Figure 6.8. Roaming data traffic made in the region - postpaid (TB)

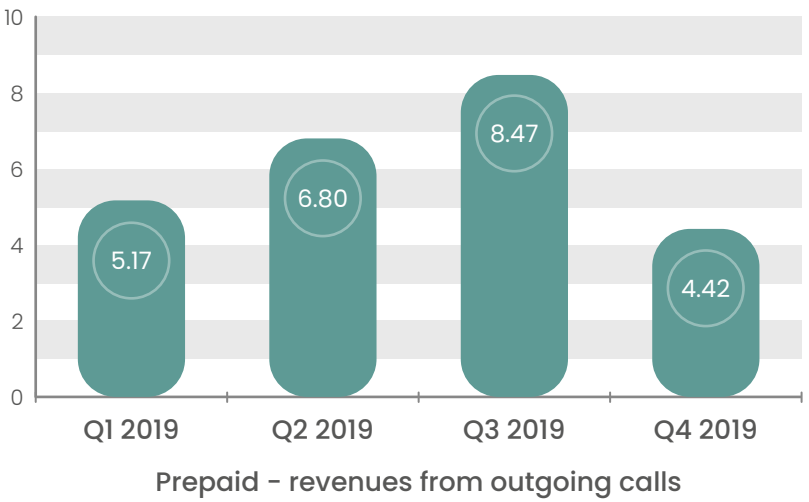


Source: **RATEL**

The data illustrating the trend of revenues made from roaming do not include the revenues made from tariff add-ons.

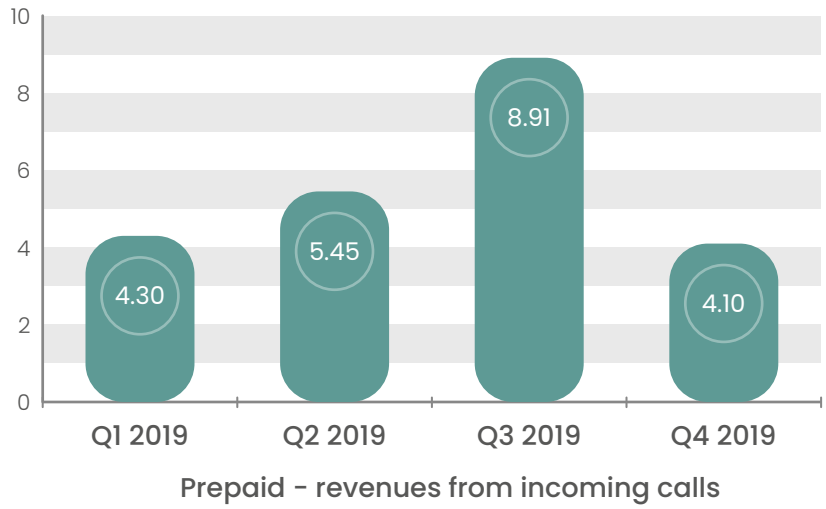
The revenues made from outgoing roaming calls provided to prepaid users in the region are higher than the revenues made from incoming roaming calls, as given in Figures 6.9. and 6.10. In Q4 2019, the lowest revenues were made from outgoing and incoming calls.

Figure 6.9. Revenues made from outgoing roaming calls provided to prepaid users in the region (mil. RSD)



Source: **RATEL**

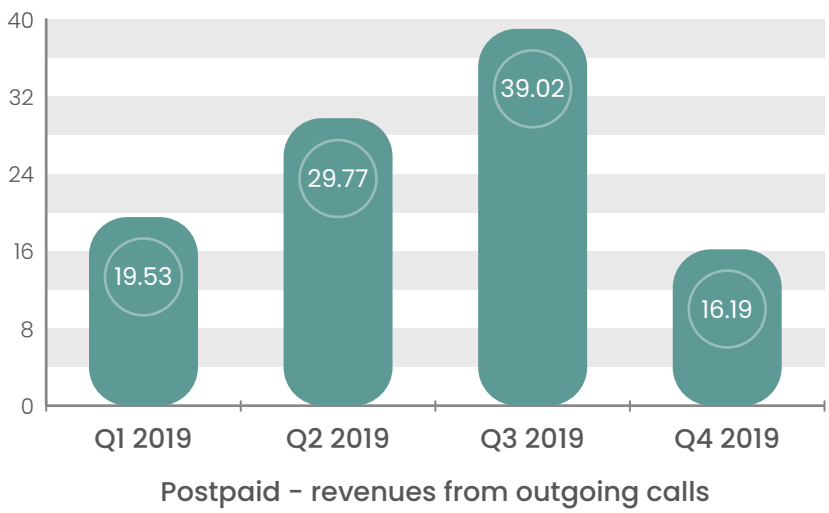
Figure 6.10. Revenues made from incoming roaming calls provided to prepaid users in the region (mil. RSD)



Source: **RATEL**

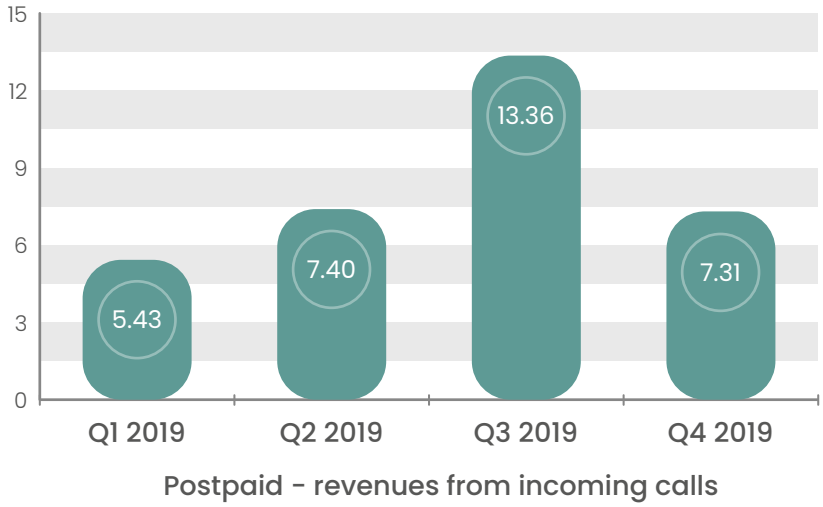
The revenues made from outgoing roaming calls provided to postpaid users in the region are much higher than the revenues made from the incoming roaming calls in all four quarters of 2019, as given in Figures 6.11. and 6.12.

Figure 6.11. Revenues made from outgoing roaming calls provided to postpaid users in the region (mil. RSD)



Source: **RATEL**

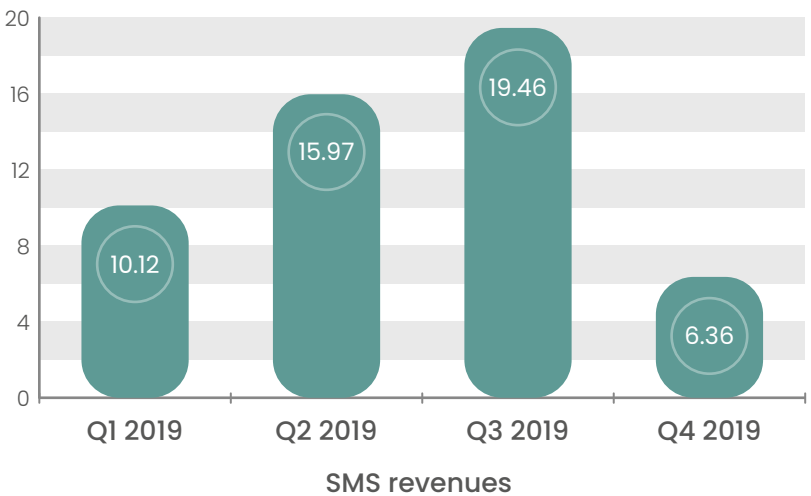
Figure 6.12. Revenues made from incoming roaming calls provided to postpaid users in the region (mil. RSD)



Source: **RATEL**

Revenues made from SMS roaming were highest in Q3 2019, during the holiday season when people travel more to the region (Figure 6.13).

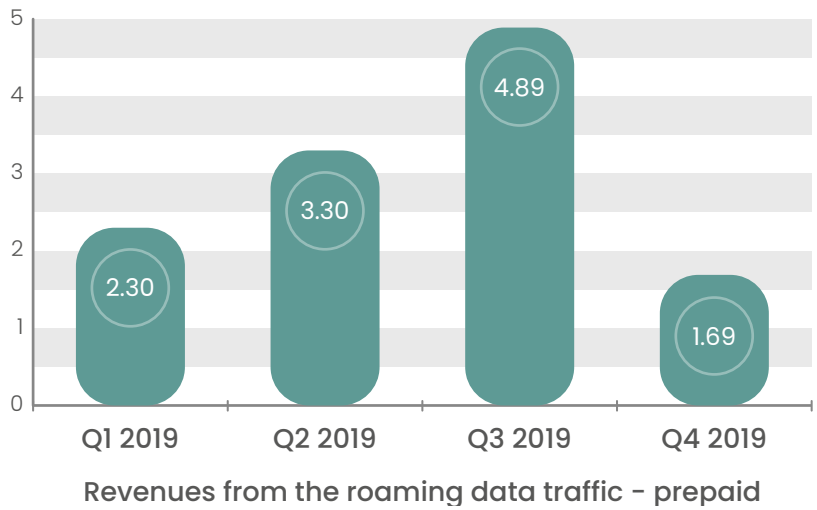
Figure 6.13. Revenues made from SMS roaming in the region (mil. RSD)



Source: **RATEL**

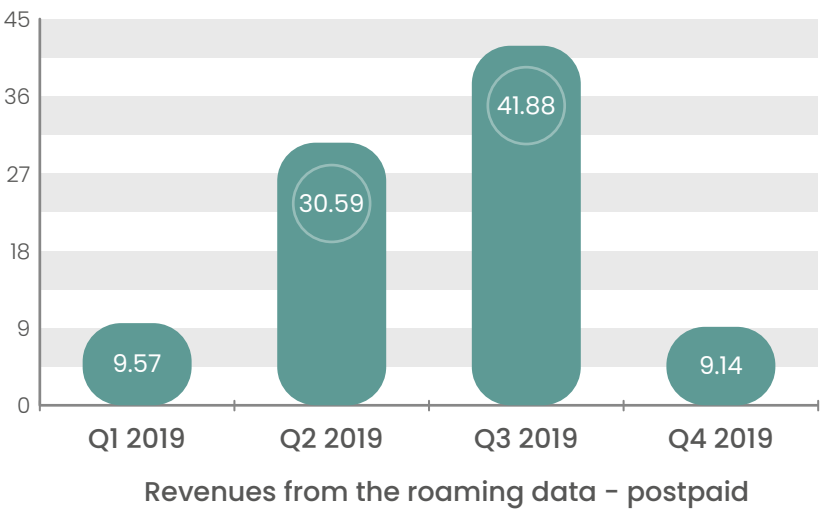
The revenues made from data roaming made by postpaid users in the region are significantly higher in all four quarters of 2019, compared to the revenues made from data roaming provided to prepaid users. Data roaming was most used during Q3 2019 and the revenues made from providing the service to postpaid users were 10 times 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)



Source: **RATEL**

Figure 6.15. Revenues made from the roaming data in the region - postpaid (mil. RSD)



Source: **RATEL**

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.

7 BROADBAND INTERNET SERVICES

The broadband market in Serbia has been experiencing a significant growth for years, which continued to in 2019. 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.

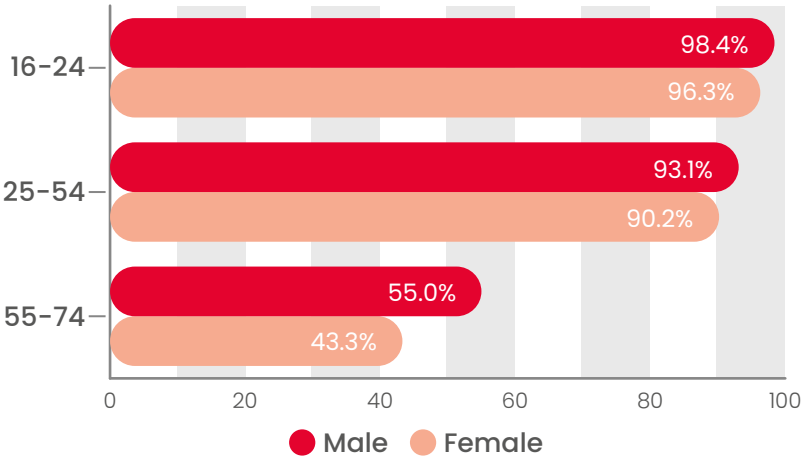
According to the survey on ICT usage by individuals, households and business, carried out in 2019 by the national Statistical Office on the sample of 2,800 households and 2,800 individuals, the number of Internet users increased slightly compared to the previous year by 4.8%, eight out of ten persons in Serbia have used the Internet in first quarter of 2019[6].

The Internet was used most by the youngest population (16 – 24 years) and it is equally used by male and female population. In 2019, the share of respondents from younger population who have an account on the social networks, such as Facebook and Twitter, slightly increased, amounting to 94.8%.

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.

6 Data taken from the publication "Usage of information and communication technologies in the Republic of Serbia, 2019", Statistical Office of the Republic of Serbia, based on research from March 2019.

Figure 7.1. Internet users by gender and age

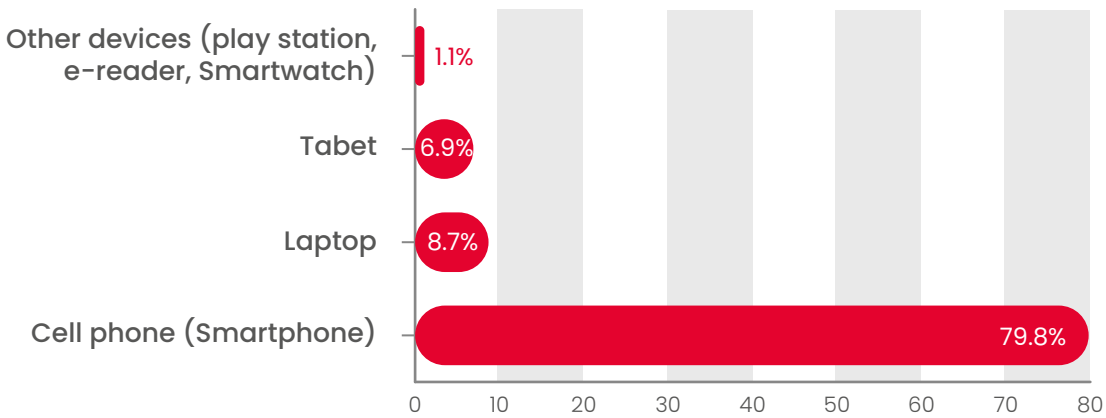


Source: **Statistical Office of the Republic of Serbia**

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 for 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.

79.8% of the respondents use a Smartphone for Internet access outside home or work, which is particularly characteristic for the youngest population (16-24 years old) since more than 93% of them are using Smartphone for the Internet access (Figure 7.2).

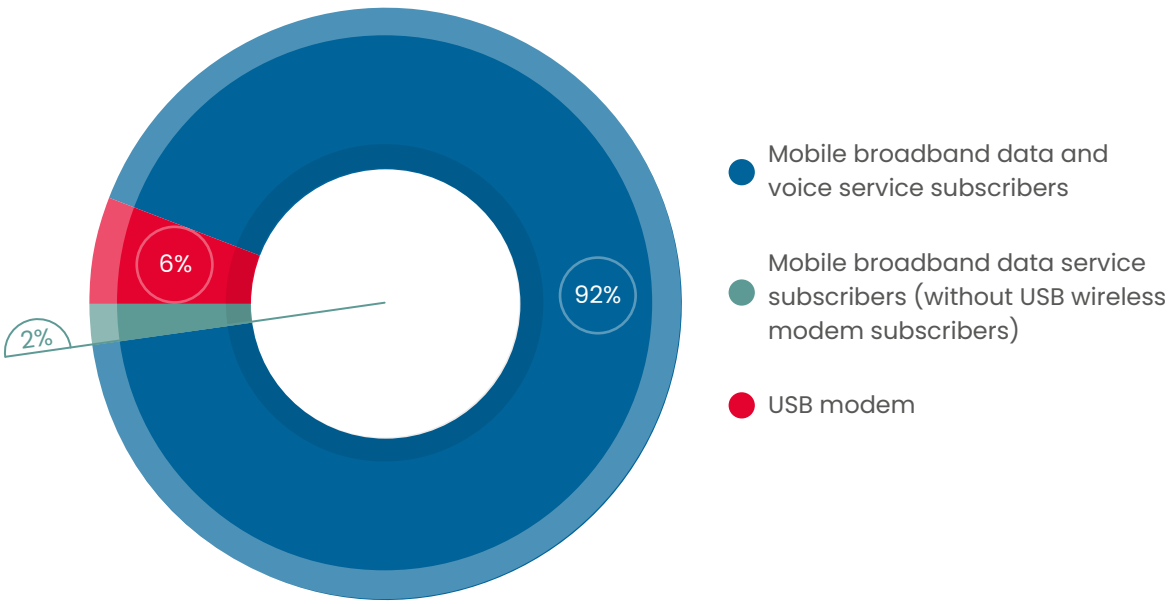
Figure 7.2. Mobile devices used for Internet access outside home/work



Source: **Statistical Office of the Republic of Serbia**

The growing usage of mobile phones for the Internet access is reflected in the constant rise of the users of the mobile Internet service, provided in 2019 by three mobile operators: Telekom Srbija, Telenor and Vip mobile and one virtual mobile operator - Globaltel.

Figure 7.3. Mobile broadband users structure

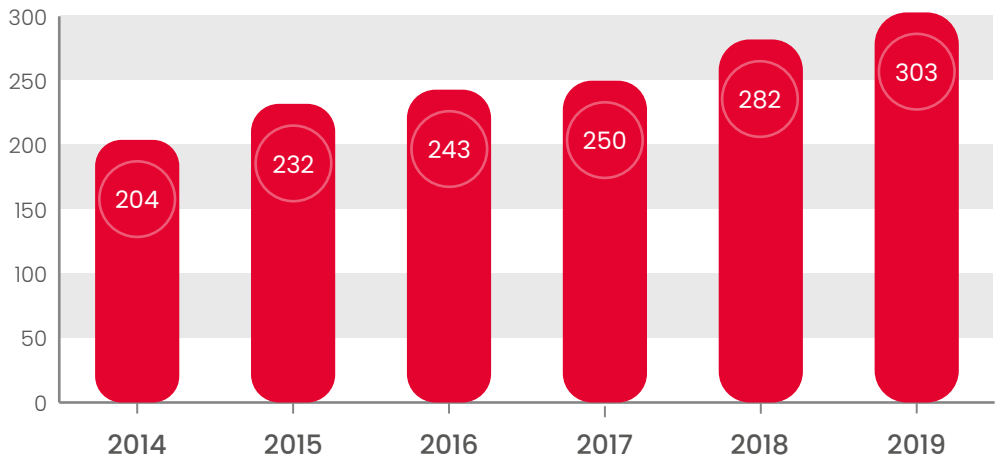


Source: **RATEL**

The total number of active mobile broadband users in 2019 was 6.3 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 2018. This is an 8.6% increase compared to 2018 when the number of active broadband users was around 5.8 million. Data show that the number of subscribers who purchased mobile broadband Internet services independently of voice services doubled compared to the previous year.

The number of M2M subscriptions increased as well, amounting to 303 thousand in 2019, which is by 7.4% more than in the previous year.

Figure 7.4. Number of M2M subscriptions (thousand)

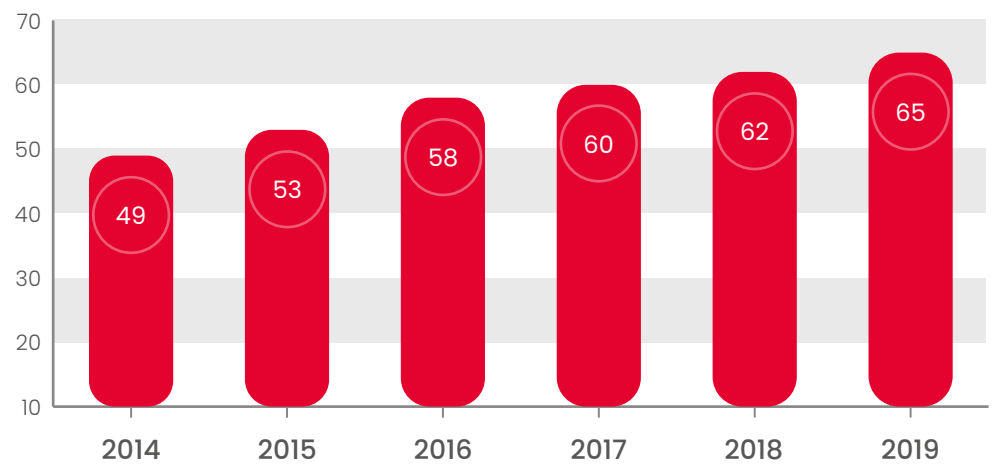


Source: **RATEL**

The number of users resulted in the increase in the traffic volume increased by 1.5 times compared with the previous year, amounting to almost 332 million GB on an annual level in 2019 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 1,599 dinars.

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

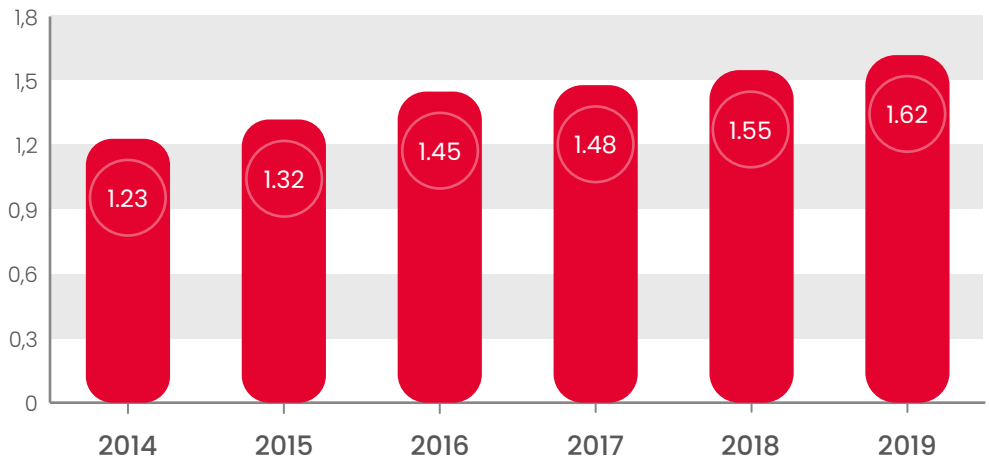


Source: **RATEL**

In 2019, sixty-five out of one hundred households (65.3%) had fixed broadband.

The total number of fixed broadband subscribers in 2019 was 1.62 million, which is a 4.5% increase compared with the previous year (Figure 7.6).

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

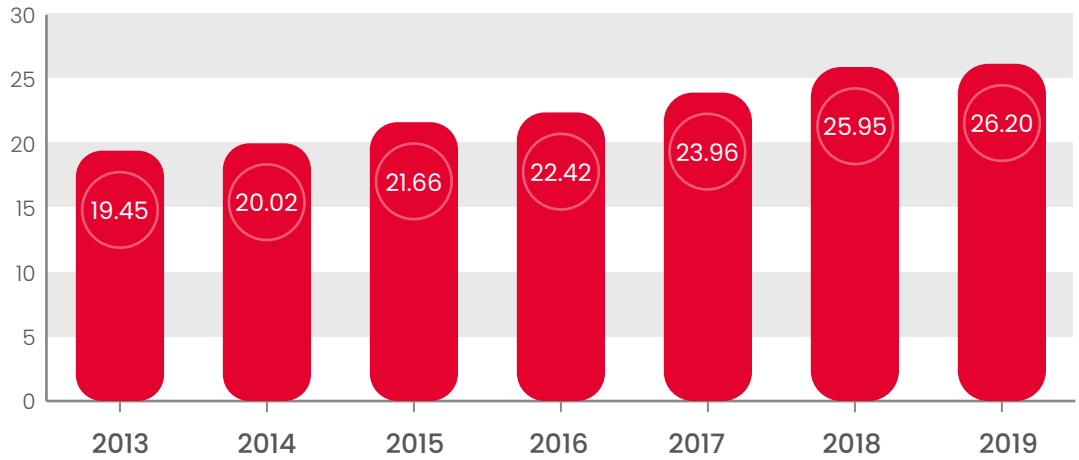


Source: **RATEL**

In terms of the technology used, based on the available data, the biggest percentage increase of 53% was seen in the number of broadband users with FTTH (Fiber to the Home) or FTTB (Fiber to the Building) fibre-optics Internet access, however this number is still relatively low, corresponding to 10% of the total number of users. The number of users with coaxial cable infrastructure grew by 5%, whereas the number of users with fixed wireless access increased by 12%. The number of users of xDSL decreased by 5% third year in a row. However, xDSL subscriber structure changed significantly with a substantial increase in the number of users of VDSL technology that account for 49% of the total number of xDSL users, due to greater demand for packages with bigger throughput.

The increase in the number of users is reflected in the growth of revenues form fixed broadband Internet service, which grew by 1% compared to 2018 (Figure 7.7.)

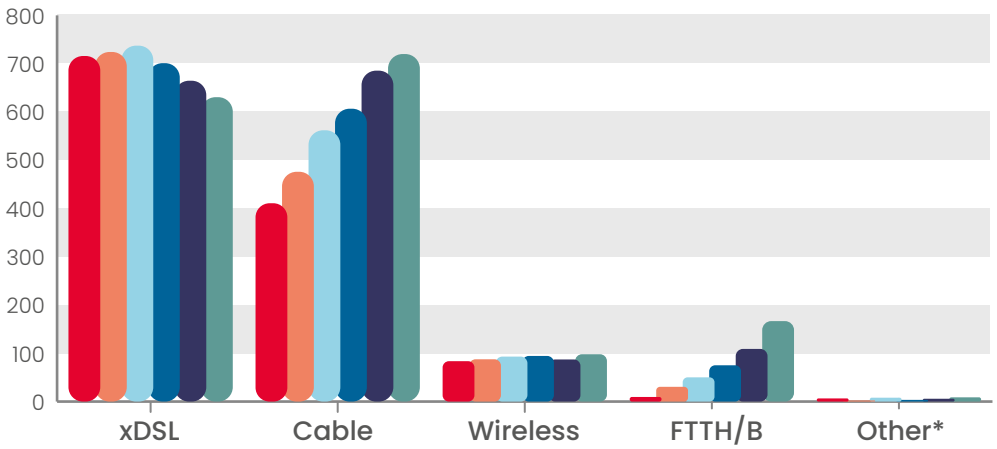
Figure 7.7. Revenues from fixed broadband (billion)



Source: **RATEL**

In 2019, the coaxial cable infrastructure is for the second time in a row the most widely used access technology with 44% of the total number users, followed by xDSL infrastructure with 39% of users (Figure 7.8).

Figure 7.8. The share of the broadband subscribers by access technology (thousand)

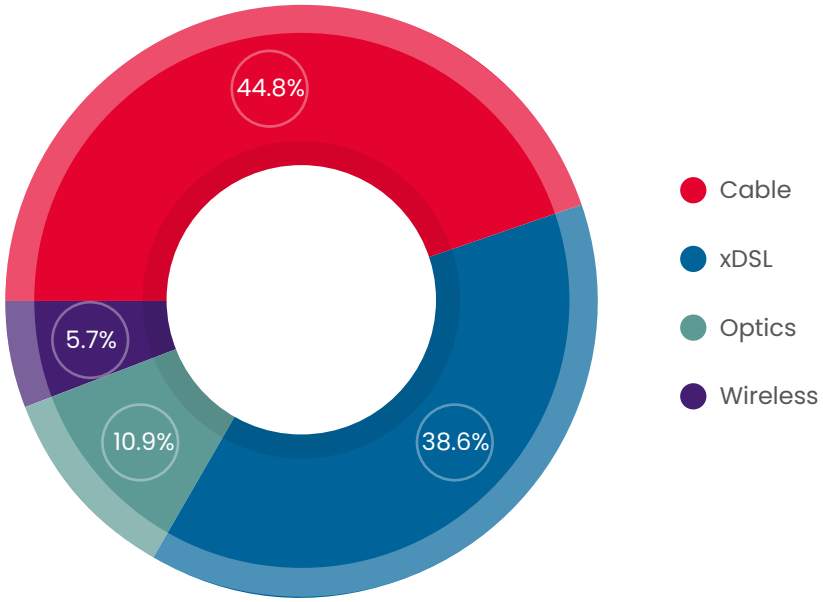


	xDSL	Cable	Wireless	FTTH/B	Other*
2014	**715.84**	**410.82**	**83.64**	**9.52**	**6.49**
2015	**724.16**	**475.97**	**87.57**	**30.53**	**2.29**
2016	**737.25**	**561.94**	**93.14**	**50.16**	**7.99**
2017	**701.00**	**606.62**	**94.49**	**75.15**	**3.50**
2018	**664.61**	**685.48**	**87.20**	**109.04**	**5.83**
2019	**630.51**	**719.88**	**98.01**	**166.63**	**8.76**

* Eternet, LAN...
Source: **RATEL**

The structure of revenues made from fixed broadband access follows the subscriber structure, since the revenues from cable services accounted for 44.8% and xDSL for 38.6% of the total revenues (Figure 7.9).

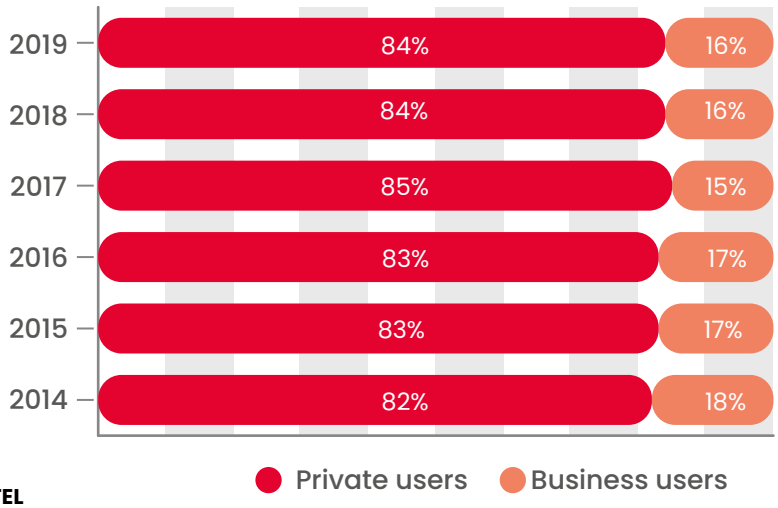
Figure 7.9. The structure of revenues made from fixed broadband, by access technologies



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 2019. The share of private and business users in the total revenues made in the past five years is illustrated in Figure 7.10.

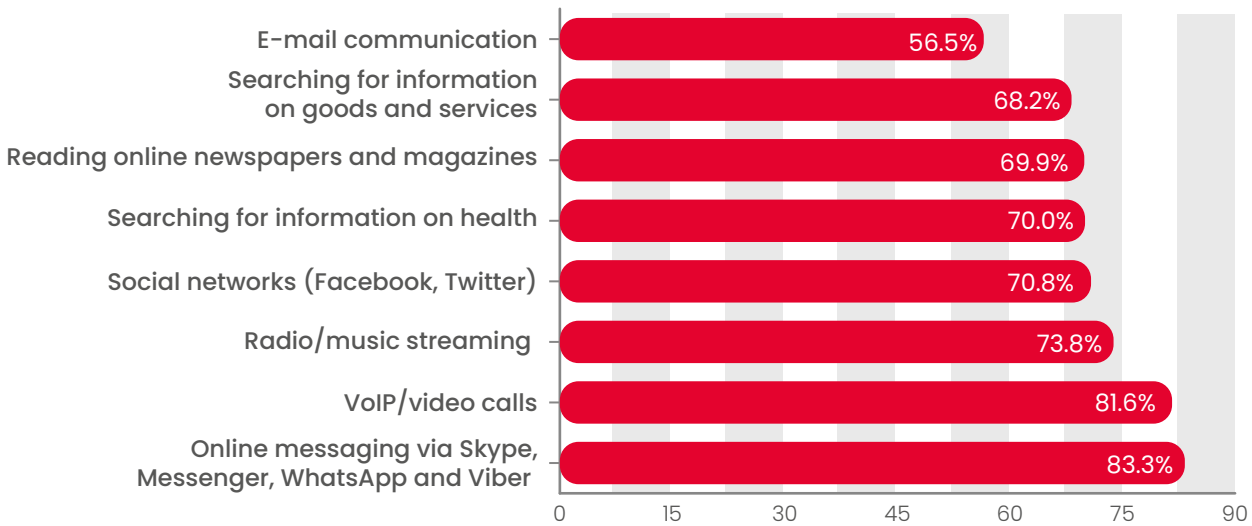
Figure 7.10. Share of private and business users in the total revenues made from fixed broadband Internet service



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 online messaging via Skype, Messenger, WhatsApp and Viber (83.3%), VoIP calls (81.6%) and music streaming platforms (radio, music streaming) (73.8%).

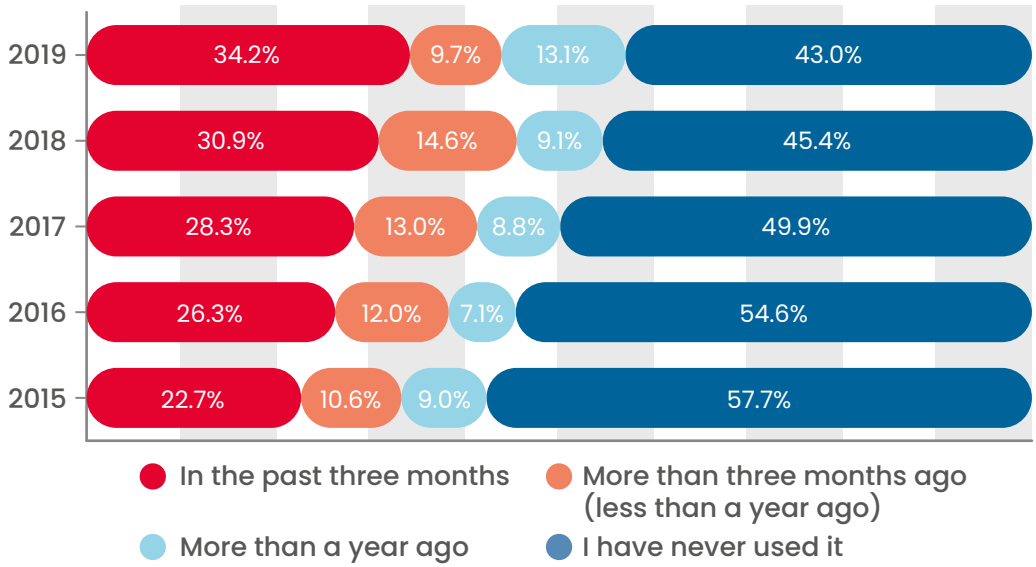
Figure 7.11. Types of Internet usage for private purposes



Source: **Statistical Office of the Republic of Serbia**

The technological developments are changing user habits. In 2019, more than 1.82 million people purchased or ordered goods and/or services online. Online purchase of goods and/or services is growing and the number of persons that made an online purchase increased by 20,000 in respect to the previous year. In the past three months 34.2% of the respondents have ordered goods or services online, whereas 43% of the respondents have never used the Internet for these purposes. The change in habits of the individuals regarding the online purchase in the last 5 years can be seen in Figure 7.12.

Figure 7.12. Ordering/purchasing goods or services online



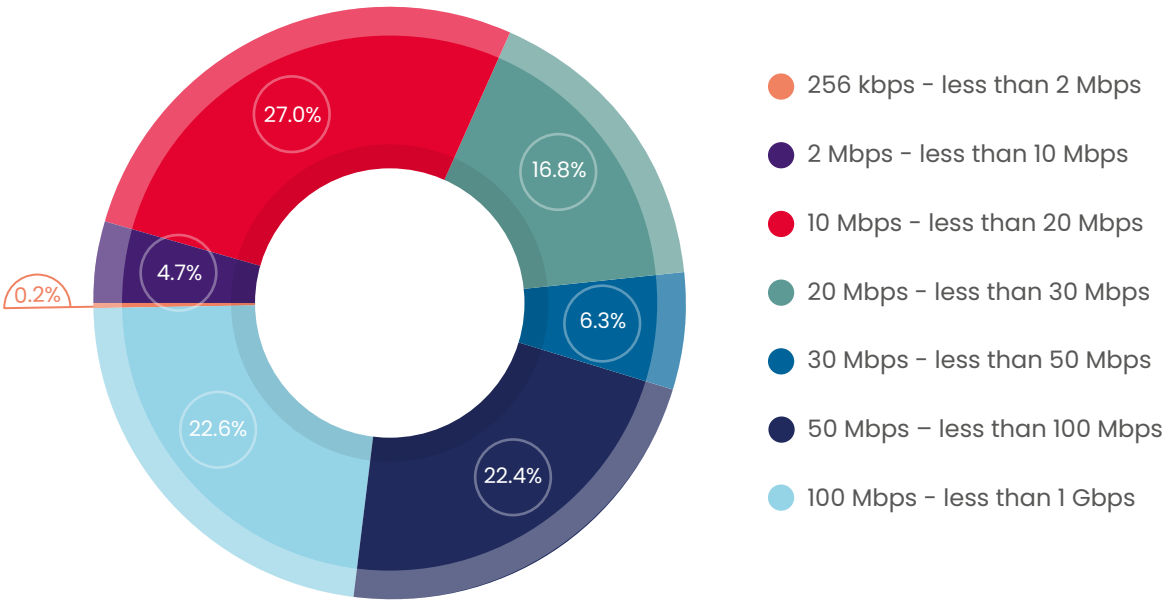
Source: **Statistical Office of the Republic of Serbia**

Although the number of 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 of the Internet access. Changes in user habits, increased number of users accessing video streaming services, along with the increase in the number of device 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 the fixed broadband access, the same as the previous year, Internet packages offering 10 Mbps were the most sold, at the price ranging between 790 and 1,900 dinars.

The distinction between broadband speeds offered and the overview of this indicator help understand the digital divide, and the data on the number of users, depending on the available speed, help create and introduce regulatory measures targeted at bridging the digital gap. According to the available data, in 2019 there were 27% of fixed broadband users who used the packages of at least 10 Mbps but less than 20 Mbps and more than 22% of users who used the packages of at least 50 Mbps but less than 100 Mbps.

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

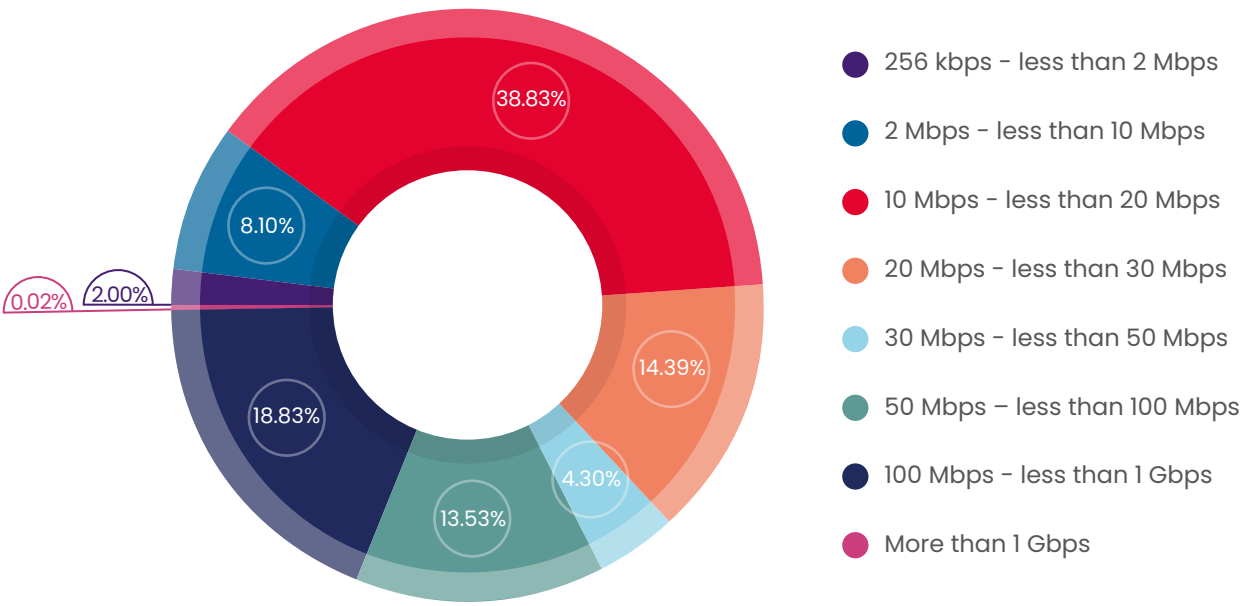


Source: **RATEL**

The share of the fixed broadband subscribers according to access rate influenced the amount of the average bill for fixed broadband Internet, which amounted to 1,436 dinars for private users and 4558 dinars for business users in 2019.

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.

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



Source: **RATEL**

Out of the total number of companies with Internet connection, 83.6% have their own website, mainly with the purpose of giving the possibility to view contents in customized mode (79.3%), providing the description of goods or services and price lists (82.6%) and the possibility for consumers to get acquainted with the products (66.6%).

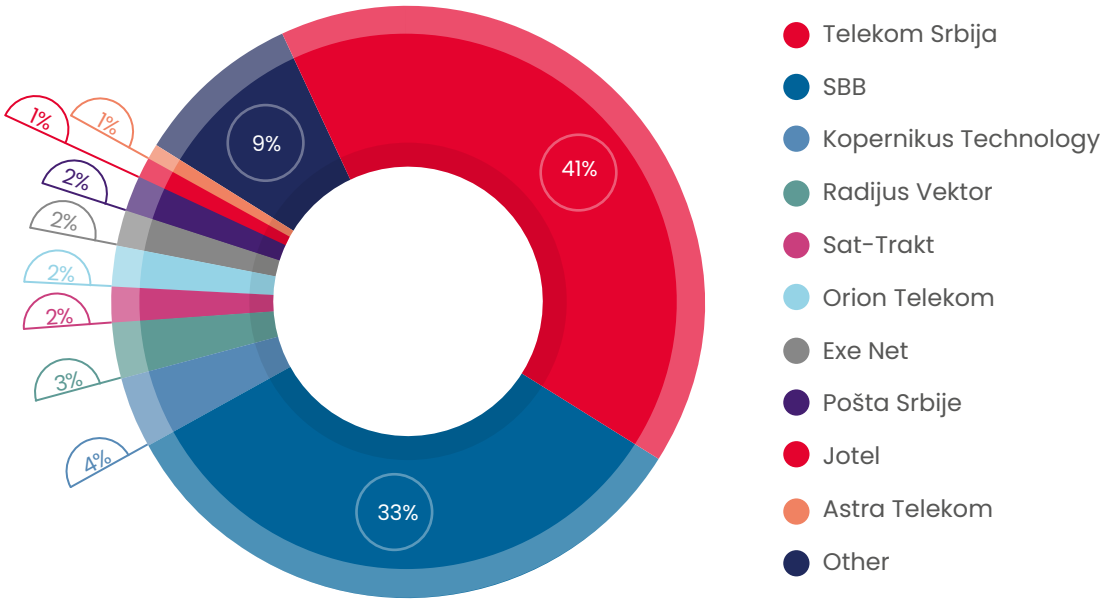
Social networks are becoming increasingly important for the businesses. During 2019, nearly 47.3% of the companies used social networks, such as Facebook, LinkedIn, Xing or Yammer, for business purposes. Multimedia websites for information sharing, such as Youtube, Flickr, Picassa (16.8%) and company blogs such as Twitter (12.2%) were also widely used.

The number of companies paying for cloud service, accessed via Internet for the purpose of software usage, data storage etc. increased in 2019 to 21.9%. The cloud service, located on the server of the service provider, can be used upon user request and is 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 2019 was around 1.66 billion GB (1.55 EB). The assessed international link capacity usage was approximately 747 thousand Mb/s and the leased international link capacity (lit/equipped) was around 3.25 million Mb/s.

Telecommunications Company "Telekom Srbija" remains to be the largest operator of fixed broadband in the Republic of Serbia in 2019, with a market share of 41% in terms of the number of subscribers, showing a decreasing trend in the past two years. Other leading ISPs in the market are: SBB with 33% market share, followed by Kopernikus technology, Radijus vektor, Sat-Trakt, Orion telekom, EXE NET, PE "Pošta Srbije", Jotel and Astra telekom, each of them holding a significantly smaller share compared to Telekom Srbija and SBB. Together these 10 operators hold 91% of the Serbian ISP market in terms of the number of subscribers.

Figure 7.15. Market share of the leading ISPs in 2019



Source: **RATEL**

In 2019, there were 210 registered operators providing broadband Internet access. 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.

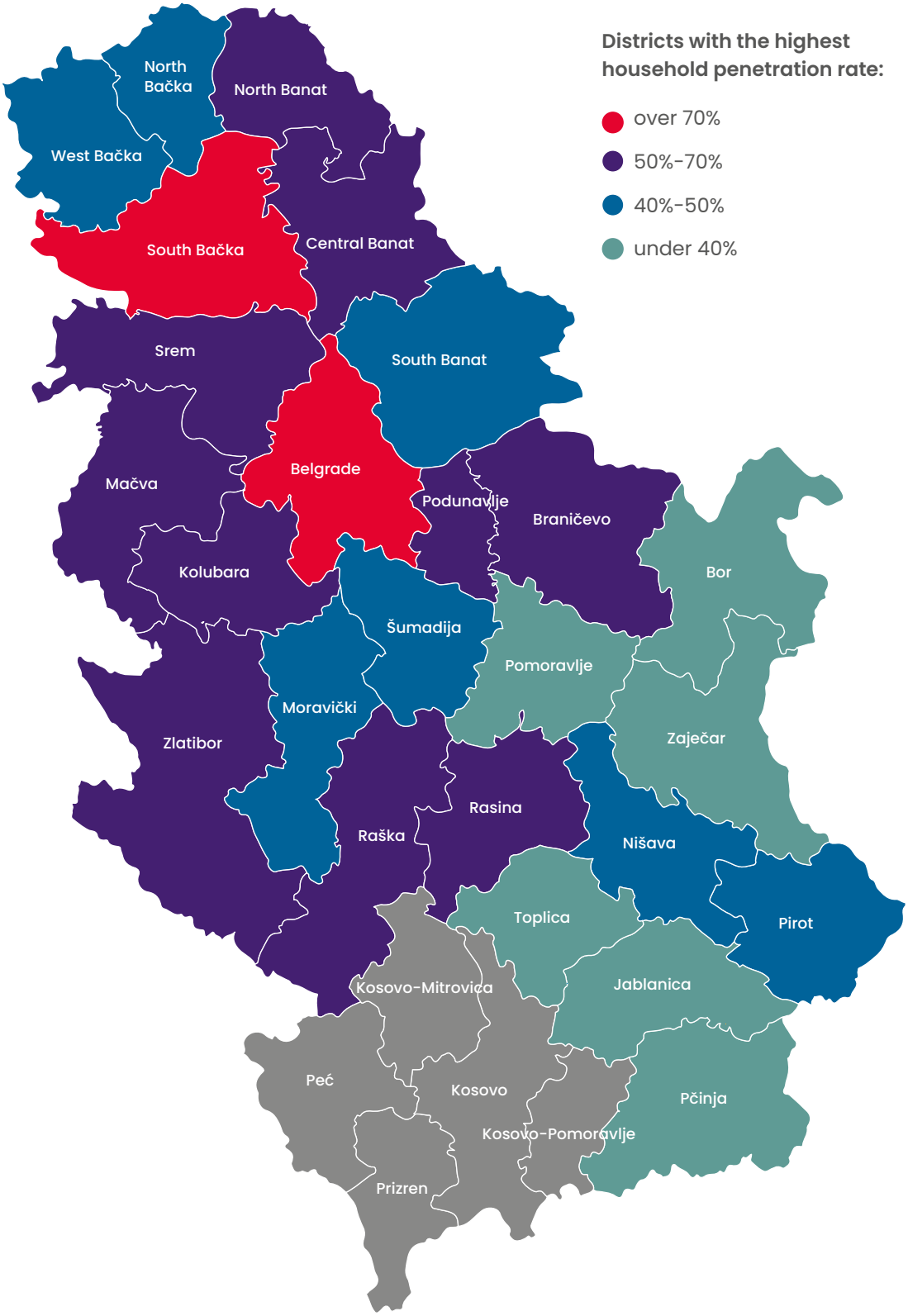
Data on penetration rates for Kosovo and Metohija and for Preševo have not been presented in the table due to unavailability of information on the number of households.

Table 7.1 shows data on broadband penetration rate for households, by districts, and Figure 7.16. provides a graphic image on the map of Serbia.

Table 7.1. Internet access service penetration by districts

District	Penetration rate (%)
Belgrade	86.25
South Bačka	76.20
Nišava	59.78
South Banat	55.22
Šumadija	55.08
North Bačka	51.23
West Bačka	50.96
Raška	49.49
Podunavlje	48.77
Morava	48.68
Srem	48.24
Central Banat	48.19
Kolubara	46.17
Braničevo	46.01
Rasina	43.62
Zlatibor	42.16
North Banat	42.10
Pirot	41.79
Mačva	41.63
Zaječar	39.89
Bor	38.76
Pomoravlje	38.60
Pčinja	36.39
Toplica	33.18
Jablanica	30.86

Figure 7.16. Overview of Internet access service penetration by districts



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. The analysis was based on processing the data collected from operators that submitted the data on Internet service provision in inhabited locations.

Table 7.2. List of 10 municipalities/cities with the highest Internet access service penetration

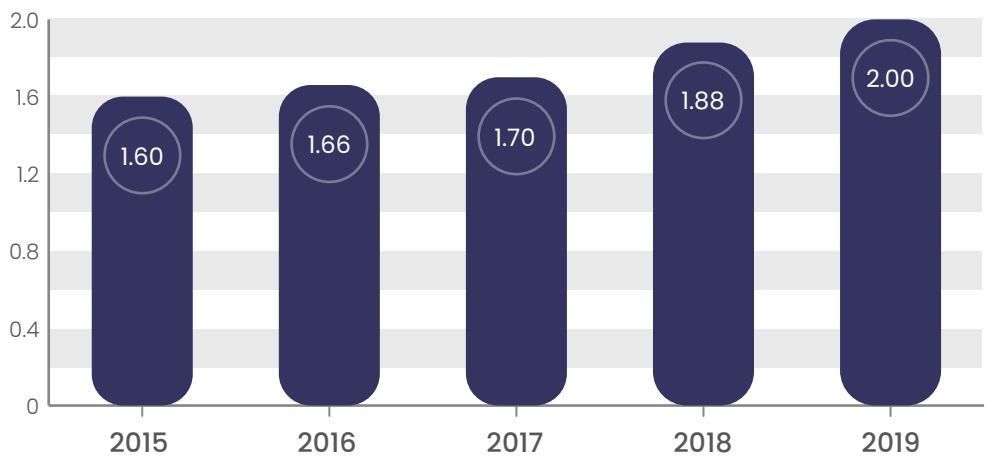
City/municipality	Penetration (%)
Novi Sad	95.98
Belgrade	86.25
Niš	72.23
Temerin	67.69
Vršac	66.77
Požarevac	65.43
Kragujevac	64.31
Pančevo	61.33
Novi Pazar	61.23
Petrovac	58.04

8 MEDIA CONTENT DISTRIBUTION

In 2019, there were 84 registered media content distribution operators providing the service via cable distribution network (coaxial, hybrid and optical), xDSL technologies, satellite distribution network and wireless network. There is also another media content distribution service on the market – paid terrestrial television, broadcasted via the network of terrestrial transmitters in the DVB-T2 standard. For the usage of this service, an indoor antenna and a set-top box are required.

The total number of subscribers of the media content distribution service in 2019 was 2 million, which represents an increase by 6.4% compared to the previous year, mostly due to the increase of CDS service subscribers. Approximately 1.25 million subscribers used the service of media content distribution within service package (bundled service), most often coupled with the service of broadband Internet access and/or fixed telephony. The mentioned bundled services that include media content distribution have marked an increase by 15% compared to the previous year.

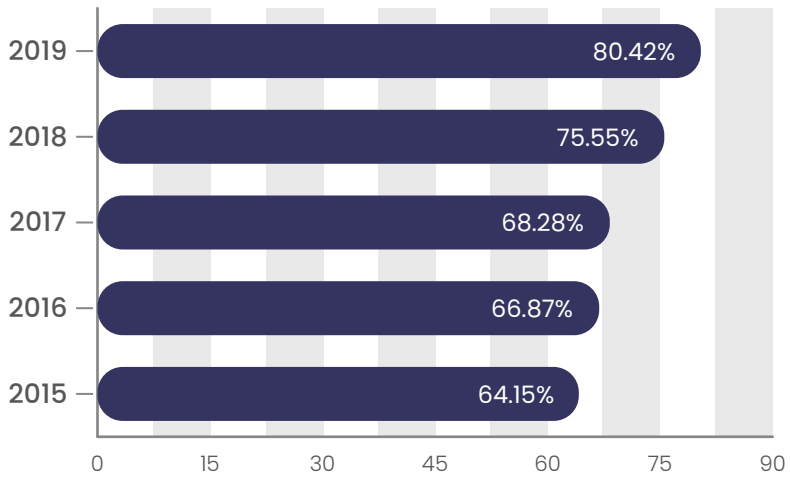
Figure 8.1. Total number of subscribers (in million)



Source: **RATEL**

The household penetration is 80.42%.

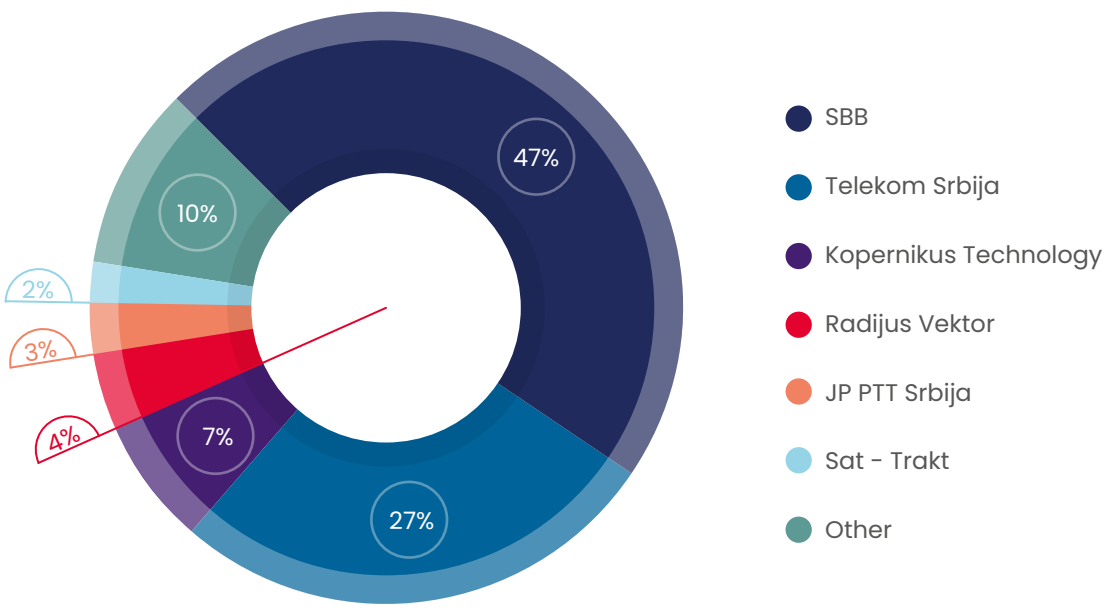
Figure 8.2. Household penetration (in%)



Source: **RATEL**

The largest media content distribution operator in the Republic of Serbia in 2019 is still Serbia Broadband – Srpske kablovske mreže Ltd. (SBB Ltd.), with a market share of 47%, in terms of number of subscribers. Telekom Srbija JSC accounts for around 27% of the market share in 2019, whereas the Public Enterprise "Pošta Srbije", Kopernikus Tehnology Ltd, Radijus Vektor Ltd. and Sat-Trakt Ltd, in terms of number of subscribers, account for a joint market share of 90% pertaining to media content distribution.

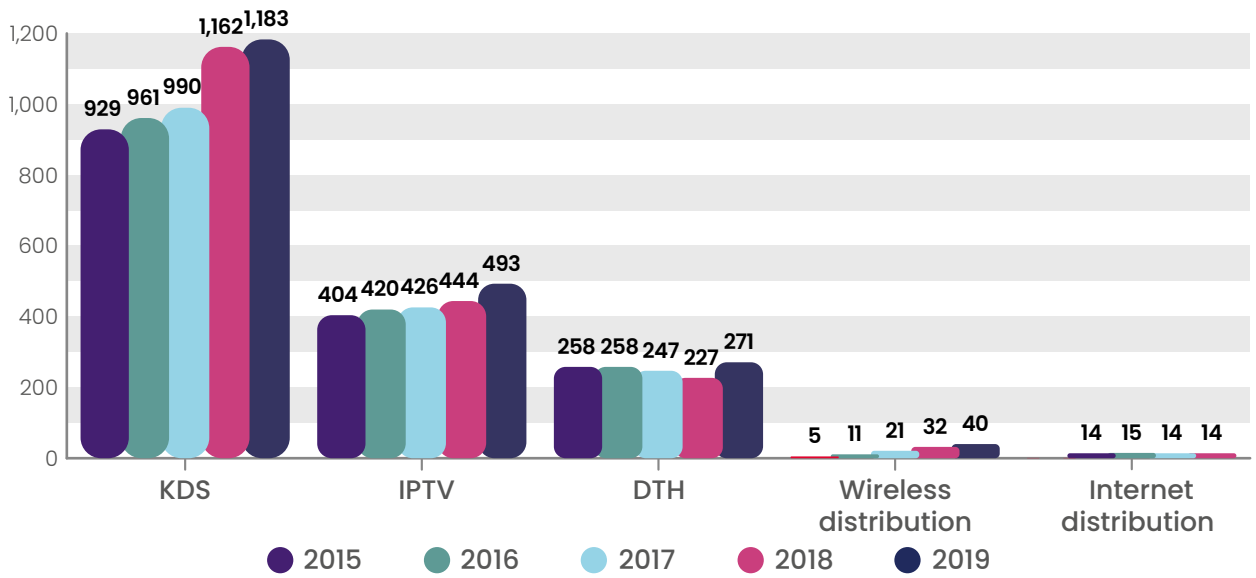
Figure 8.3. Market share of leading operators in 2019



Source: **RATEL**

Media content distribution via cable distribution systems (CDS) is still dominant in 2019, with around 1.18 million subscribers, which is an increase by 1.7% compared to the previous year. The number of IPTV subscribers via xDSL technologies has increased as well, by approximately 11% compared to the previous year, whereas the number of DTH subscribers via satellite network has augmented by approximately 19%. The number of media content distribution subscribers via wireless network has equally continued to grow in 2019, amounting to approximately 40 thousand, whereas the number of media content distribution subscribers via Internet has amounted to approximately 14 thousand.

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

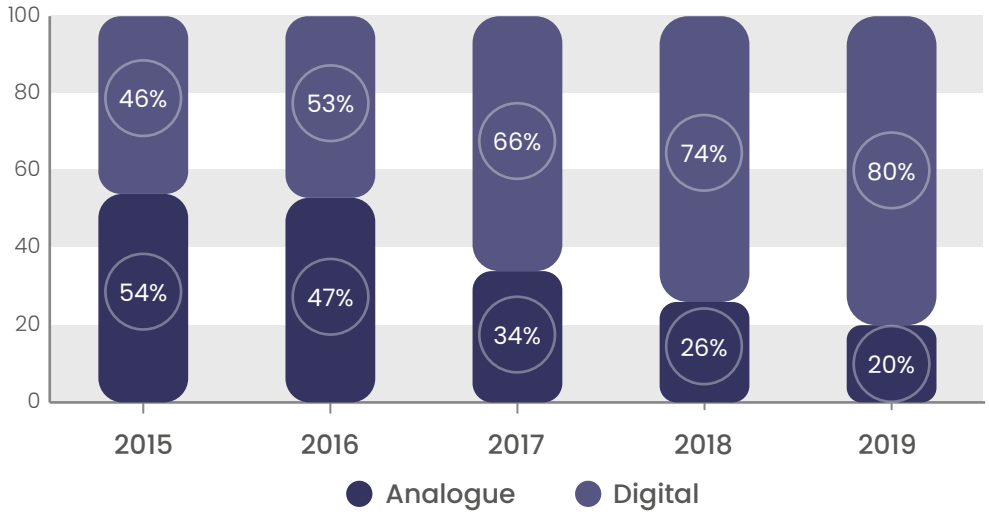


Source: **RATEL**

The share of subscribers by type of distribution has not changed substantively during 2019, in terms of most popular types of distribution, while the shares of other types of distribution have augmented slightly, from 2.5% to 2.7%. More precisely, these are the subscribers using wireless distribution, whose number grew from 1.7% to 2%, including the subscribers of paid terrestrial TV, present on the market since 2016, with almost 21 thousand subscribers in 2019.

In 2019, as much as 80% of the total number of CDS subscribers have 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 content in high resolution (HD), and to have at their disposal numerous additional services, with the analogue to digital distribution switchover being encouraged by the operators' diverse promotional activities.

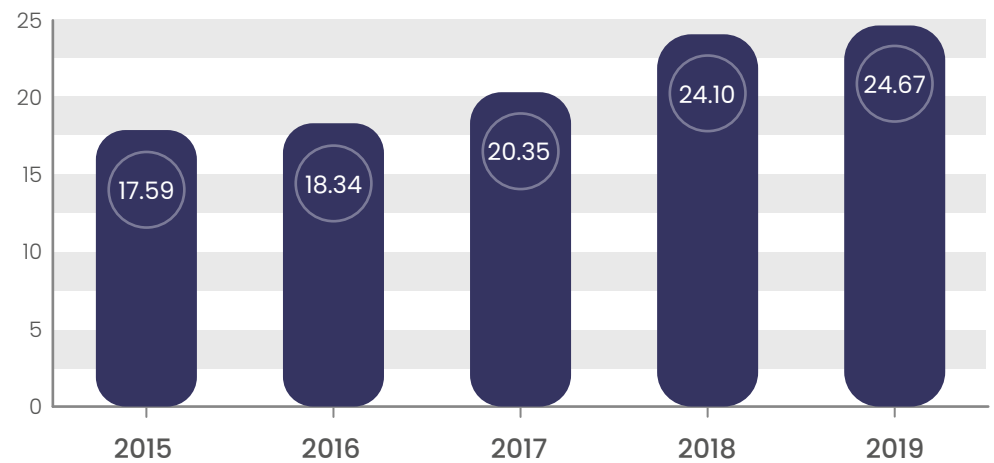
Figure 8.5. Distribution of CDS subscribers



Source: **RATEL**

The total income of media content distribution operators in 2019 reached 24.67 billion dinars, which is by almost 2% higher compared to the previous year.

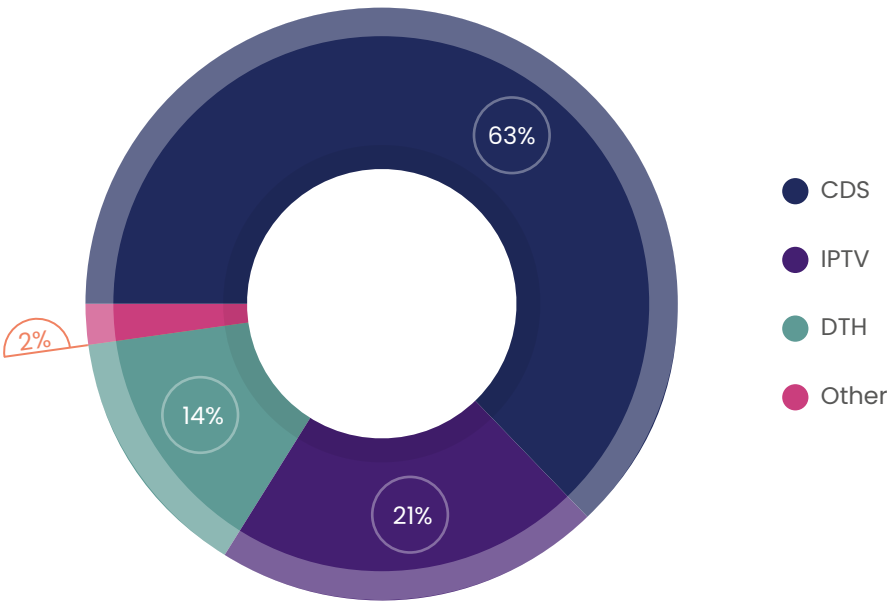
Figure 8.6. Revenue trends on media content distribution market (in billion dinars)



Source: **RATEL**

The share of revenues by the type of distribution has not changed in 2019 compared to the previous year. CDS accounts for the biggest share in the revenues from the media content distribution (63%), with IPTV (21%) and DTH (14%) on the same level as in 2018. 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 2%.

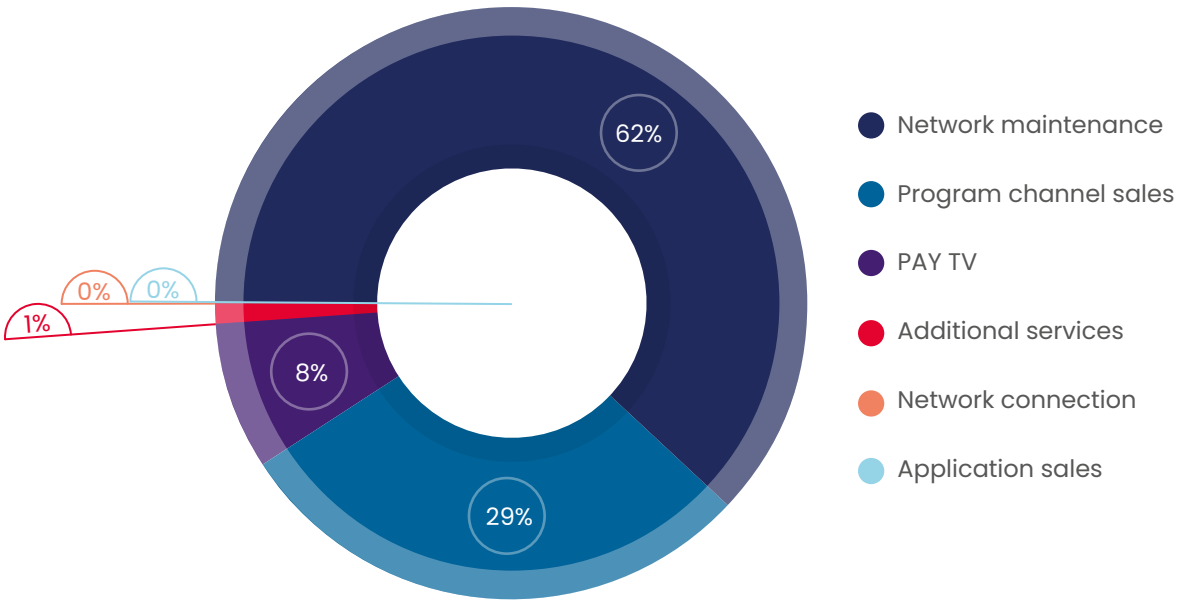
Figure 8.7. Structure of revenues from media content distribution in 2019



Source: **RATEL**

The revenues from the network maintenance and sale of program channels, representing an income from the sale of own program channels to other operators, account for 91% of the total income, as shown in Figure 8.8. Revenues from additional paid program packages, i.e. PAY TV service, make up almost 8% of the total revenues. Network connection charges account for approximately 0.31% of the total revenues in 2019. The reason for such a low share is the fact that the majority of operators do not charge for this service during promotional offers or for a 12-month/24-month user contract. Additional service income includes revenues from services such as video on demand, rewind service, program recording etc, which altogether account for almost 1% of the total revenues in 2019. Revenues pertaining to the sale of TV watching app refer to the application that is sold independently of the distribution service, and for which there is no user's agreement, account for 0.04%, a rather negligible portion of the total income.

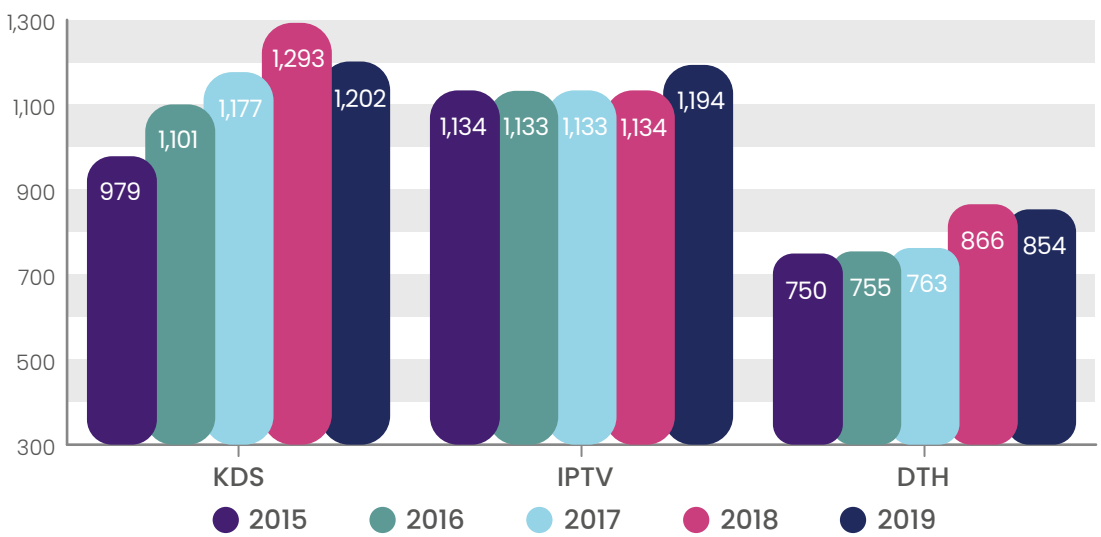
Figure 8.8. Share of revenues from media content distribution in 2019



Source: **RATEL**

In 2019, the average monthly subscription for basic analogue CDS package was 1,086 dinars, against 1,232 dinars for digital CDS. The average subscription for basic IPTV package has marked a slight rise compared to the previous year, amounting to 1194 dinars, whereas the average monthly subscription for DTH is 854 dinars.

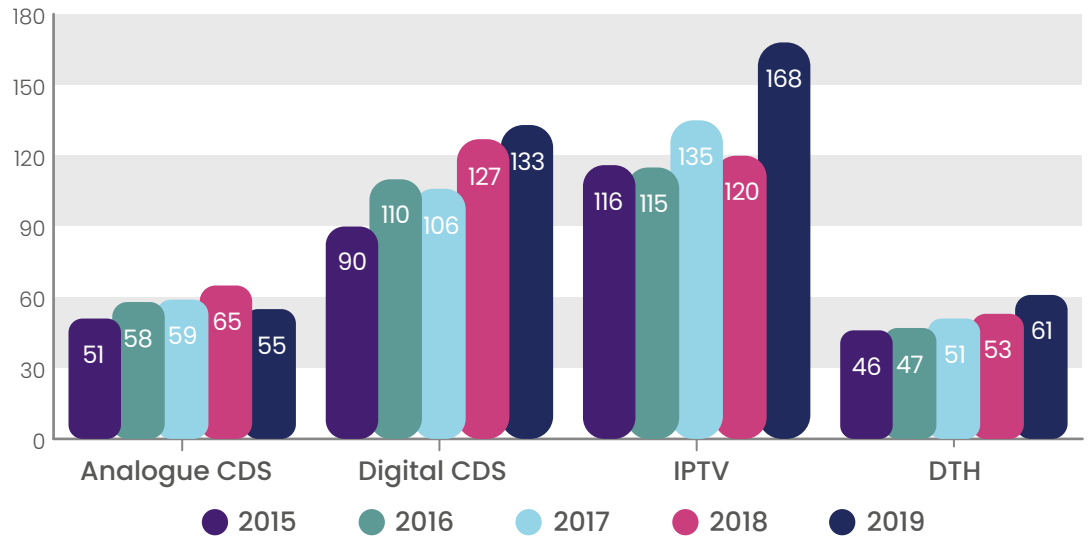
Figure 8.9. Average monthly subscription for basic package of the most popular types of distribution (in dinars)



Source: **RATEL**

The average number of TV programs in the basic package in 2019, for different types of distribution, has ranged from 55 in case of analogue CDS, to 168 in case of IPTV. There is still a big disproportion between the number of basic package programs of the analogue and those of the digital CDS, which is one of the means operators use to encourage subscribers to switch to 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 with additional subscription. These program packages, beside programs from their regular offer already included in the subscription, also contain additional educational, sport-related, film or entertainment and other additional HD programs. According to the available data, in 2019, these programs were followed by more than 395 thousand subscribers.

Beside extra channels, additional services available to the subscribers of digital CDS 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 2019, out of the total number of subscribers, 1.2 million used additional services and realized over 822 million requests for an additional service (around 653 requests annually per subscriber), out of which more than 33 million requests for the VoD service, i.e. 27 requests per subscriber annually.

For the distribution service subscribers to be able to watch media content in digital format (whatever the network they might be connected to – cable, telephony, wireless)

on various TV devices, for each one of those they need an additional receiver (set-top box), which is paid separately. During 2019, more than 463 thousand subscribers were renting the additional receiver.

In addition to the distribution service, it is also possible to follow certain TV content on mobile devices, using different applications, without connecting oneself to the distribution network and without entering into subscriber agreement with the operator. The application user is not obliged to pay monthly subscription, while the application itself is usually activated by means of an SMS, charged at a previously set rate. This rate actually represents the fee for the usage of the application during a certain, usually shorter period of time.

Based on the data on the number of subscribers in populated areas provided by the operators, the number of media content distribution subscribers in 2019 was 1.98 million. This number excludes the subscribers of digital terrestrial TV.

The media content distribution service penetration by districts and municipalities was calculated based on the data provided by the operators and concerns the media content distribution service in the populated areas.

The relevant data about Kosovo and Metohija and Preševo were not included in the table, due to the impossibility of data collection (regarding the number of households).

Table 8.1 displays the data on the penetration of media content distribution service per household on a district level, and Figure 8.11. includes a graphical overview on the map of Serbia.

Table 8.1. Penetration of media content distribution service by districts

District	Distribution of subscribers per household by districts (%)
City of Belgrade	107.82
South Backa	89.73
Nišava	82.25
Central Banat	80.57
Srem	78.48
Šumadija	77.18
Braničevo	77.10
Podunavlje	74.03
South Banat	72.29
Pomoravlje	70.00
North Bačka	69.60

District	Distribution of subscribers per household by districts (%)
Raška	68.64
Kolubara	68.39
Morava	66.32
Mačva	65.26
Rasina	63.97
Zaječar	62.26
Pčinja	61.42
West Bačka	61.41
Jablanica	61.11
Pirot	60.50
Zlatibor	60.43
Bor	55.88
North Banat	54.50
Toplica	44.77

Table 8.2. List of municipalities/cities with media content distribution (MCD) service penetration per municipality/city household

Municipality	Penetration of MCD service per municipality household
Čajetina	141.24
Novi Sad	112.10
Novi Bečej	108.77
Belgrade - total	107.82
Veliko Gradište	98.32
Niš	97.85
Žitište	93.57
Beočin	90.39
Sremski Karlovci	89.65
Požarevac	88.10

Municipality	Penetration of MCD service per municipality household
Raška	86.59
Malo Crniće	86.19
Stara Pazova	85.49
Irig	85.33
Pančevo	84.52
Dimitrovgrad	83.65
Kragujevac	83.31
Inđija	82.13
Velika Plana	81.05
Vršac	80.83
Žagubica	80.44
Aranđelovac	78.72
Svilajnac	78.28
Ćićevac	77.75
Zrenjanin	77.68
Kikinda	77.38
Ruma	77.37
Šabac	77.18
Smederevo	77.14
Golubac	76.73
Bujanovac	76.65
Lapovo	76.58
Vrbas	75.81
Ćuprija	74.88
Sremska Mitrovica	74.82
Valjevo	74.62
Subotica	74.33
Jagodina	74.22
Paraćin	73.83
Kruševac	73.65

Municipality	Penetration of MCD service per municipality household
Šid	73.45
Čačak	73.13
Opovo	71.94
Sokobanja	71.78
Užice	70.89
Pećinci	70.66
Kraljevo	70.13
Ljig	69.52
Petrovac	69.25
Sombor	69.06
Vrnjačka Banja	69.05
Novi Pazar	68.75
Leskovac	68.35
Bor	67.47
Temerin	67.13
Kovin	65.40
Pirot	64.02
Mali Zvornik	63.86
Batočina	63.25
Zaječar	63.11
Ub	62.97
Lajkovac	62.61
Gornji Milanovac	62.53
Srbobran	62.31
Smederevska Palanka	61.86
Nova Crnja	61.61
Titel	61.38
Ljubovija	61.23
Žabalj	60.96
Topola	60.84

Municipality	Penetration of MCD service per municipality household
Kula	60.44
Knjaževac	60.38
Vranje	60.32
Požega	59.46
Loznica	59.43
Aleksandrovac	59.17
Plandište	58.56
Krupanj	58.45
Bogatić	58.06
Bečej	57.79
Novi Kneževac	57.63
Sečanj	57.37
Arilje	57.22
Bačka Topola	56.90
Bajina Bašta	56.77
Odžaci	56.06
Prokuplje	56.05
Lebane	55.83
Alibunar	55.83
Ivanjica	55.72
Majdanpek	55.28
Mionica	55.11
Blace	54.96
Osečina	54.08
Prijepolje	53.31
Lučani	53.01
Vladičin Han	52.87
Bački Petrovac	52.61
Aleksinac	52.60
Bela Palanka	52.25

Municipality	Penetration of MCD service per municipality household
Čoka	52.13
Boljevac	51.81
Svrljig	51.50
Rača	50.68
Varvarin	50.54
Koceljeva	50.13
Knić	49.82
Trstenik	49.69
Malilđoš	48.79
Vlasotince	48.75
Negotin	48.57
Despotovac	47.35
Kovačica	46.90
Vladimirci	46.05
Medveđa	45.78
Apatin	45.76
Nova Varoš	45.23
Doljevac	44.40
Kladovo	43.95
Žabari	42.61
Rekovac	42.57
Priboj	42.50
Brus	41.65
Ražanj	41.28
Kanjiža	39.29
Bela Crkva	39.17
Bač	38.54
Kosjerić	38.52
Žitorađa	38.15
Bačka Palanka	36.40

Municipality	Penetration of MCD service per municipality household
Babušnica	36.06
Kučevo	36.02
Tutin	35.46
Merošina	35.27
Bojnik	35.22
Ada	33.87
Senta	32.46
Sjenica	29.36
Trgovište	27.73
Surdulica	25.93
Crna Trava	23.30
Gadžin Han	22.13
Kuršumlija	19.13
Bosilegrad	11.47

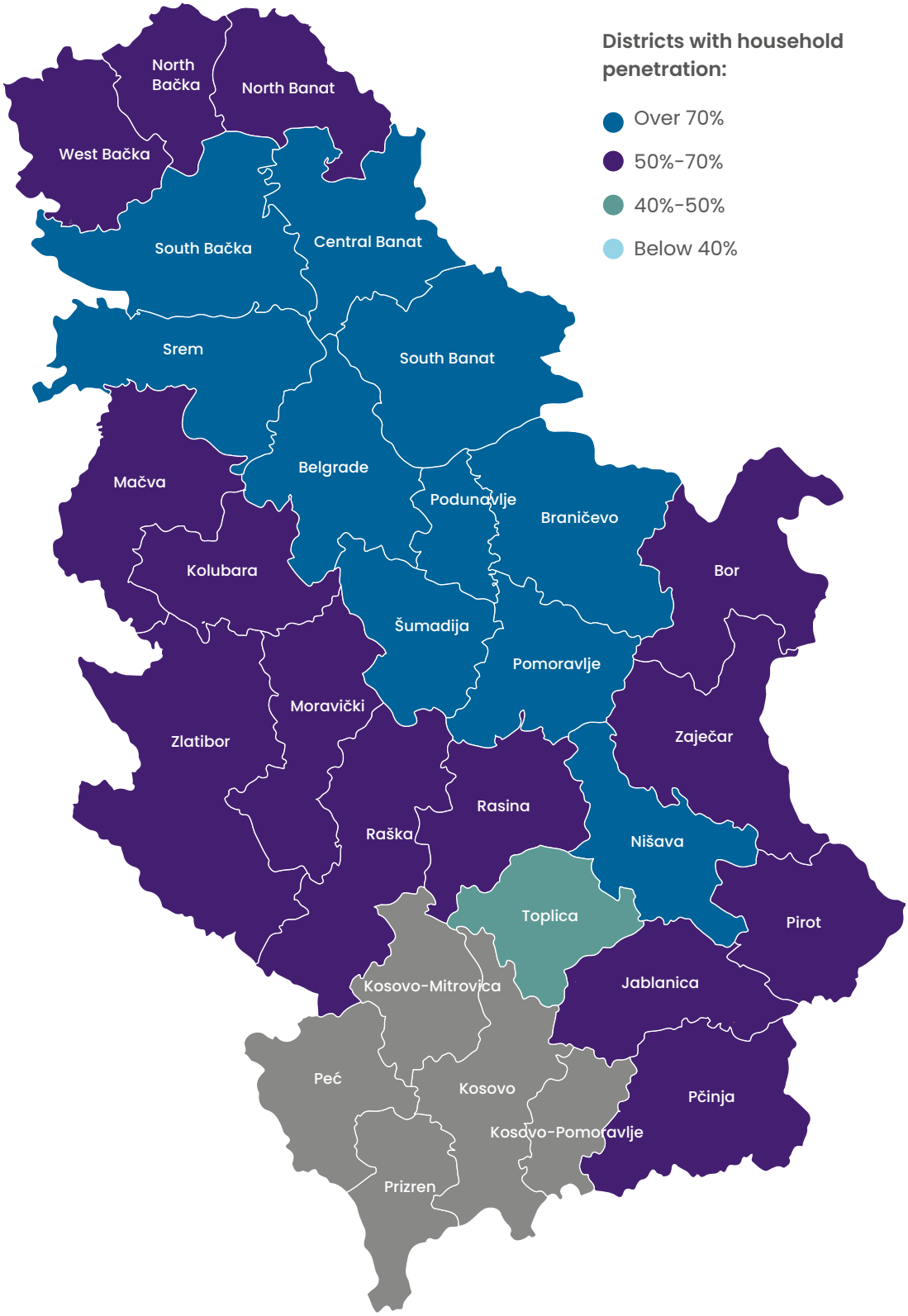
Table 8.3. Municipalities with penetration of media content distribution service per household under 20%

Municipality	Technology penetration per household (%)
Kuršumlija	19.13
Bosilegrad	11.47

Table 8.4. Penetration of technologies for media content distribution in Serbia by total number of subscribers

Technology	Technology penetration
CDS analogue	9.28%
CDS digital	50.09%
IPTV	24.71%
Wireless digital	1.74%
DTH	13.53%
OTT	0.66%

Figure 8.11. Overview of media content distribution service penetration by district



9 BUNDLED SERVICES

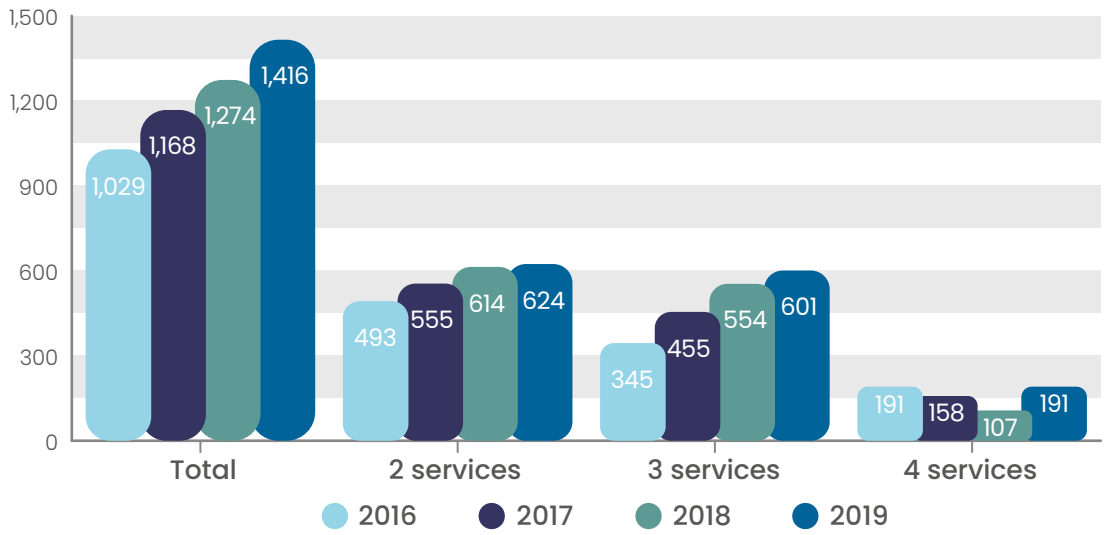
Bundled services are commercial offers of two or more services at a flat rate, which is lower than the sum of individual prices for each of the services. On the electronic communications market, service packages (bundled services) are the result of the horizontal integration, enabling operators to use 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 some costs and attract new subscribers, regardless of if they use their own or another operator's network for the provision of retail services. Bundling services into packages also makes it possible for the operators as independent market players 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, due 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 one single registration and one 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, normally offered separately from the voice service via mobile network.

Based on the available data, on the market of the Republic of Serbia, bundled services are offered by around 40 operators, out of which 21 operators offer 3-service packages, whereas 4-service packages are offered by one operator. The total number of bundled service subscribers in 2019 was around 1.41 million, marking a growth by 11% compared to the previous year. The triple-play package subscribers account for the growth by 8%, while the number of double-play service packages grew by 2% compared to 2018. The number of 4-service subscribers marked an outstanding growth by 79% in 2019.

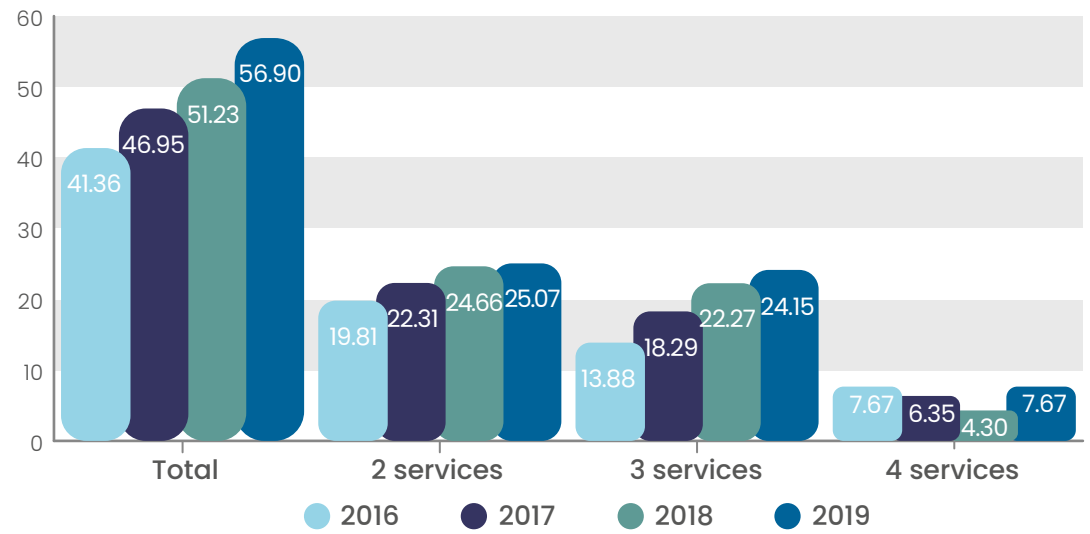
Figure 9.1. Number of bundled service subscribers (in thousand)



Source: **RATEL**

In 2019, the penetration of bundled services by the number of households was around 57%.

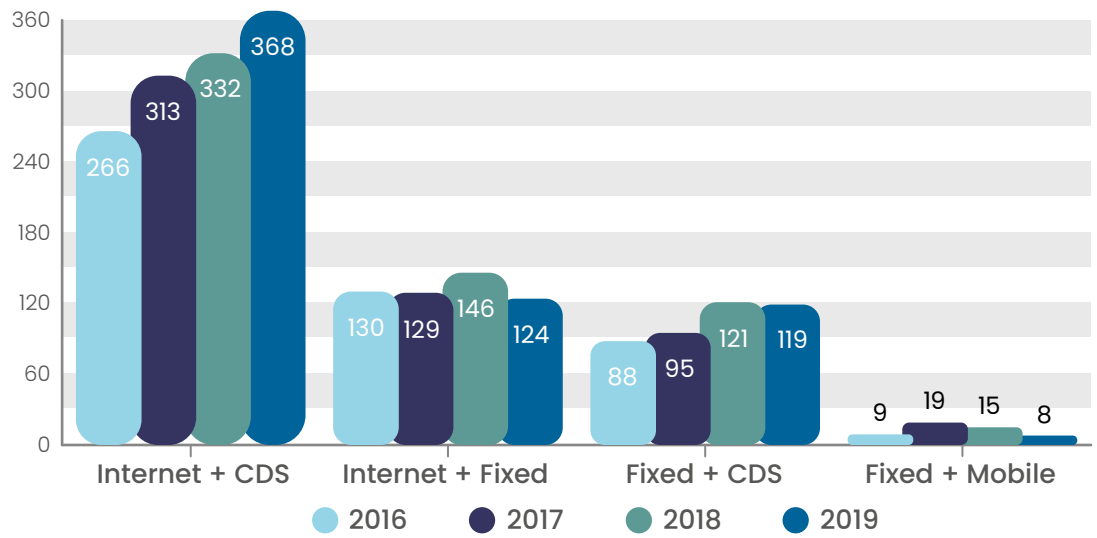
Figure 9.2. Bundled service penetration by the number of households (%)



Source: **RATEL**

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 2019 the number of subscribers of broadband Internet access and media content distribution increased (by 11%), while the number of subscribers of packages including fixed telephony and media content distribution marked a decrease by 2%, as well as subscribers of the broadband Internet and fixed telephony package (a drop by 15%), while the number of subscribers of packages with mobile telephony remained low.

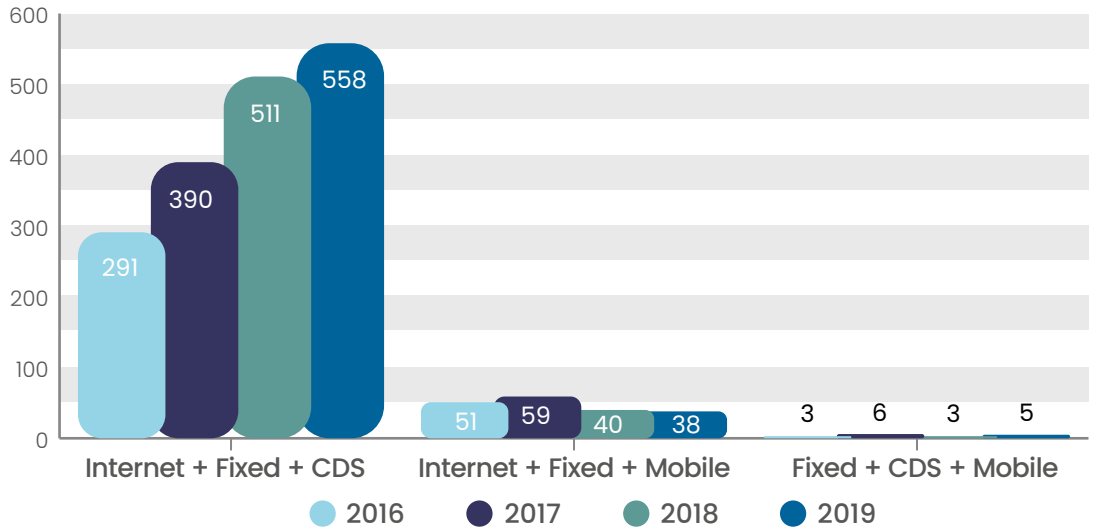
Figure 9.3. Number of 2-service package subscribers (in thousand)



Source: **RATEL**

The best selling 3-service package is bundled service including broadband Internet access, fixed telephony and media content distribution. This package has seen an increase of subscribers by 9%. As of 2016, triple-play packages offering fixed telephony, media content distribution and mobile telephony are present on the market, but their number has is still fairly low, amounting to approximately 5 thousand subscribers in 2019.

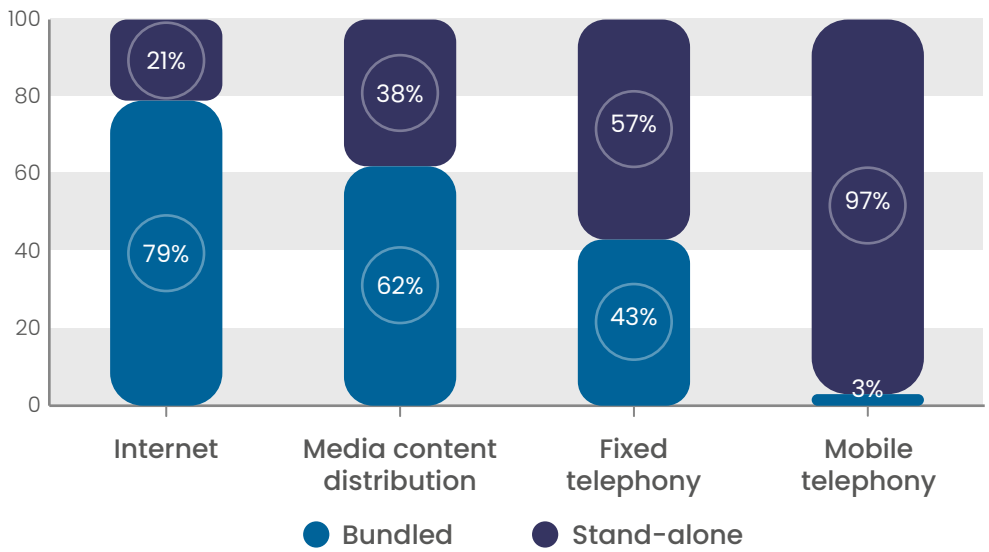
Figure 9.4. Number of 3-service package subscribers (in thousand)



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 significant increase, while the situation regarding the mobile telephony service has not changed significantly. The best selling service within the package is still the service of broadband Internet access, used in bundled mode by over a million subscribers in 2019. It is followed by the service of media content distribution, used in package by more than half of its subscribers (around 1.2 million), while the least popular service is that of mobile telephony.

Figure 9.5. Share of stand-alone and bundled services purchased by subscribers in 2019

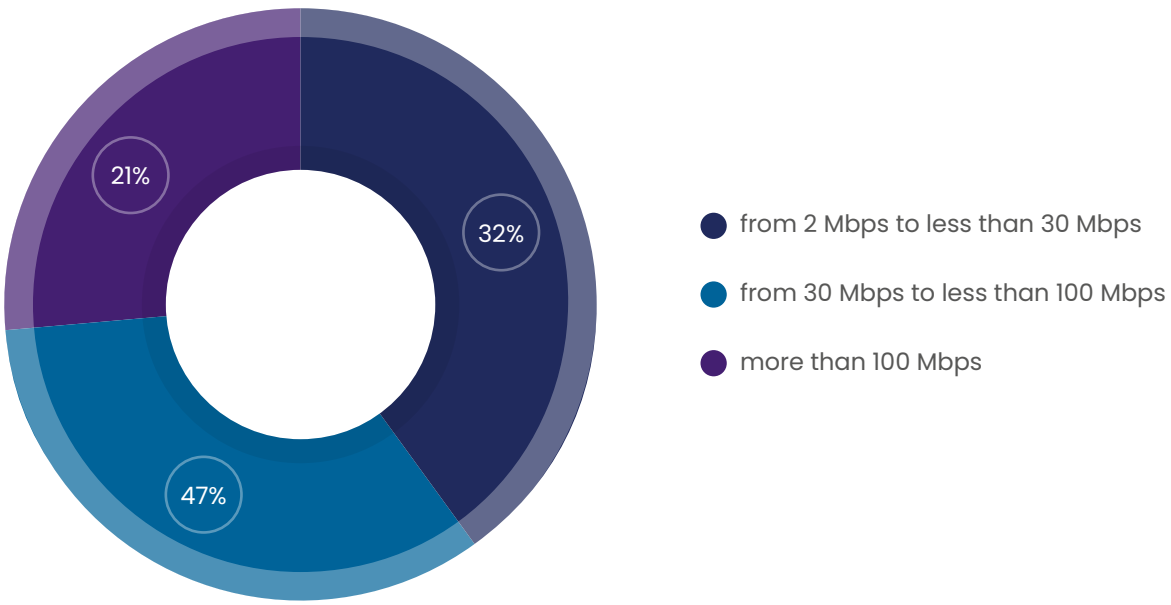


Source: **RATEL**

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 2019 containing broadband Internet access service, as much as 47% 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, 76% of the subscribers opted for the above rate, whereas 62% 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, 35% of the subscribers also used the slower Internet rate (from 2 Mbps to less than 30 Mbps).

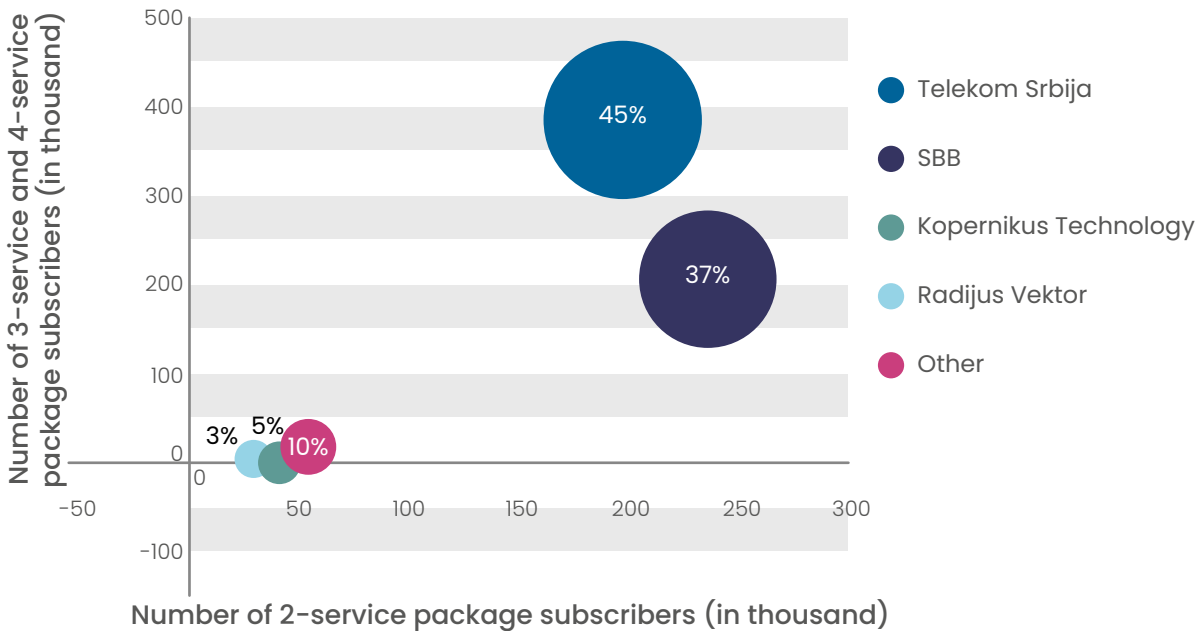
Figure 9.6. Subscribers of the most popular service packages using diffrerent Internet speeds in 2019



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 bundles services. The share of operators measured by the number of bundled service subscribers is shown in Figure 9.7.

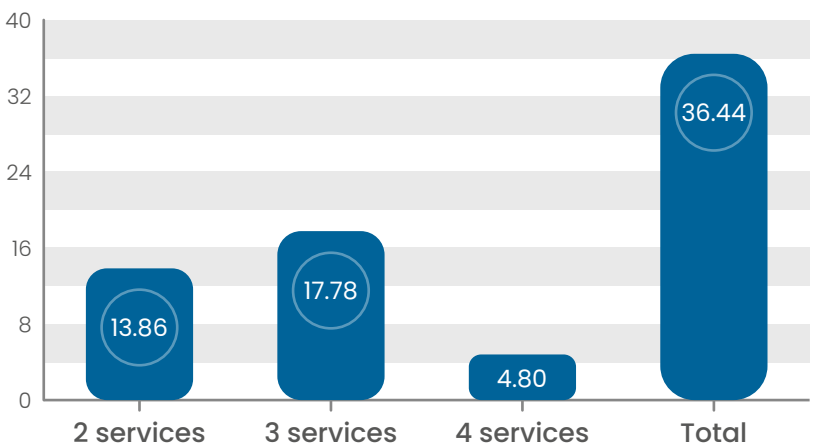
Figure 9.7. Share of operators by the number of bundled service subscribers in 2019



Source: **RATEL**

From the sale of bundled services in 2019, the operators earned an income of 36.4 billion dinars, the most of which (around 17.8 billion dinars) is generated from the sale of triple-play bundles, while the sale of quad-play packages accounted for the smallest income share (around 4.8 billion dinars).

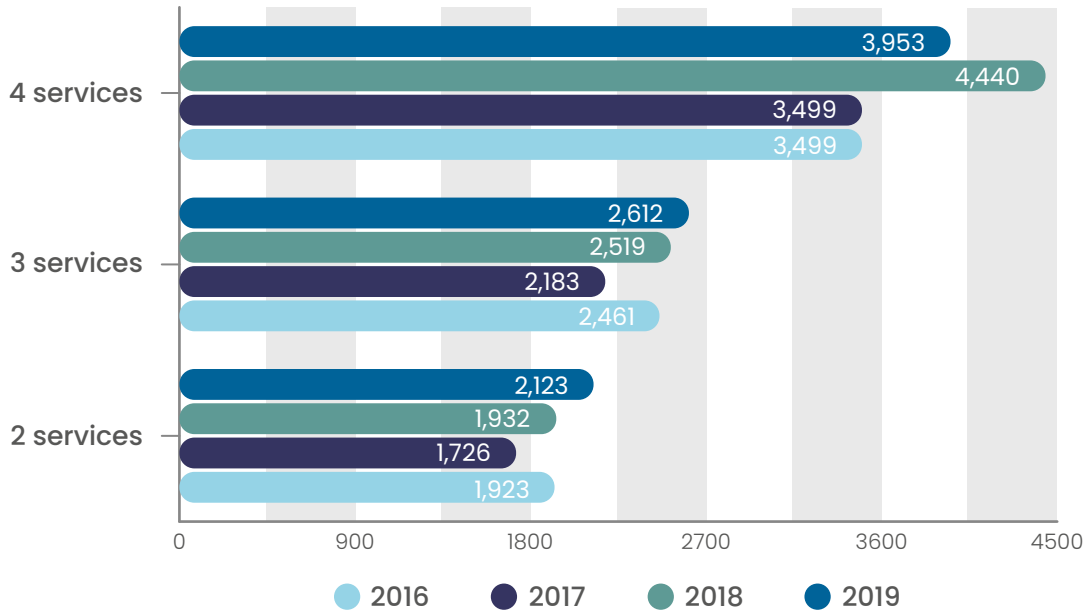
Figure 9.8. Earned income from bundled service sales in 2019 (in billion dinars)



Source: **RATEL**

Monthly subscriptions for the best selling packages in 2019 ranged between 750 dinars for the cheapest package and 3,999 dinars for the most expensive one, depending on the operator and the package content. These amounts are similar to those of the previous year, except in case of 4-service bundles, whose price dropped. Operators often offer bundled services at promotional prices (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 mobile telephony package included in the bundled service. The average subscription amounts for the best selling bundled services in the Republic of Serbia are given in Figure 9.9.

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



Source: **RATEL**

10 VALUE ADDED AND MESSAGING SERVICES

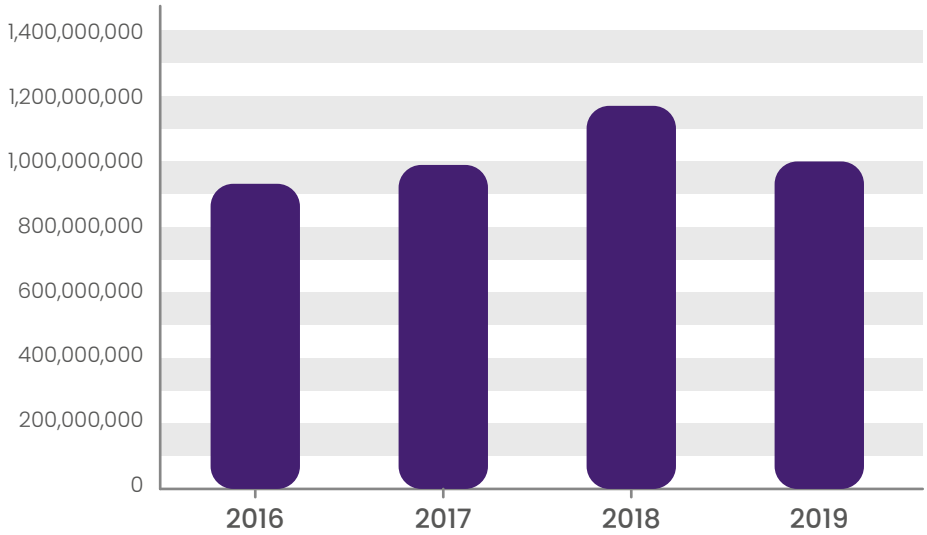
The Law on Electronic Communications and Rulebook on general terms and conditions for electronic communication activity ("Official Gazette of RS", no. 38/11) have created administrative possibility for messaging and value added service (VAS) providers to be registered in the register of operators managed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

In 2019, there were 50 operators in the register of public communication networks and services registered for value added service provision, most of them simultaneously 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.

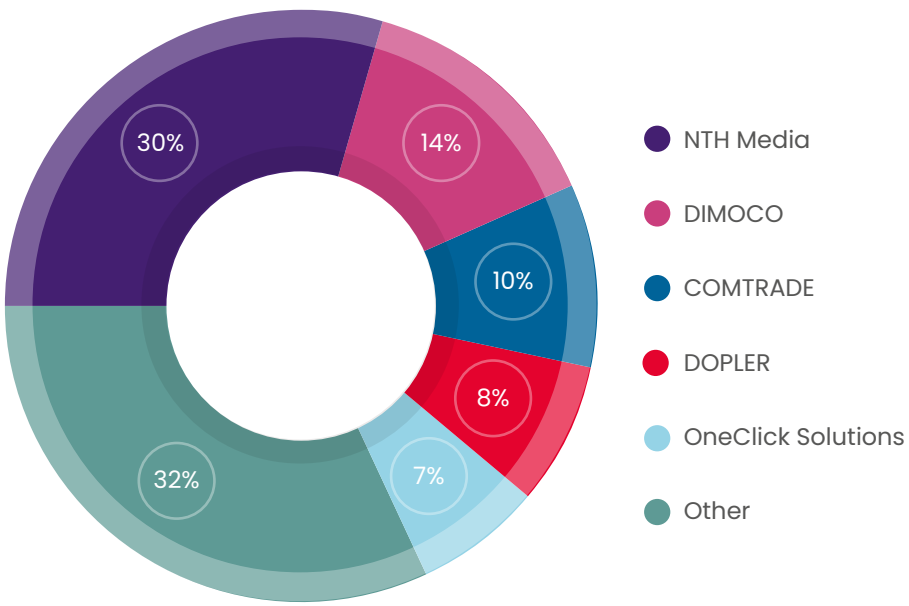
Annual revenues for the period 2016-2019 pertaining to the above services are given in Figure 10.1. The service provision accounts for the total income of 930 to 1,174 million dinars annually. In 2019, the revenues in this market, according to the data collected by RATEL, amounted to approximately 1,005 million dinars, which means that the operators' income has decreased by approximately 14% 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 the network operators and messaging and value added service providers.

Figure 10.1. Annual revenues 2016-2019



According to the available data provided to RATEL by the operators, there were three operators with the largest revenues from the messaging and value added service provision in 2019: NTH Media LLC, DIMOCO and COMTRADE, with the total share of 54% of the value added service market.

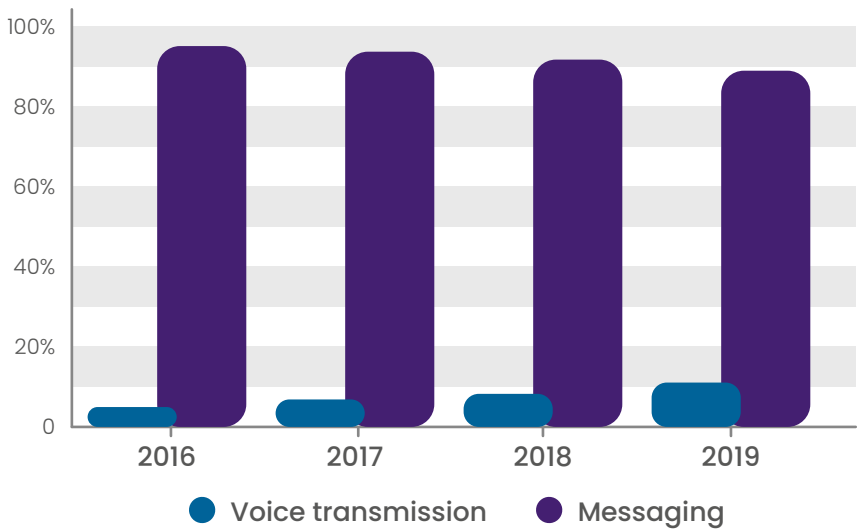
Figure 10.2. Market share of messaging and value added service operators by revenues made from these services



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 89% of the total revenues made by the operators in 2019 are revenues from messaging service (SMS, MMS) and VAS messaging, and the rest of the revenues 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 set 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.

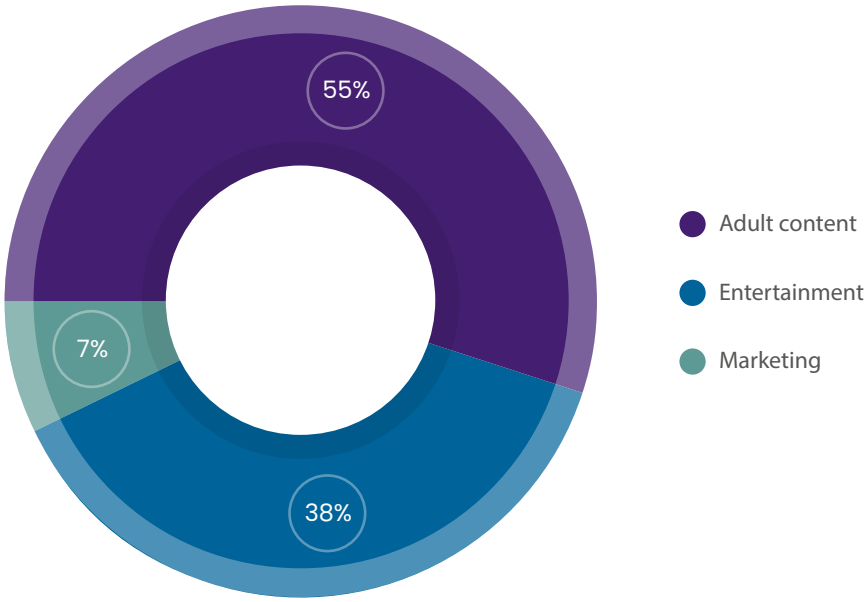
Figure 10.3. Market share by type of VAS and revenues made in 2016, 2017, 2018 and 2019



For the purpose of VAS voice transmission, the operators were assigned 580 numbers, i.e. 40 numbers more than the previous year.

In 2019, the voice value added service provision accounted for approximately 1.64 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 2019



In 2019, the volume of bulk message transmission and VAS message transmission was 566 million messages, the 90% of which account for bulk messages, and 10% for VAS messages.

The share of realized VAS messages by purpose is shown in Figure 10.5, with 78% 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 55% of the messages fall under category „Banking transaction notifications".

Figure 10.5. Share of realized VAS messages by purpose in 2019

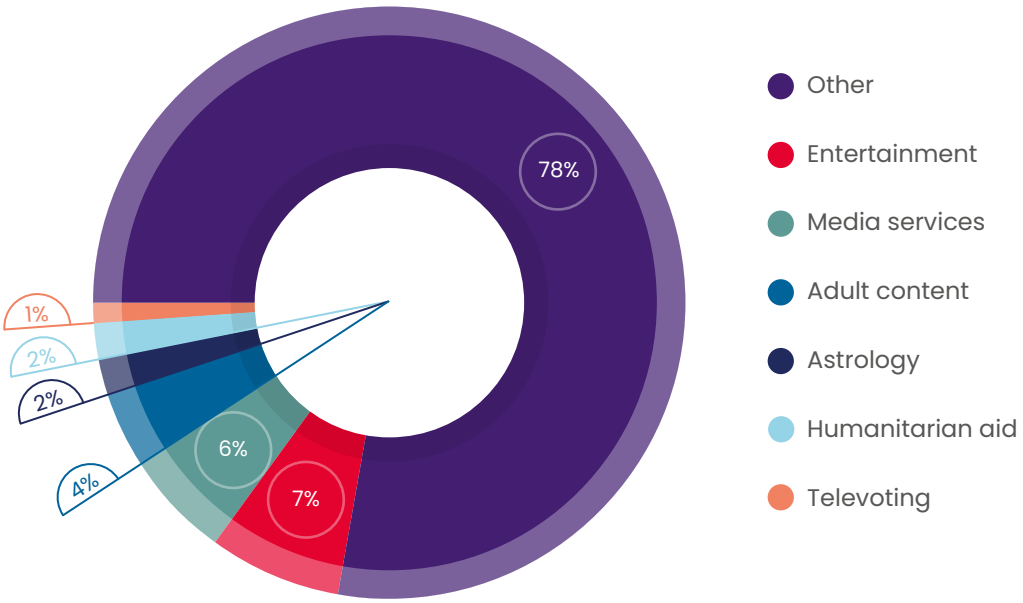
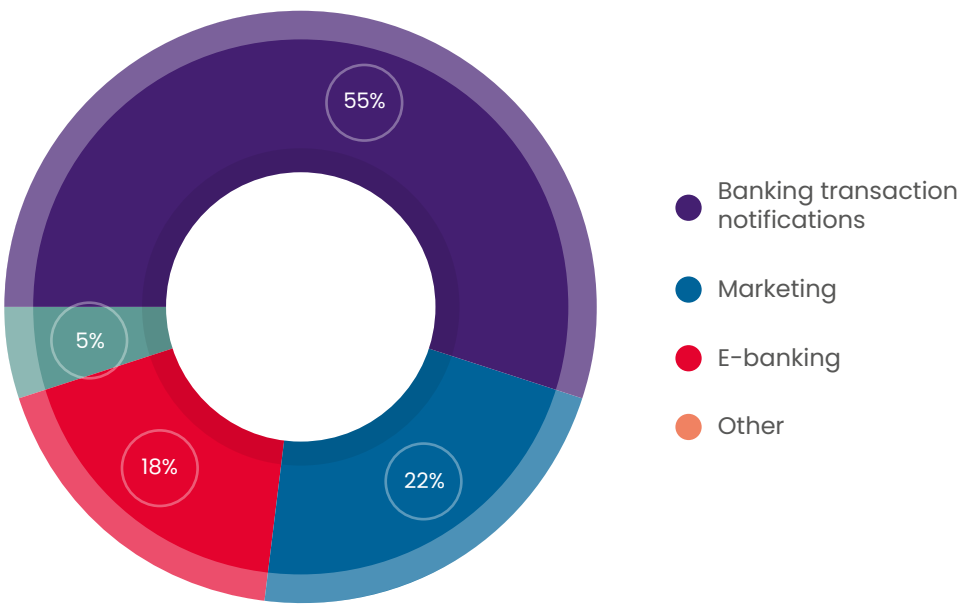
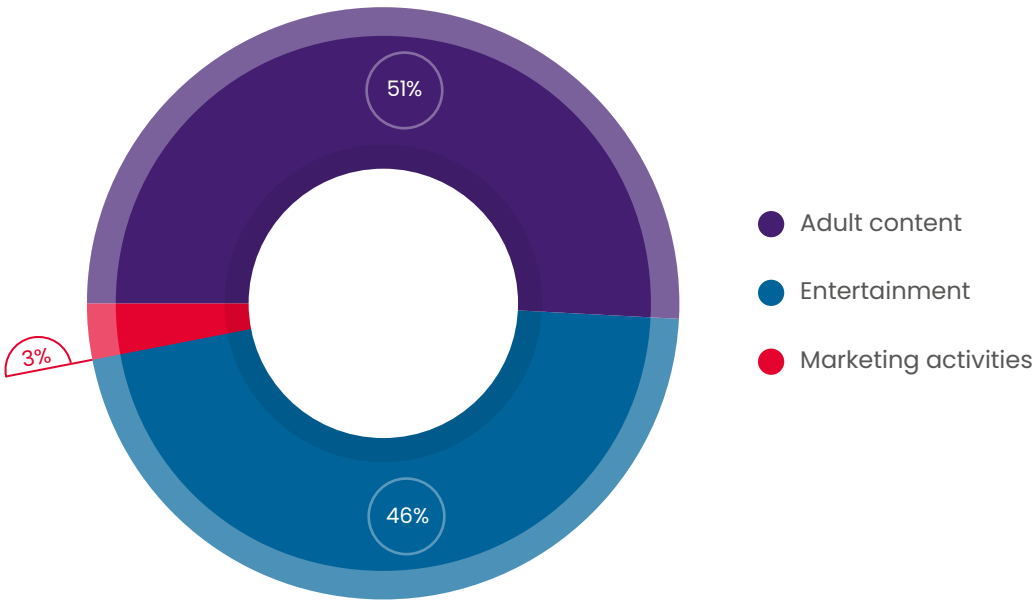


Figure 10.6. Share of realized bulk messages by purpose for message transmission in 2019



Revenues from voice VAS transmission amount to approximately 114 million dinars, with the shares by purpose being shown in Figure 10.7.

Figure 10.7. Share of voice VAS revenues, by purpose in 2019



Revenues from message service transmission (bulk messages) and VAS messages amount to more than 890 million dinars, 83% 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.

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 2019

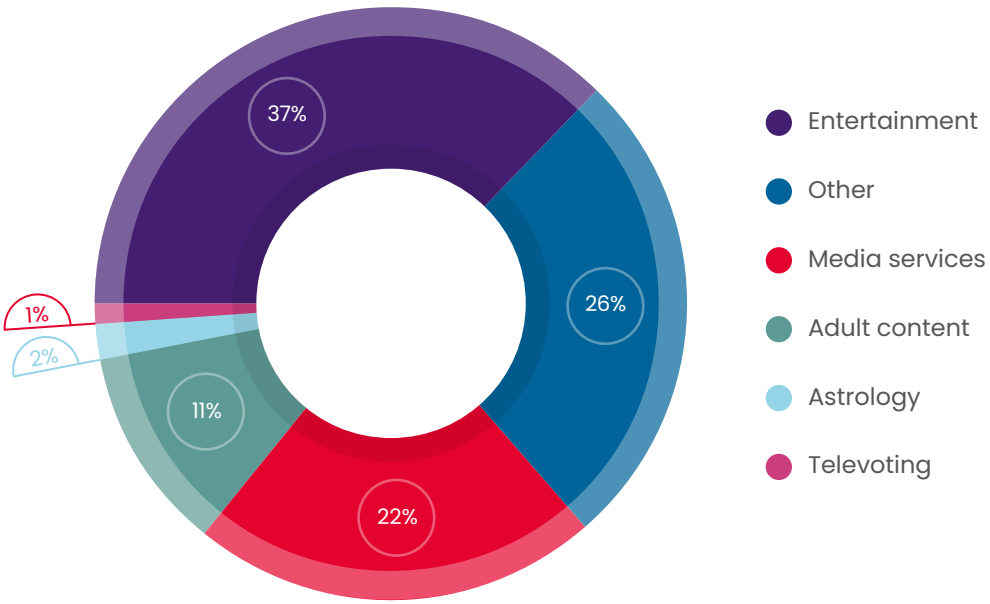
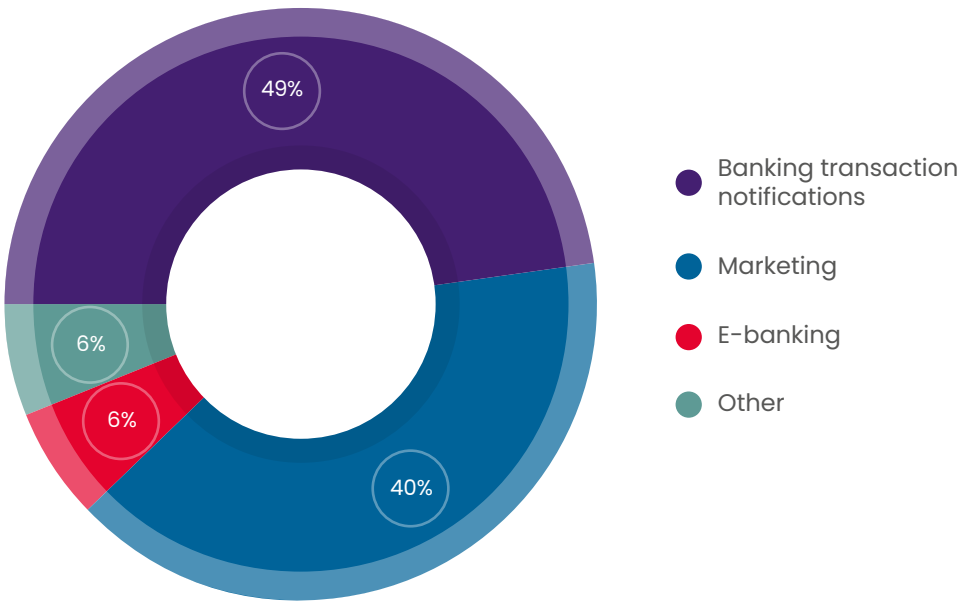


Figure 10.9. Share of message transmission revenues by purpose in 2019



11 MONITORING OF ELECTRONIC COMMUNICATIONS NETWORK AND SERVICE QUALITY PARAMETERS

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, 2020.

Average values of quality parameters for electronic communications services and networks for the period 2017–2019

Table 11.1 shows the number of the operators of electronic communications networks and services that submitted their network and service parameters in a report.

Table 11.1. Number of operators which provided reports

	2017	2018	2019
Voice service on the public telephone network at a fixed location	18	18	**24**
Voice service provided via Internet (VoIP)	22	20	**23**
Services on the public mobile communications network	4	4	**4**
Broadband access service	114	107	**102**
Media content distribution service	57	60	**40**

Average supply time for electronic communications services

For all electronic communications services, the average time from the instant of a valid service order being received to the instant a working service is made available for use, during last year was less than 4 days. The operators keep fulfilling the demands of users for electronic communications services more swiftly, so that the average supply time has become shorter or at least maintained on the satisfactory level, compared to the previous years.

Table 11.2. Average supply time for service

	Prescribed value	2017	2018	2019
Voice service on the public telephone network at a fixed location	10 days for 50% new connections a year	4.4	4.7	**3**
Voice service provided via Internet (VoIP)	8 days for more than 95% requests	2.5	3	**4**
Broadband access service	8 days for more than 95% requests	3.1	6	**3**
Media content distribution service	8 days for more than 95% requests	2.6	3.2	**3.4**

Customer complaints about quality of electronic communications services

During 2019, the percentage of user complaints about the quality of electronic communications services was on average less than 8% for all types of services. The highest percentage of complaints (8%) 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 all electronic communications services. For all electronic communications services, the percentage of users' complaints about the correctness of bills was less than 1%.

Table 11.3. Users' complaints and complaint resolution

		Prescribed value	2017	2018	2019
Voice service on the public telephone network at a fixed location	Percentage of user complaints about quality of service	**0.5%**	2.4%	2.9%	**2.17%**
	Resolution time for user complaints for 80% of the complaints (days)	**10.0**	1.1	1	**1.2**
	Percentage of user complaints about bill correctness	**≤1%**	0.9%	1%	**0.54%**
Voice service provided via Internet (VoIP)	Percentage of user complaints about quality of service	**-**	2.7%	2%	**1.2%**
	Resolution time for user complaints for 80% of the complaints (days)	**1.0**	0.72	1	**1**
	Percentage of user complaints about bill correctness	**≤1%**	0.1%	0.1%	**1%**
Services on the public mobile communications network	Percentage of user complaints about quality of service	**-**	1.9%	1.9%	**2%**
	Percentage of user complaints about bill correctness	**≤1%**	0.1%	0.1%	**0.1%**
Broadband access service	Percentage of user complaints about quality of service	**-**	6.1%	9%	**8%**
	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%**	0.7%	0.4%	**0.6%**
Media content distribution service	Percentage of user complaints about quality of service	**-**	4.5%	6%	**7%**
	Percentage of user complaints about bill correctness	**≤1%**	0.7%	0.7%	**0.45%**

QoS Parameters for operators' call centres

The shortest response time of an operator's call center during last year was for the voice service on the public mobile telephone network and amounted to 38 seconds.

Response time in call centers during 2019 remained at approximately the same level as in 2018, namely with the operators providing voice service on the public telephone network at a fixed location and operators providing media content distribution service. Notably shorter was the operator's response time in the broadband access and media content distribution support service, compared to the previous years

Table 11.4. Call center operator response time (in seconds)

	2017	2018	2019
Voice service on the public telephone network at a fixed location	27	30	**28**
Voice service provided via Internet (VoIP)	68	40	**25**
Services on the public mobile communications network	28	29	**38**
Broadband access service	40	32	**35**
Media content distribution service	31	30	**22**

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

The ratio of all unsuccessful calls, including 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 0.79% in 2019, which is a slightly worse result compared to the previous reporting cycle.

Table 11.5. Quality parameters for voice service on the public telephone network at a fixed location

	Parameter definition	Prescribed value	2017	2018	2019
Unsuccessful call ratio (all calls)	Percentage of call attempts to an existing user, which failed due to system failure or no capacities available. The case where the called party (B-Number) is busy or not responding is not regarded as a failed call.	**≤1%**	0.53%	0.83%	**0.79%**
Supply time for call (average time for national calls)	Time between selecting the two last digits of the subscriber's number and call verification signal.	**< 3s**	3.3	3.4	**2.7**

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,
- Vip mobile and
- Globaltel,

whereby, during 2016, Globaltel was registered as 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 50th week of 2019, between the 9th and 13th of December 2019.

Table 11.6. Quality parameters for public mobile services

	Parameter definition	**Prescribed value**	**2017**	**2018**	**2019**
Call Setup Success Rate for GSM mobile network (Call Setup Success Rate)	CSSR=(successful call attempts/all call attempts)*100	**> 98% at GSM network level**	99.42%	99.5%	**99.39%**
Call Setup Success Rate for UMTS mobile network (Call Setup Success Rate)	CSSR=(successful call attempts/all call attempts)*100	**> 98% at UMTS network level**	99.53%	99.88%	**99.25%**
Telephony Setup Time for GSM network	Time for connection setup from the moment user activates sending function.	-	6s	4.6s	**4.5s**
Telephony Setup Time for UMTS network	Time for connection setup from the moment user activates sending function.	-	5s	3.3s	**2.7s**
DL Throughput for Packet Interactive in GSM and UMTS mobile networks	Average throughput toward user (DL) for packet interactive.	**> 128 Kb/s**	5.6Mb/s	5.3Mb/s	**2.8Mb/s**
DL Throughput for Packet Interactive in LTE mobile network	Average throughput toward user (DL) for packet interactive.	-	35.7Mb/s	29.5Mb/s	**54.4Mb/s**

It is observable that the call setup time in 2G and 3G mobile communications networks has become shorter.

DL throughput for packet interactive toward users in GSM and UMTS mobile networks has decreased, but also significantly increased for packet interactive toward users in LTE mobile network.

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 50th week of 2018, between the 9th and 13th of December 2019.

Table 11.7. Network load for GMS and UMTS network voice traffic

		2017	2018	2019
GSM voice traffic	mean value of network load for GSM network voice traffic, Erlang/TRX	1.53	1.52	**1.22**
UMTS voice traffic	mean value of network load for UMTS network voice traffic, Erlang/TRX	1.76	2.1	**2.59**

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 Serbia. For that very reason, RATEL has been undertaking comprehensive benchmarking of mobile communications networks belonging to the following operators: Telekom Srbija, Telenor and Vip mobile, for three consecutive years now.

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). Benchmarking measurements were realized during October and November 2019 and represent an integral part of RATEL's regular activities.

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 five hot-spot locations in Belgrade and Novi Sad.

Benchmarking measurements of 2019 were carried out in 50 cities and along 10,000 km of roads in the Republic of Serbia. During the campaign, 6,000 calls, 20,000 data transfer sessions, 20,000 web browsing tests and 5,000 Youtube video testing sessions were performed, on all mobile networks, including all available technologies (2G, 3G, 4G). The measurements included:

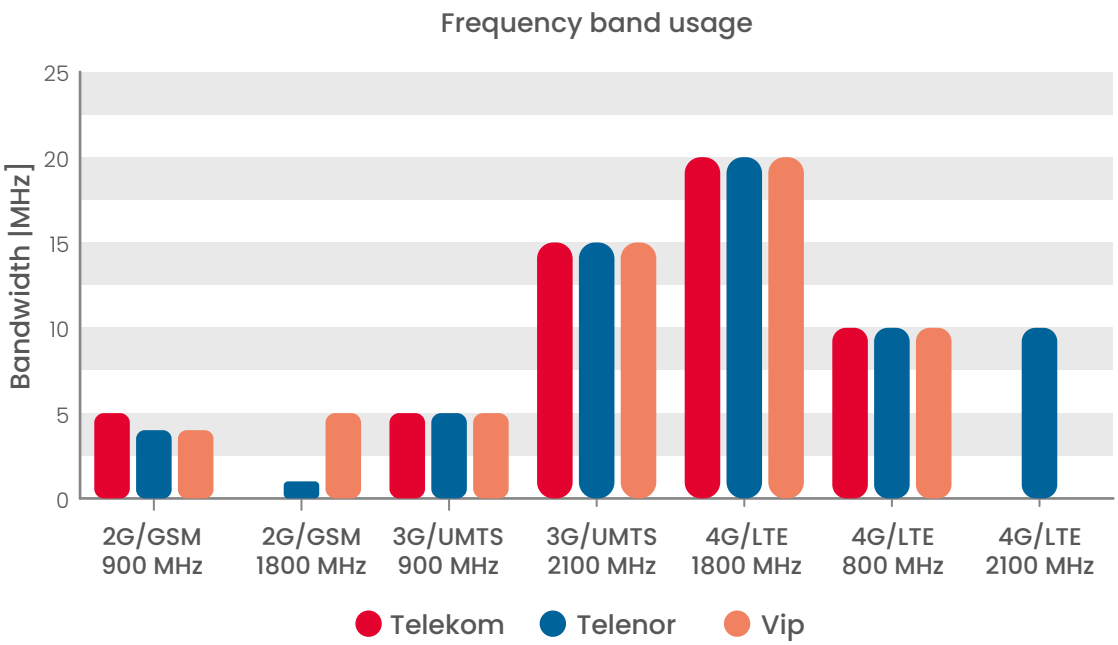
- radio parameter measurements for 2G/3G/4G technologies,
- measurement of KPIs for voice service and data transfer service.

Since the benchmarking of mobile networks was carried out in October and November 2019, the measured and calculated values of quality parameters, including final results, refer only to that period.

Radio parameters for 2G/3G/4G technologies

Radio frequency bands (2G, 3G, 4G) used by operators during benchmarking:

Figure 11.1. 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 Vip mobile, with Telenor using it to a slightly lesser extent.

3G/UMTS: All three operators used radio frequency band 2100 MHz. Radio frequency band 900 MHz was mostly used by Telenor, still employing the CSFB technology.

4G/LTE: Radio frequency bands 800 MHz and 1800 MHz were used by all three operators, with Telenor also using 2100 MHz band for selected areas. Telekom Srbija and Vip mobile used both bands in all categories, with Telenor again additionally using the 2100 MHz band, for example in Zrenjanin. All three operators predominantly used 20 MHz bandwidth channel for cities and towns, while along the roads 10 MHz bandwidth channel was used.

The use of Carrier Aggregation (or CA – combination of multiple carriers aiming to achieve higher data transfer rate) depends on network configuration and on the quantity of sent data during the test. In big cities, Telenor used LTE carrier aggregation for 40% of data transfer tests, Telekom Srbija for approximately 35% and Vip mobile for around 24%.

In smaller cities, carrier aggregation was used to a much lesser extent – by Telenor for 30% of data transfer tests, and by Vip mobile and Telekom Srbija for around 28% of tests. Along the roads, only Vip mobile had an observable CA sample – around 14%, followed by Telenor with 12% and Telekom Srbija with 7%.

KPI benchmarking for voice and data transmission services in 2017, 2018 and 2019

Within the performed benchmarking measurements, Telekom Srbija had the best total score in 2019, thanks to an outstanding improvement of the quality of all services in all categories. It is followed by Vip mobile, with an enhanced voice service quality in all categories. Generally speaking, by implementing the VoLTE service (voice transmission through 4G, Voice over LTE) Telekom Srbija and Vip mobile gained an advantage over Telenor.

Compared to 2018, all three mobile operators upgraded their voice transmission service quality. The VoLTE service implementation (voice transmission through 4G, Voice over LTE) helped Telekom Srbija and Vip make a significant step forward.

All KPI values for voice service tests were on the expected levels:

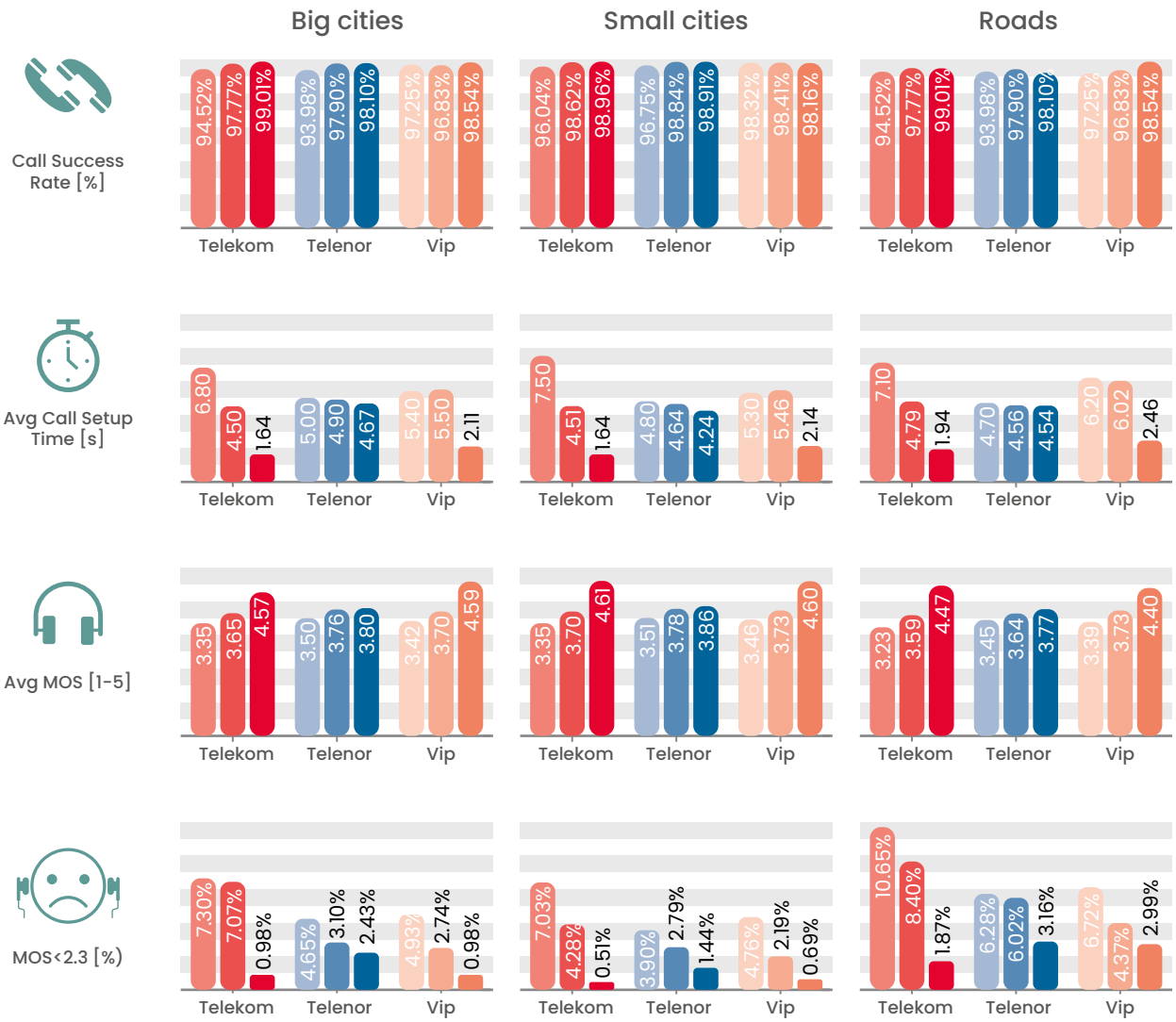
- *Call Success Rate: Telekom Srbija and Vip mobile increased their rate of successfully realized calls in big cities, while in small cities all three operators had the results on the same level as the previous year (with modest improvements made by Telekom Srbija and Telenor). The performance of all three operators was slightly degraded along the roads, compared to 2018.*
- *Call Setup Time: The most striking difference in results, compared to the previous benchmarking campaigns, concerns Telekom Srbija and Vip mobile, who significantly improved their average call setup time. Telekom Srbija showed better parameter values for voice service in all categories, compared to Telenor and Vip mobile. Telenor, on the other hand, made a step forward compared to the previous campaigns, despite an unchanged voice transmission technology (CSFB).*
- *Average value of MOS parameter. Average MOS results have been upgraded by 1 point compared to 2018, with the operators providing VoLTE services. Telenor also made progress, to the extent permitted by the CSFB technology.*
- *High percentage of samples with unsatisfactory MOS parameter values: MOS<2.3 voice signal quality considered unacceptable by users has been significantly reduced in all categories, with all three operators. The best performance however (over 6%) was achieved in the Telekom Srbija network.*

All three mobile operators reached satisfactory KPI values (KPI – Key Performance Indicator) for voice service tests in big and small cities. Along the roads, the Vip mobile and Telenor networks both saw CSR (Call Success Rate) that could be improved.

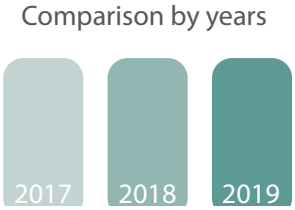
Telekom Srbija had the best voice service performance, mainly due to the shortest average call setup time. Telekom Srbija and Vip mobile demonstrated similar voice service quality, wtih Telekom Srbija showing better results, thanks to a greater availability. Telenor's results came out worse due to the lack of VoLTE functionality.

The complete analysis and comparison of KPI parameters for voice service is shown in Figure 11.2

Figure 11.2. Voice service testing results – KPI



Note: Different colour shades are used to make distinction between benchmarking campaign results in 2017, 2018 and 2019. Lighter shades represent benchmarking campaign results of 2017, whereas darker and the darkest refer to the benchmarking campaign results of 2018 and 2019 respectively. The example is demonstrated in the following figure:



As for the data transmission service parameters, Telekom Srbija improved its quality of service significantly compared to the previous years. Telenor and Vip mobile also made a step forward compared to 2018.

In the Telenor network, the data transmission QoS has been much higher than that of voice service. Telekom Srbija and Vip mobile had the best performance at data transfer service testing, with results ranging between 70% and 90% out of the maximum score, due to a greater data transfer service availability.

Comparative overview of the FDTT HTTP data transmission results is given in Figure 11.3

Figure 11.3. FDTT HTTP data transmission service testing results (DL 400 MB)

The session success rate reflects the level of reliability of the Internet connection provided by the mobile operator to users. During the benchmarking campaign of 2019, all three operators achieved excellent results (>99%), both in big and small cities. Compared

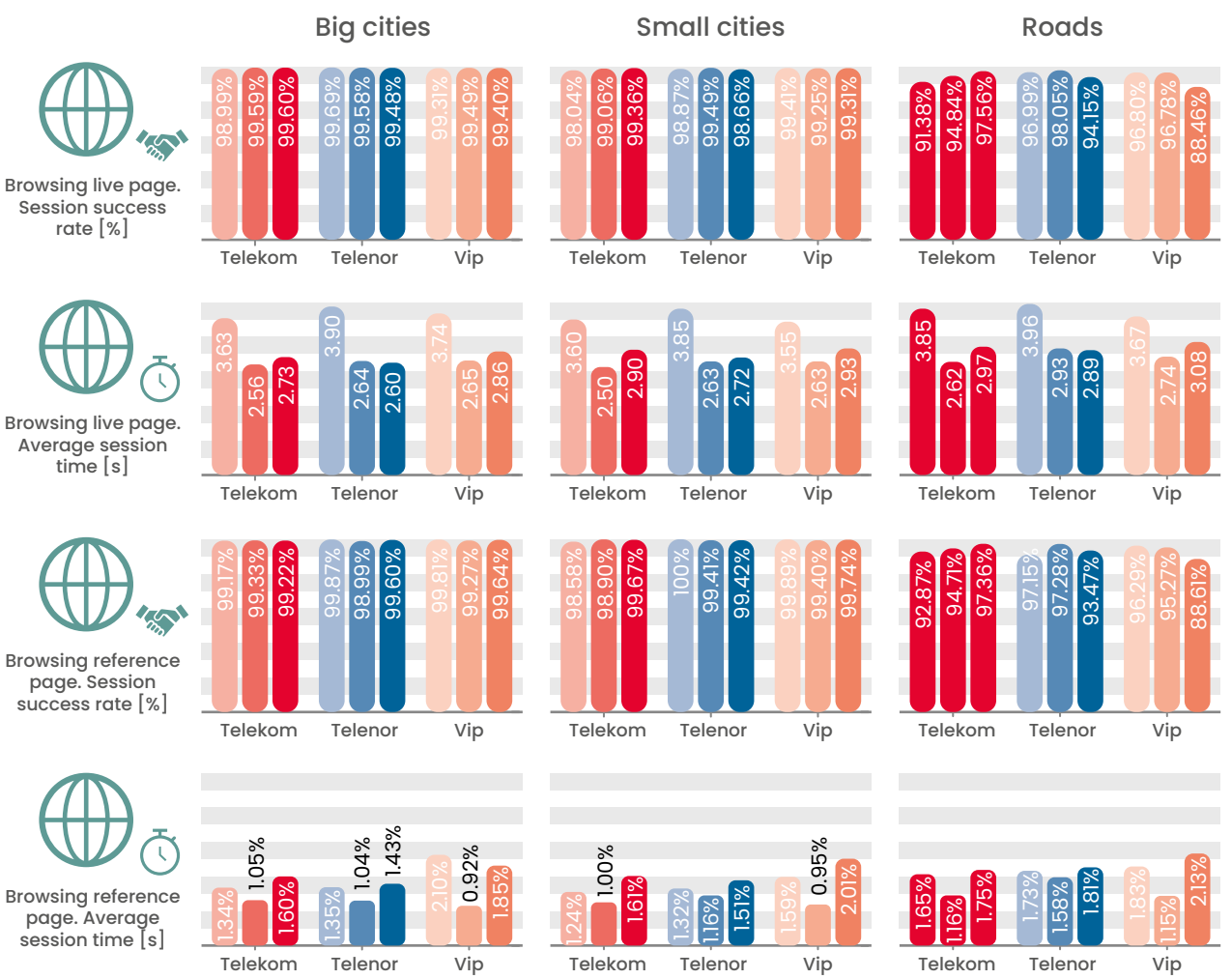
to the previous campaigns, the quality of service in big and small cities was maintained at the same level, whereas the QoS along the roads was slightly degraded.

The average data transmission rate was improved for all three operators, compared to 2018. The biggest improvement was made by Telenor (better results by 20-30 Mb/s compared to the previous year). The results achieved in 2019 have enabled the subscribers to comfortably use some of the most demanding services, such as videostreaming.

The percentage of samples with an average data transmission rate below 4 Mb/s is a metrics quantifying the rate of measurement samples not fulfilling the minimum criteria of customer satisfaction. If the average data transmission rate falls below 4 Mb/s, subscribers may encounter problems when using more demanding services, such as videostreaming or when downloading greater amounts of data. Compared to 2018, Telekom Srbija and Telenor made progress in all categories. Vip mobile improved its results in big and small cities, while its results along the roads were better during previous campaigns.

The comparative overview of the browsing service testing results can bee seen in Figure 11.4.

Figure 11.4. Browsing service testing results



The rate of successfully realized browsing live page sessions reflects most precisely web browsing service subscribers' quality perception. During the 2019 benchmarking campaign, all operators had almost identical performance in big and small cities, with differences unnoticeable for a user. The best results along the roads achieved Telekom Srbija. Vip mobile and Telenor scored weaker results than in the previous campaign. Despite negligible differences, users still can notice QoS fluctuations along the roads. Differences between the 2019 and 2018 results are due not only to the operators' network performance, but also to the changes in live pages' content and structure.

The average session time differs during the campaigns, due to the network improvements and changes in live pages' content and structure. All three operators' performance was on a similar level, with Telenor achieving the best results in all categories.

The rate of successfully realized browsing reference page sessions in this year's benchmarking campaign in cities remained on the same level as during the campaign 2018, while Telekom Srbija made progress along the roads. From the users' perspective, differences are hard to perceive both in big and small cities.

The average reference page browsing session time has degraded for all operators, the biggest degradation pertaining to the Vip mobile network. Telenor marked the best score in the cities. Along the roads, Telekom Srbija and Telenor had similar results.

Parameters referring to YouTube and comparative results overview in 2019 are shown in Figure 11.5.

Figure 11.5. YouTube video service testing results

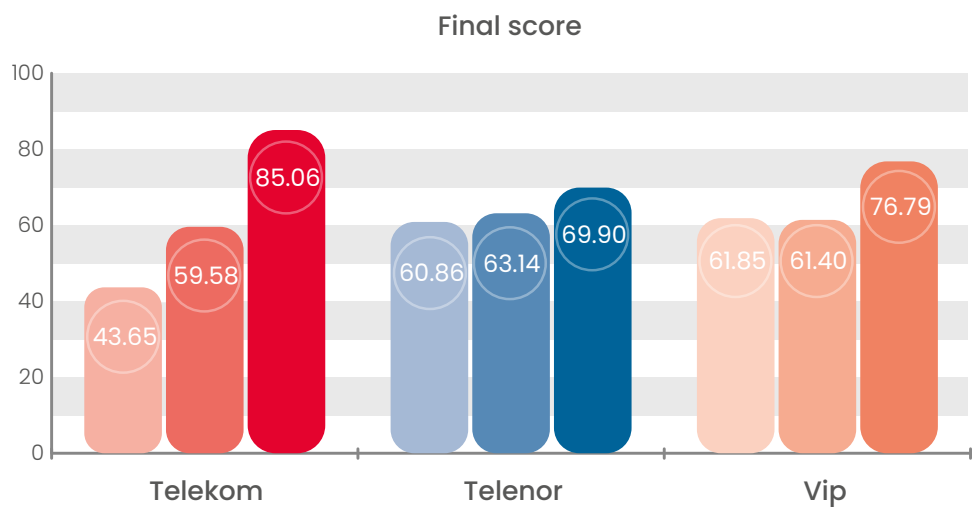
The rate of successfully realized sessions has been improved for all operators. Differences between the operators are indiscernible by users.

The uninterrupted video playout rate has been improved for all operators during this year's benchmarking campaign both in big and small cities. All three operators scored excellent results in these categories, with negligible differences indiscernible by the user. Along the roads, Telekom Srbija made progress compared to the previous campaign, Telenor remained on its last year's level and Vip mobile had slightly weaker results (by 1%).

YouTube VMOS is a complex metrics reflecting all aspects of video signal quality (resolution, interruption, blurriness, blockage etc.). Comparing the results between 2019 and 2018, all operators improved their result by 0.5 VMOS points, due to the usage of a different YouTube player. Measurements in 2017 were performed with YouTube App v11.49.55 and during the 2018 benchmark, YouTube App v13.10.55 was used. This app starts playout with low resolution and upgrades gradually over time to 1080p. During the 2019 benchmarking campaign, YouTube App v13.48.51 was used. All three operators reached similar results in all categories. Scarce small differences are hardly discernible by the end user.

The analysis of the above and scoring of all parameters according to the scoring matrix have resulted in the final measurement results performed in 2019, as shown in Figure 11.6.

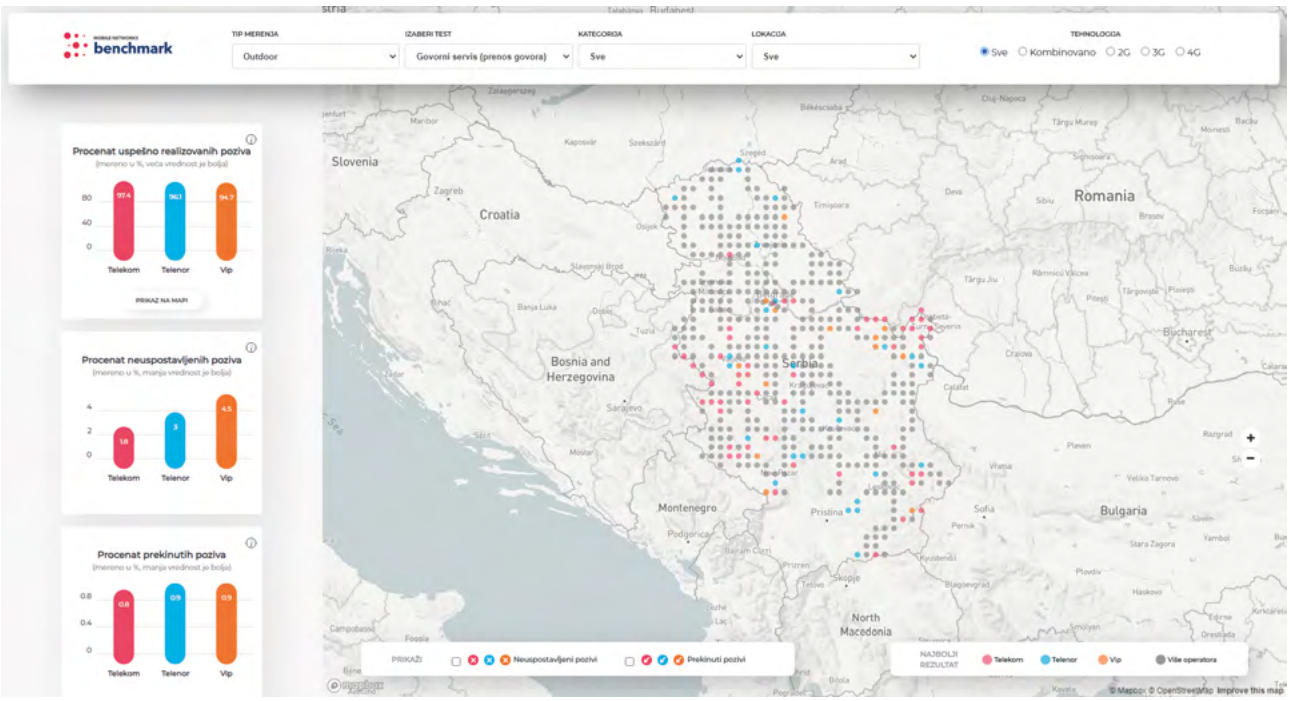
Figure 11.6. Comparison of final results



Upon the completion of the benchmarking, followed by data processing and analysis of the measurement results regarding mobile operators' network quality in the Republic of Serbia, an update was added to the interactive portal for comparative mobile network quality referring to the 2019 results and an additional functionality allowing the analysis of result trends. The portal is available in Serbian and English, at the following address:

http://benchmark.ratel.rs.

Figure 11.7. Benchmarking interactive portal



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. Since then, 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/sr/index

The testing of Internet connection 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

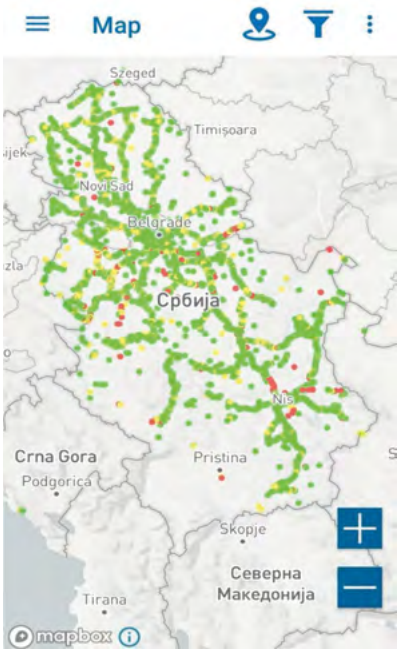
Application logo and number of downloads from Google Play Store and Apple App Store in 2019

App	Digital distribution service	Number of app downloads
RATEL Net Test	Google Play	3062
		700

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 11.8. Mobile application home page

Figure 11.9. 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,
- data upload speed: measurement from user to measuring server,
- latency,
- packet loss,
- signal quality (RxQual, Ec/Io, RSRQ) and signal strength (RSSI, RSCP, RSRP), if a mobile terminal is used,
- zero measurements – measurements in 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 11.10. Testing of Internet connection

Figure 11.11. Testing results

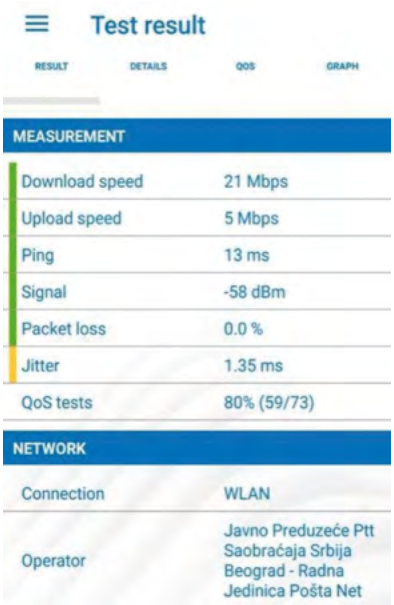


Figure 11.12. Zero measurements

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.

6656 users measured their Internet connection quality using RATEL NetTest application in 2019. 61.2% of subscribers used web application, 37.2% mobile phone, and 1.6% measured the above parameters by means of a tablet. The majority of measurements were performed for the Telekom Srbija telecommunications network.

12 ELECTRONIC COMMUNICATIONS INFRASTRUCTURE INTENDED FOR SHARED USE

The Agency 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, hereinafter: the Rulebook).

Pursuant to Article 52 od the Law, the Agency 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). The Agency adopted the Rulebook 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, the Agency 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.

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.

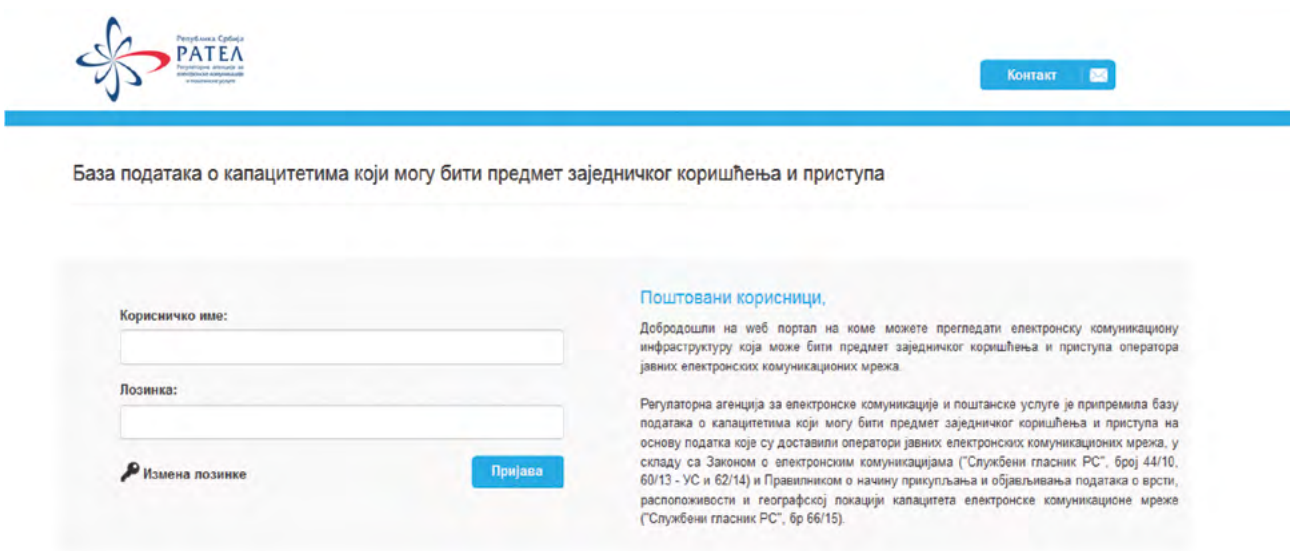
On December 31, 2019, the Database contained information on 1739 antenna masts, 1500 optic cables and approximately 200,000 cable duct elements. A web – GIS application for end users (operators of electronic communications networks) has been made

available on RATEL's website. There have been around 6100 logins to this database during 2019.

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 a username/password combination, Figure 12.1.

Figure 12.1. Access to Capacity database web – GIS application



The Web – GIS application includes standard tools for map operation, such as (Figures 12.2 and 12.3):

- Switching on/ switching off of layers;
- Zooming;
- Measurement of distance/ surface;
- Definition of coordinates in different coordinate systems;
- Selection of data using spatial inquiries/ selection of areas by hand;
- Selection of a large number of data through free ArcGIS online service (satellite footages, topographic maps, street networks etc.)

Figure 12.2. Use of standard tools – measurement of surface by hand

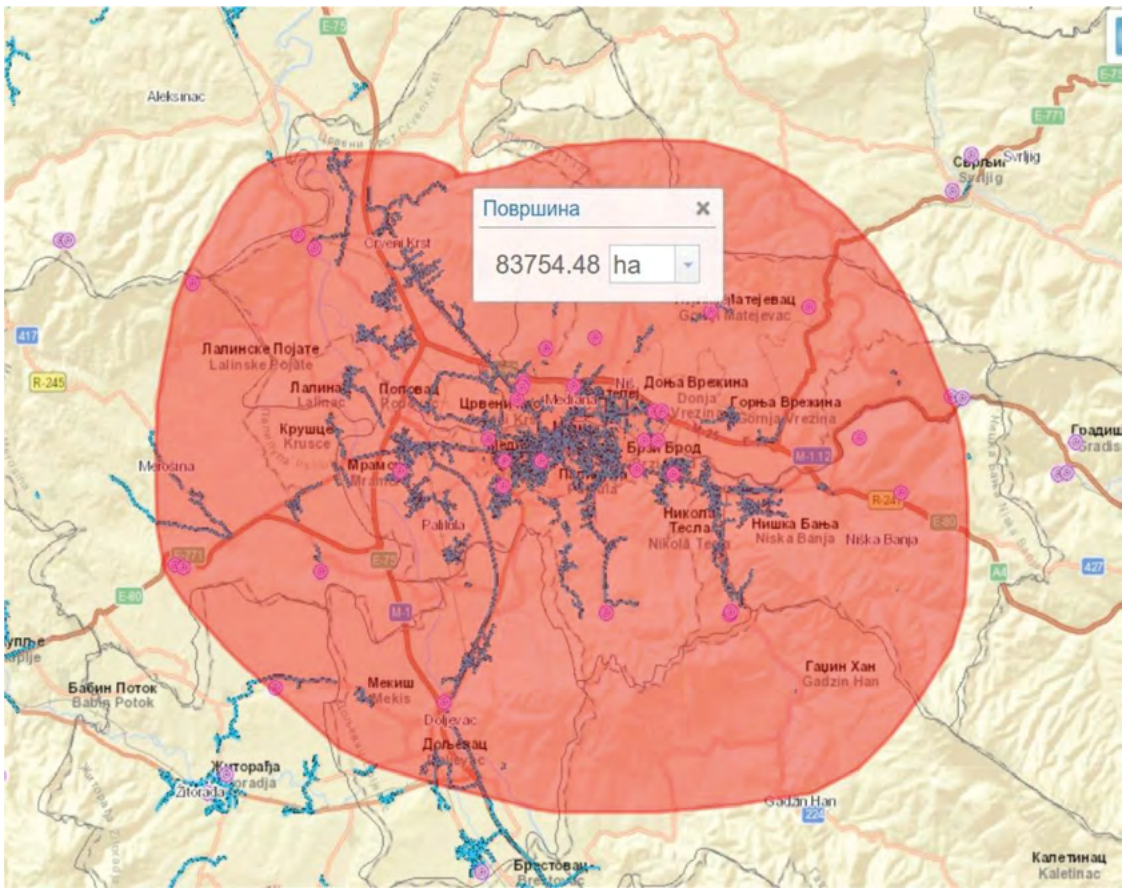
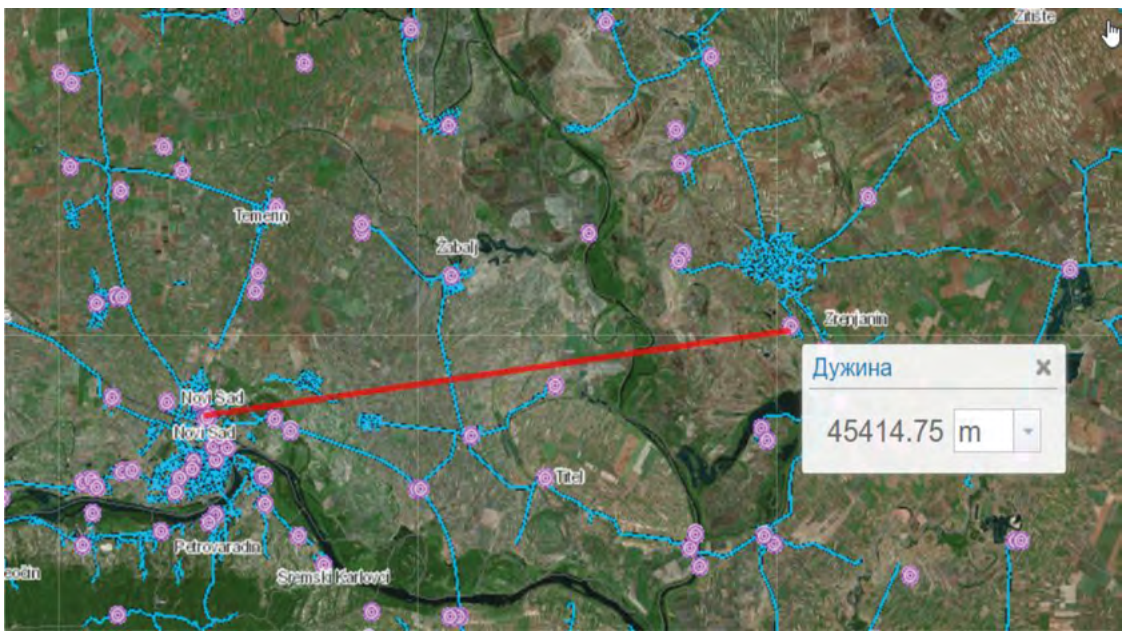


Figure 12.3. Use of standard tools – measurement of distance



Cable ducts of electronic communications networks

Based on Annex 1, EKMI1 Form of the Rulebook, data on cable ducts to be collected are the following (Figures 12.4 and 12.5):

- 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 12.4. Cable details

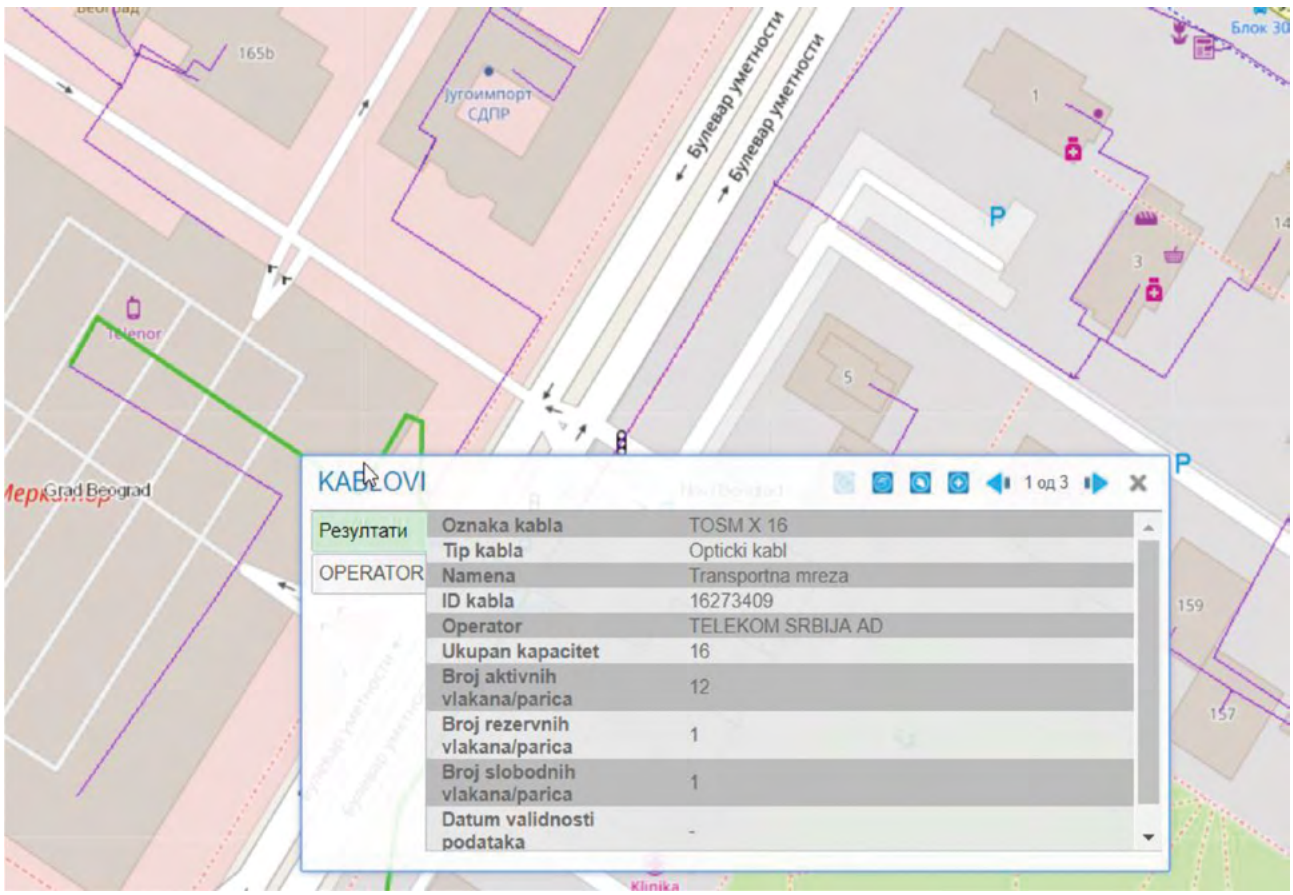
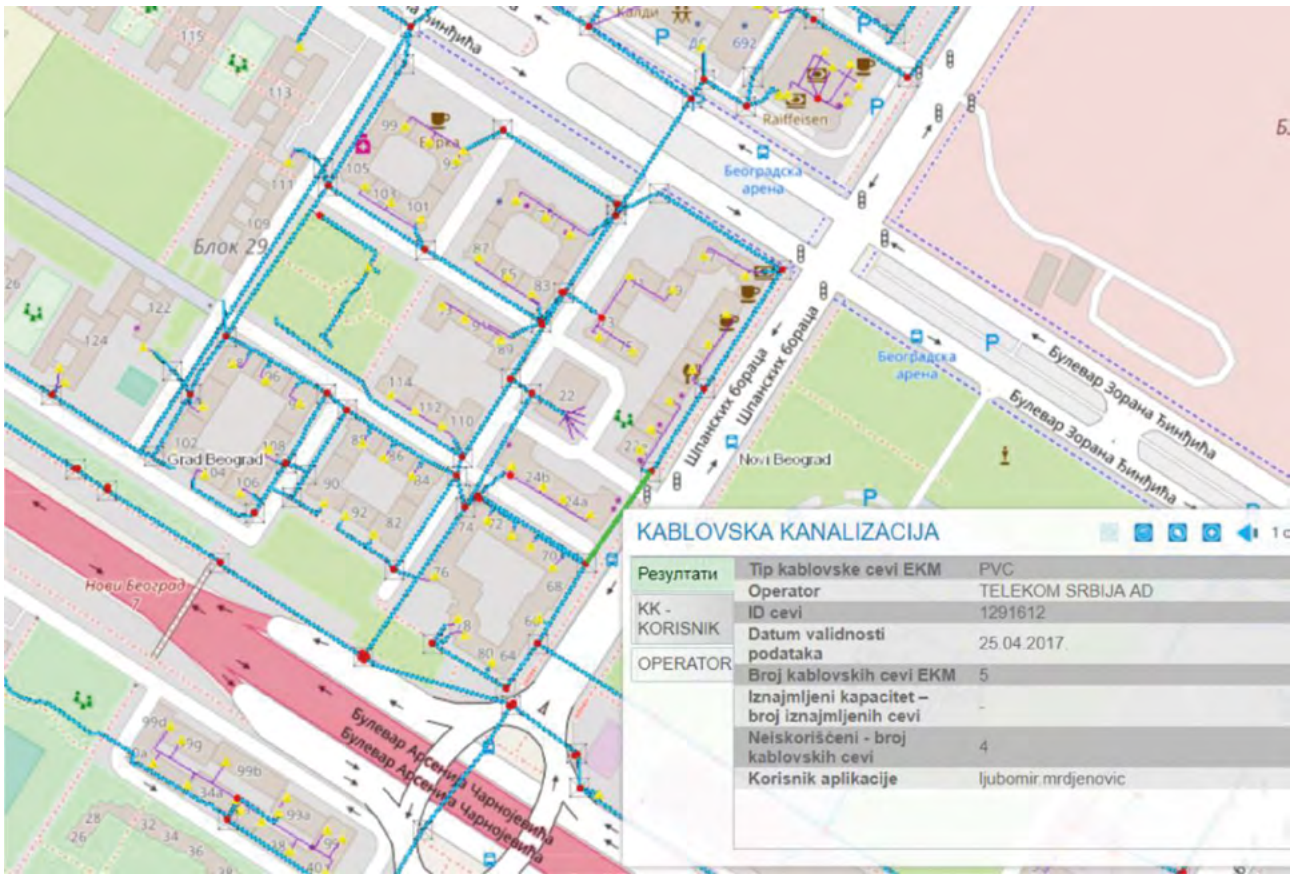


Figure 12.5. Cable ducts segment details



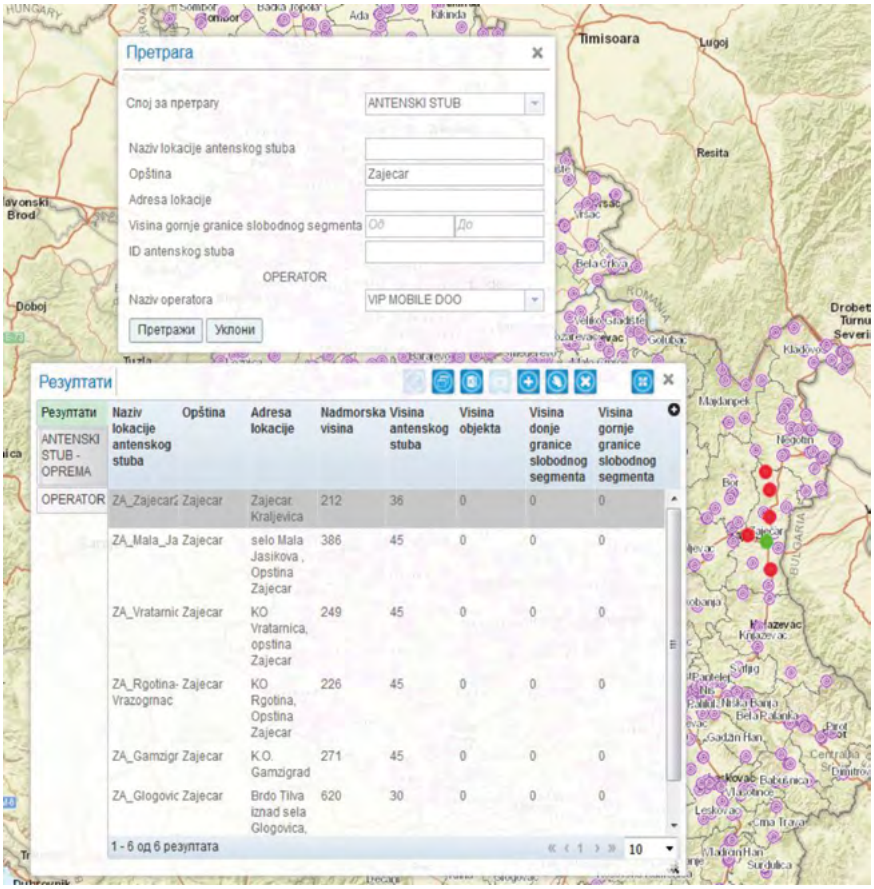
Electronic communications network antenna masts

Based on Annex 2, EKMI2Form of the Rulebook, data on antenna masts and equipment to be collected are the following (Figures 12.6 and 12.7):

- 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 12.6. Antenna mast data

Figure 12.7. Antenna mast spatial query



13 POSTAL SERVICES MARKET

In 2019, the volume of postal services in the Republic of Serbia has decreased by 5%; however an increase of income by more than 8% has been observed.

During 2019, in the Republic of Serbia approximately 309 million postal services were provided.

In 2019, there were in average 124 delivered postal items per household, (43 items per inhabitant), out of which 108 postal services from the UPS domain (38 per inhabitant).

Postal services in the Republic of Serbia generated during 2019 an income of approximately 21.2 billion dinars, (approximately 180 million EUR), representing close to 0.4% of the projected GDP (5,401.79 billion dinars[7]).

On December 31 2019, 59 commercial service operators, including the public postal operator – PPO (PE Post of Serbia), had authorization to provide postal services. During 2019, 5 authorizations to provide postal services have been revoked, while one authorization to provide postal services has been awarded.

Much like the previous year, in 2019, 26 operators provided domestic express services, 2 operators provided international express services, 6 operators provided both international and domestic express services and 25 operators provided courier services. A limited number of operators, although possessing an authorization to perform commercial services (courier and express), discontinues periodically their services, making longer or shorter breaks in their activities, which is recorded in the Register of postal operators' authorizations. As for the domestic express operators, some of them provide postal services on behalf and for the account of bigger postal operators.

The number employees in postal sector in the Republic of Serbia is increasing continually (Table 13.1), reaching the growth rate increased by 0.8% compared to 2018. Out of the total number of employees in the Republic of Serbia (2,101,267[8]) 0.9% are in the postal sector.

The PPO still employs the highest number of postal workers (79%), however their number has declined by 0.8% compared to 2018. The growth of the number of postal employees is due to the growth in the express and courrier sectors, which has been slightly over 7% compared to the previous year.

7 Statistical Office of the Republic of Serbia (RZS)
8 RZS

Like in previous years, the employees of auto-transport companies (drivers) such as AD „Nišekspres" and „Autoprevoz Kikinda" were not included in the total number of employees, nor were the employees of the logistics companies (Gebrüder Weiss, Milšped, etc.).

Table 13.1. Postal employees

Postal employees during 2015-2019					
	2015	**2016**	**2017**	**2018**	**2019**
PPO	14,965	14,868	14,980	15,121	**15,001**
Other postal operators	2,751	3,096	3,629	3,762	**4,031**
TOTAL	17,716	17,964	18,609	18,883	**19,032**

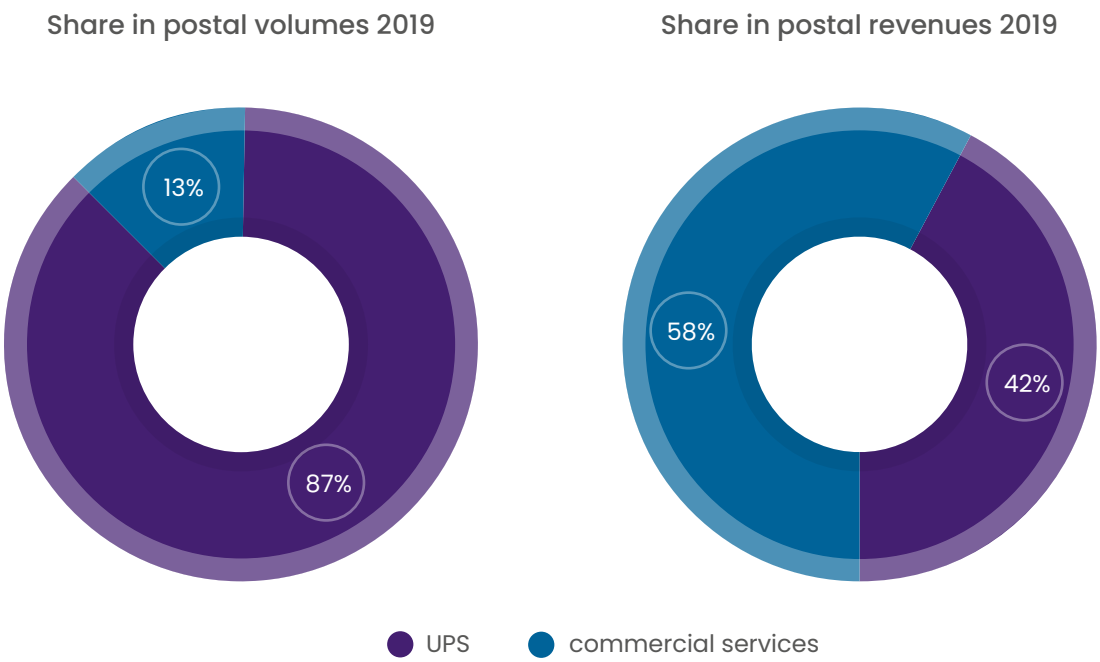
In 2019, the volume of universal postal service (UPS) was around 270 million, while the volume of commercial services amounted to more than 39 million, making up a little under 13% of the total volume of postal services (Table 13.2). Universal postal service remains dominant, with a share of over 87% in the total volume of postal services.

Table 13.2. Postal service market in 2019

Postal services market in the Republic of Serbia in 2019				
TYPE OF SERVICE	**VOLUME thous. RSD**	**INCOME thous. RSD**	**VOLUME %**	**INCOME %**
Universal postal service	269,715	8,916,212.00	87.4	42.1
Commercial services	39,005	12,276,567.18	12.6	57.9
TOTAL	308,720	21,192,779.18	100.0	100.0

The UPS share in terms of both volume and income has continued to decrease. In 2019, around 58% of the total income in postal industry was earned by the commercial services, as the most profitable portion of the market (Figure 13.1).

Figure 13.1. Shares in volume and income of UPS and commercial postal services in 2019



Comparative overview of volumes and income from UPS and commercial services

Universal postal service (UPS) is provided by the PPO (PE „Post of Serbia"), the exclusive license owner, while commercial services are provided by all postal operators.

UPS is, by definition, a service of general interest consisting of several postal services provided continuously on the entire territory of the Republic of Serbia. This service must comply with the set quality, therefore the universal service provider (USP) must meet certain quality standards. UPS is 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, including letters in court, administrative and offence procedures,
- cecograms up to 7 kg,
- collection, transmission and payment of postal money orders,
- collection, transport and delivery of parcels up to 10 kg in domestic postal traffic,

- collection and transport of parcels up to 10 kg in international postal traffic (outbound),
- delivery of parcels up to 20 kg in international postal traffic (inbound).

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, so a continuous search for new models of UPS funding and elaboration of the existing ones is constantly under way.

In the Republic of Serbia, the Law foresees the funding of UPS from the scope of reserved services. Reserved services represent an exclusive right of the PPO.

Reserved service limits are set by RATEL. The determined limit is 100 g[9] in terms of weight and threefold the amount of the postal charge for a first-weight category letter and the fastest transmission level, in terms of price. This amount in 2019 was 81 dinars.

Reserved postal services in domestic and international postal traffic include the following services:

- transmission of all letter-post items (including recorded items) up to set limits per weight and price,
- collection and/or transmission and/or payment of money orders,
- collection and/or sorting and/or transport and/or delivery of letters in court, administrative and offence procedures, regardless of limits,
- collection, sorting, transport and delivery of addressed direct mail,
- collection, sorting, transport and delivery of notifications on day and time of voting.

Unlike several previous years which saw a rise in the share of reserved services in the total UPS, it is observable that in 2019 this share remained the same as in 2018 (98%).

The most numerous reserved postal item category, letters up to 20 g – 100 g, have kept the largest share in the UPS (91.57%), which is a slightly lower figure compared to 2018 (91.84%). With a new regulation of the new Law on Postal Services prescribing lowering of the reserved postal service limits up to 50 g, the spotlight is on the share of this postal item category which in 2019 was 96.3% in the total UPS, accounting for its dominant portion.

Since 2016, the items from the 20 g – 100 g category have been on the decrease, however in 2019, this segment marked a surge in the UPS share compared to the previous year, with share 6.48% (6.27% in 2018).

9 In November 2019, the new Law on Postal Services came into effect („Official Gazette of RS" No. 77/2019) whereby the reserved service limit was changed to 50 g. Since the Law started to apply at the end of year, for the purpose of this Market Overwiew for 2019 we decided to keep the limit up to 100 g.

In terms of UPS volumes, in 2019 interestingly almost all services have been in decline compared to 2018, with the exception of postcards and postal money orders which rose by 0.47% and 2.65% respectively.

The biggest drop in services during 2019 was recorded in items with small UPS share: insured parcels (-37%), insured COD letters (-31%), addressed direct mail (-28%) and special delivery or cumbersome parcel (-27%). Non-recorded letters remain the dominant UPS category in 2019, marking nonetheless a drop in volume by 5.5%, unlike in the previous years.

In the total revenue generated from the PPO's postal services, reserved services account for 70.2% (out of which letter-post items make up 61.2%, and money orders 9%). In 2019 as well, the reserved service income share has been on the decline. Non-reserved services have marked a growth in the income share generated from the PPO postal services (accounting for 5.4%).

As shown in the UPS volume, the share of reserved postal items income remains the largest portion of the UPS revenues (95.5%) The letter-post items up to 20 g income is still dominant, although their volume share has decreased slightly in 2019, amounting to 87.09% (in 2018 it was 87.24%). The income generated by postal items up to 50 g is 93.6% of the total UPS revenues.

Unlike the UPS volume where almost all services are on the decline, the income segment has seen several services (beside postcards and postal money orders) boosting their share, the major among them being insured letters (almost 34%), postcards (15%), followed by printed matter and registered printed matter (7% and 7.7% respectively).

The biggest drop in UPS income compared to 2018 is attributed to special delivery or cumbersome parcels (-25%), insured COD letters (-24%), and addressed direct mail (-19%).

Postal items handled by the PPO under the concluded agreements with legal persons (mostly non-recorded and court letters) have grown in terms of UPS income (78.5%) and stayed on same level in terms of UPS volume (88%), compared to 2018.

Despite being approximately 20 times less present in international traffic than in domestic traffic, UPS grew in volumes second year in a row.

The international inbound UPS is dominant and makes up 83% of the total UPS international volumes. These services account for over 60% of the total international traffic revenues.

Commercial postal services[10] include provision of express services, courier services and parcel services outside the UPS domain.

Express services are postal services that include collection, sorting, transport and delivery of recorded express items in the shortest delays, both in domestic and international postal traffic.

10 The new Law on Postal Services („Official Gazette of RS" No. 77/2019) recognizes no more commercial postal services, but taking into account that the Law started to apply as of November 2019, for the purpose of this Market Overview for 2019, we decided to keep the previous classification.

Courier services are postal services that include collection, transport and delivery of recorded postal items directly from sender to recipient, without sorting, with one same worker-courier performing collection, transport and delivery.

Commercial parcel service include parcels outside UPS, namely:

- collection, transport and delivery of parcels over 10 kg in domestic postal traffic,
- collection and transport of parcels over 10 kg in international postal traffic (outbound),
- delivery of parcels over 20 kg in international postal traffic (inbound).

In the service structure of operators providing commercial services, the largest share is that of domestic commercial services, which account for 97.6% of all commercial services and participate in the income with 83% (Figure 13.2).

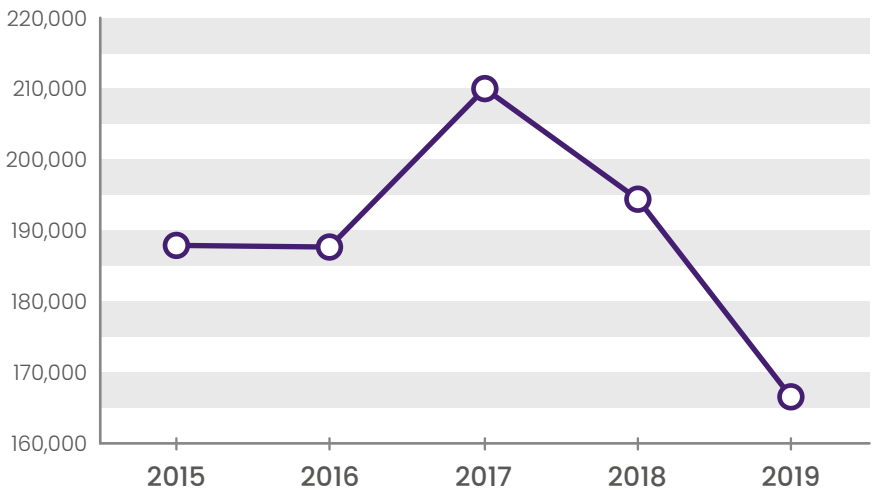
In 2019, the average price of commercial services has increased by close to 6 dinars, amounting to 268 dinars approximately. For the first time, the average income per unit increase was recorded during 2019. In the period 2010-2018 these services were on a continuous decrease.

The international commercial services participate in the volume of services with 2%, accounting for 16.5% of the revenues (Table 13.3). The average income from these services in international traffic was around 2,600 dinars, which is 197 dinars less compared to 2018.

In 2019, the courier service has had a lower share in the total volume of services, with a share of 0.4% and income share of 0.5%. The average income per service has been growing continuously, in 2019 by 26 dinars approximately and amounted to more than 375 dinars (Table 13.3).

The commercial services have been following a steady growing trend. The domestic express services have consequently seen an increase in volume by over 10%. A rise in the international volume of services by more than 25% compared to 2018 was recorded. A decrease by more than 14%, on the other hand, in the volume of courier services has been observed, for the third year in a row (Figure 13.2).

Figure 13.2. Volume trend of courier services 2015-2019



Commercial services have seen an increase in income by approximately 13%, with generated more than 12 billion dinars.

International commercial services account for an increase in revenues by almost 17%. Domestic commercial services, as dominant, have grown by approximately 13%, in terms of income.

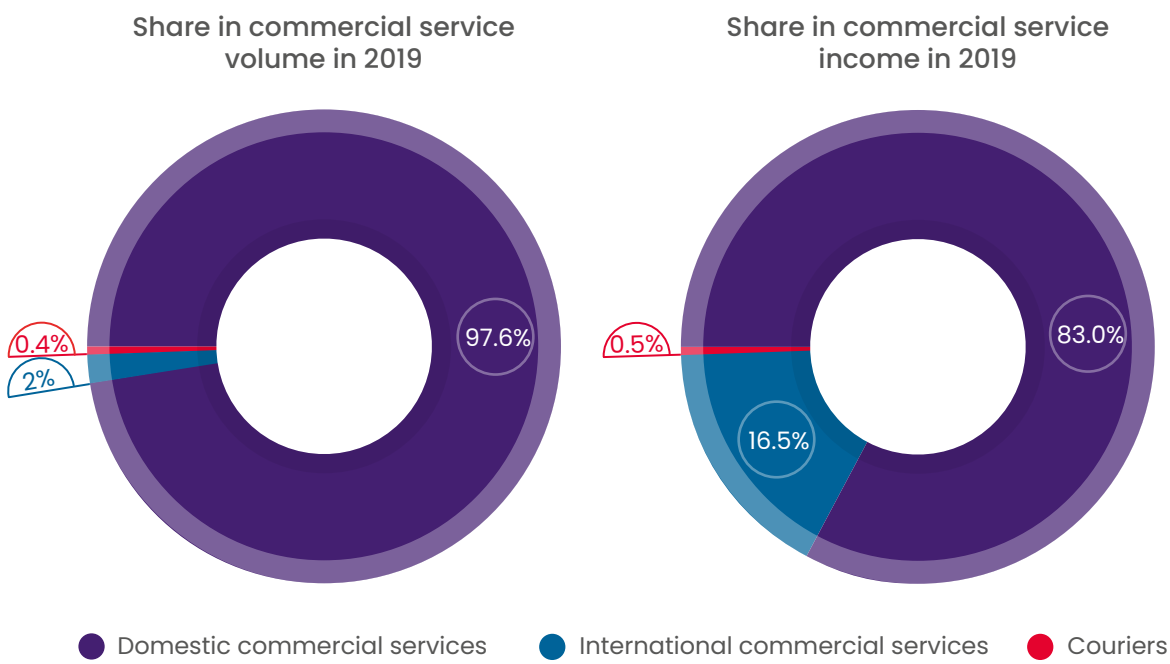
In 2019 there was an 8% drop in revenues from courier services, unlike the previous year when they showed increase.

The commercial services structure is shown in Table 13.3 and Figure 13.3.

Table 13.3. Commercial services structure in 2019

Commercial services structure in 2019				
Type of service	**Volume thous.**	**Income thous. RSD**	**Volume %**	**Income %**
Domestic commercial services	38,058	10,189,292.57	97.6	83.0
International commercial services	780	2,024,709.03	2.00	16.5
Courier services	167	62,565.58	0.4	0.5
TOTAL	39,005	12,276,567.18	100	100

Figure 13.3. Shares in volume and income of commercial postal services in 2019



The trend of commercial service volume and income shares in the Republic of Serbia over the last five years is given in Table 13.4.

Table 13.4. Trend of commercial service shares in%

Type of service	2015		2016		2017		2018		2019	
%	Volume	Income	Volume	Income	Volume	Income	Volume	Income	Volume	Income
Domestic commercial services	96.0	76.0	96.3	76.7	97.3	82.0	97.6	83.4	**97.6**	**83.0**
International commercial services	2.9	23.1	2.8	22.4	2.0	17.3	1.8	16.0	**2.00**	**16.5**
Courier services	1.1	0.9	0.9	0.9	0.7	0.7	0.6	0.6	**0.4**	**0.5**
TOTAL	100	100	100	100	100	100	100	100	**100**	**100**

Express services are dominant among all commercial services and make up 98% of the domestic commercial services traffic, while their income share amounts to 83%.

Analysis of express services and impact of remote commerce

In the following text, an overview of express services in 2019 is shown, in terms of volumes and revenues generated by domestic and international express services, distribution by weight category and by content (documents/goods), including ratio of outbound and inbound items in international traffic and an analysis of the impact of remote sales.

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

Table 13.5 and Figure 13.4 display the structure of express items by weight in domestic postal traffic (in thousand).

Table 13.5. Structure of domestic UPS express service volume by weight (in thousand)

	Express UPS 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	Doc.	Goods	
	Doc.	Goods								
Volume	5,114	11,887	4,673	3,975	4,744	2,849	4,450	5,114	32,578	37,692
%	14	32	12	11	13	8	12	14	86	100

The items containing goods prevail in the total domestic express service volume; they are almost 7 times more frequent than items containing documents. Items up to 500 g make up almost half of the total domestic express service volume, 70% out of which contain goods.

Figure 13.4. Structure of domestic UPS express service volume by weight

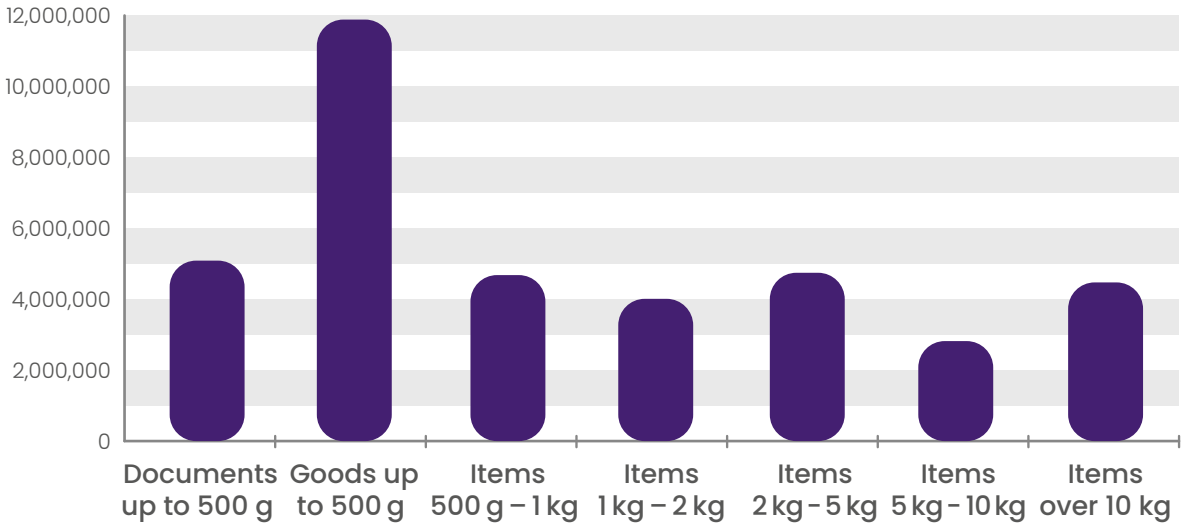


Table 13.6. and Figure 13.5 show the share of items resulting from remote sales, compared to the domestic UPS express traffic.

Remote sales are boosting the postal volumes both in domestic and international traffic.

Remote retail commerce[11] is a sale of goods/ services offered by the seller via different communications means to the buyer who is not physically or directly present.

The remote selling includes: e-commerce, catalogue sales, TV sales, commerce via postal services, printed items, advertising material with purchase order, via telephone, mobile phone, text or multimedia messages and automatic machines.

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

Items issuing from the remote commerce, which continues to expand on the European market, account for more than 1/3 of the total volume of express postal items in 2019 on the market of the Republic of Serbia (Table 13.6).

Table 13.6. Share of remote commerce in domestic UPS express items (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
Volume of domestic express items	5,114	11,887	4,673	3,975	4,744	2,849	4,450	37,692
Volume of remote commerce items	752	5,134	1,979	1,236	1,270	633	771	11,775
Remote commerce share (%)	14.70	43.19	42.35	31.09	26.77	22.22	17.33	31.24

11 The Law on Trade („Official Gazette of RS", Nos. 53/2010, 10/2013 and 44/2018 - other laws)

In 2018, remote sale items within UPS have accounted for 27% of the total volume of express items. The share of these items in 2019 grew by somewhat over 31%. The trend of items containing goods up to 500 g remaining dominant in the remote sale items (almost 44%) continued, followed by items in the category 500 g – 1 kg (17%). The share of items containing documents (items up to 500 g) has been doubled compared to 2018. The explanation is that the remote sale items containing documents up to 500 g in 2019 participated with 14.7% in the same category express item volume, whereas the share in 2018 was 7.4%.

Figure 13.5. Share of remote commerce in domestic express items

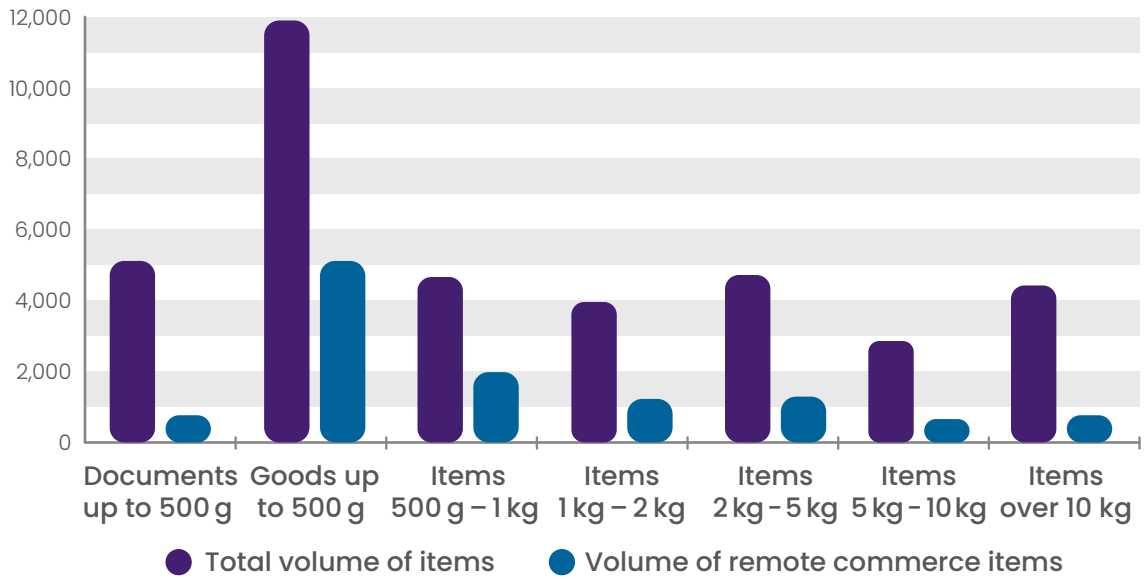


Table 13.7. and Figure 13.6. show the share of express services revenues (in million dinars) by weight in domestic postal traffic.

The income structure is following the volume trend. More than 90% of the revenues are generated from the items with goods, while the share of the items with documents has been 10 times lower. The items containing goods above 10 kg, even though in lesser volume than the majority of item categories, have a greater income share compared to all other weight categories, because the postage fee depends, among other, on the weight. Likewise, with respect to this category of items compared to the goods up to 500 g, the items over 10 kg have generated a slightly bigger income, despite their volume share being almost as twice as low.

Table 13.7. UPS express services income share (in million RSD) by weight

	UPS express items revenues							Total express item revenues		Total income
	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								
Income	908	2,267	1,147	999	1,250	879	2,518	908	9,060	9,968
%	9.11	22.74	11.51	10.02	12.54	8.82	25.26	9.11	90.89	100

Figure 13.6. UPS express services income share by weight

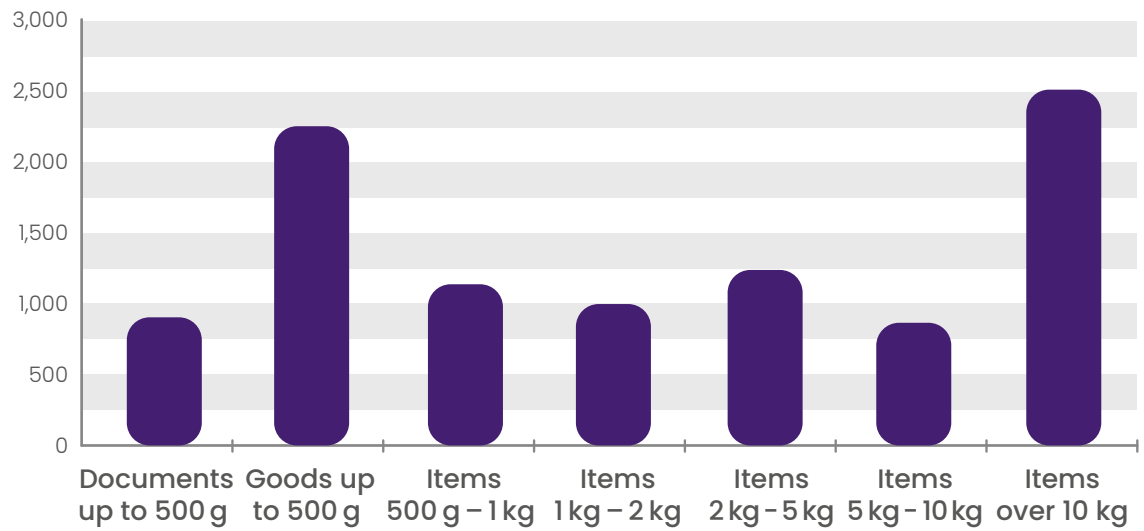
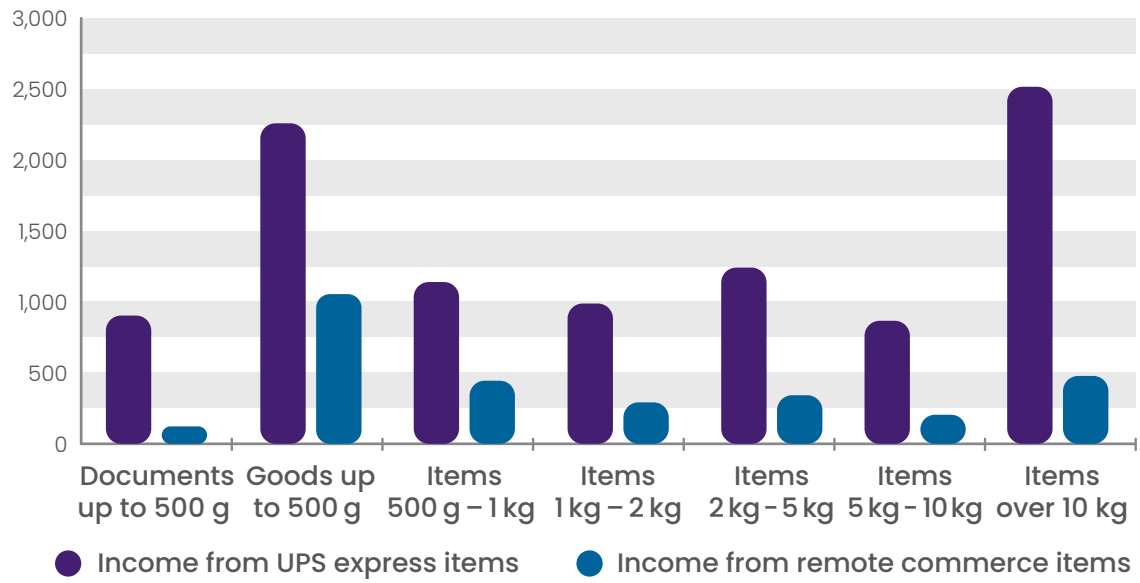


Table 13.8. and Figure 13.7 show the share of the remote commerce revenues compared to the domestic express services income (in million dinars), revealing that around 30% of the income in UPS express traffic is generated by the remote sale items. The dominant category, in terms of revenues, among the items stemming from remote commerce are the ones containing goods up to 500 g. In terms of revenues, it makes up a little over 22% of the total income of UPS express items, with almost half of the figure accounting for the revenues from the remote sale items.

Table 13.8. Share of remote sales income compared to domestic UPS express service revenues (in million RSD) by weight

	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 items revenues	908	2,267	1,147	999	1,250	879	2,518	9,968
Remote sale items revenues	133	1,054	457	306	347	218	488	3,003
Remote sales share (%)	14.65	46.49	39.84	30.63	27.76	24.80	19.38	30.13

Figure 13.7. Share of remote sales income (in million RSD) from domestic UPS express services



Compared to the situation on the express services market in 2018, the year 2019 saw clear growth in all market segments (Table 13.9. and Figure 13.8). The volume of express items increased by 10% compared to 2018, which is however less than the difference between 2017. and 2018, when the volume of express items grew by 14%.

Only express items over 10 kg marked a decrease (-6%), unlike this category's income, which augmented by 8%.

As previously mentioned, postal items resulting from the remote commerce activities have been on the rise both in the Republic of Serbia and the EU. Compared to 2018, the volume of these items grew by 28%. The volume increase is naturally reflected in the augmentation of income (35%).

Figure 13.8. Comparison between remote sales volumes in 2018 and 2019

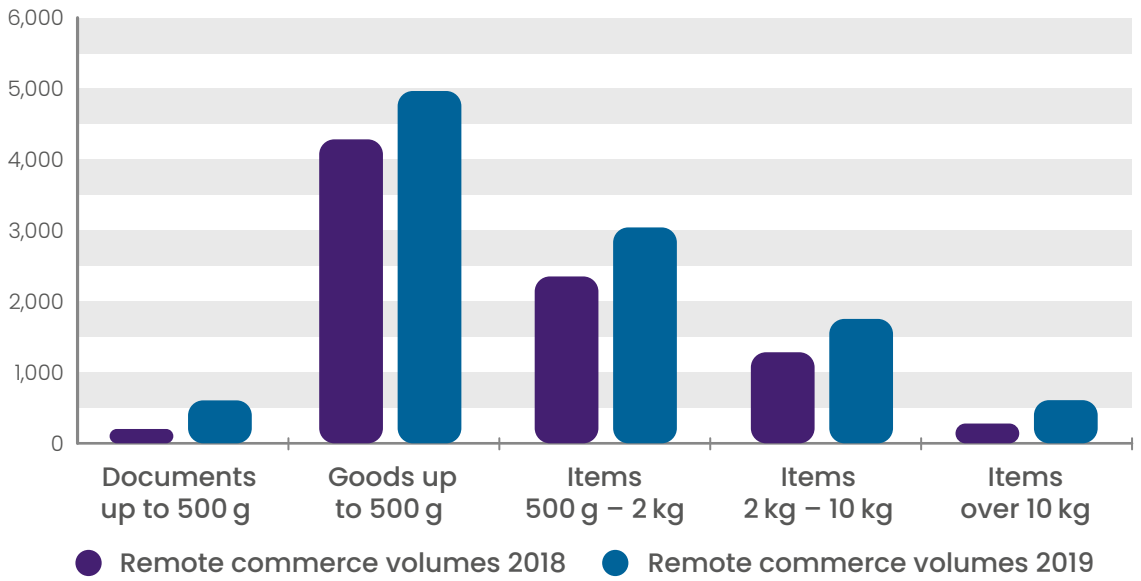


Table 13.9. Comparison of remote sales characteristics in 2018 and 2019

	Docs. up to 500 g	Goods up to 500 g	Items 500 g - 2 kg	Items 2 kg - 10 kg	Items over 10 kg	Total
Positive/negative growth of UPS express volumes 19/18 (%)	13	9	18	11	-6	10
Positive/negative growth of UPS remote sales volumes 19/18 (%)	127	16	27	32	76	28
Positive/negative growth of UPS express revenues 19/18 (%)	11	10	23	16	8	14
Positive/negative growth of UPS remote sales revenues 19/18 (%)	118	21	29	27	88	35

In addition to domestic traffic express items, international traffic express items were analyzed, based on the postal operators' data provided in Annual Questionnaires for 2019. In Table 13.10, the volume of outbound and inbound express items (by weight) in international traffic in 2019 is shown.

Table 13.10. Volume of international express items in 2019

	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	126,945	24,717	15,487	16,074	24,065	10,467	7,275	8,073	233,103
Inbound volumes	173,902	34,676	40,459	41,717	54,028	39,916	24,346	29,845	435,889
Share of outbound items (%)	54.46	10.60	6.64	6.90	10.32	4.49	3.12	3.46	100
Share of inbound items (%)	39.90	7.96	9.28	9.57	12.39	8.47	5.59	6.85	100

Inbound items account for 65% items in the total international traffic of express items. The majority of international express items are up to 500 g (both outbound and inbound), containing documents, and are 5 times more frequent than the items containing documents in the same weight category.

As for the international express item volume, there has been an increase of 7%, compared to 2018. Outbound items had a growth of 13% and inbound of 5%. In terms of international express revenues, inbound items account for 65% of the total income.

Postal market trends

The growing trend of commercial services compared to universal postal service has continued, since 2010, when RATEL started to monitor postal markets in the Republic of Serbia. Compared to 2018, the share of commercial services grew by 2.6% in terms of income and somewhat under 2% in volume. In comparison with reference year 2011, income share grew by almost 18%, and volume share by 8.7%.

Table 13.11. shows percentage shares in the postal service volume and income over the last five years.

Table 13.11. Percentage shares of postal service volume and income 2015-2019

Type of service	2015		2016		2017		2018		2019	
%	Volume	Income	Volume	Income	Volume	Income	Volume	Income	Volume	Income
UPS	92.6	51.4	91.2	48.7	90.4	46.9	89.1	44.7	87.4	42.1
Commercial services	7.4	48.6	8.8	51.3	9.6	53.1	10.9	55.3	12.6	57.9
Total	100	100	100	100	100	100	100	100	100	100

Table 13.12. shows changes in the postal service volume over the last five years. Figure 13.11 shows the trend of normalized UPS volume and commercial services compared to reference year 2011.

Table 13.12. Volumes of UPS and commercial services

Volumes of UPS and commercial services 2015-2019									
Type of service	Volume in thous.					Positive/negative volume growth in%			
	2015	2016	2017	2018	2019	16/15	17/16	18/17	19/18
UPS	291,399	283,488	291,362	289,512	269,715	-3	3	-1	-7
Comm. services	23,228	27,186	30,928	35,314	39,005	17	14	14	10
TOTAL	314,627	310,674	322,290	324,826	308,720	-1	4	1	-5

Figure 13.9. Trend of normalized UPS and commercial service volumes

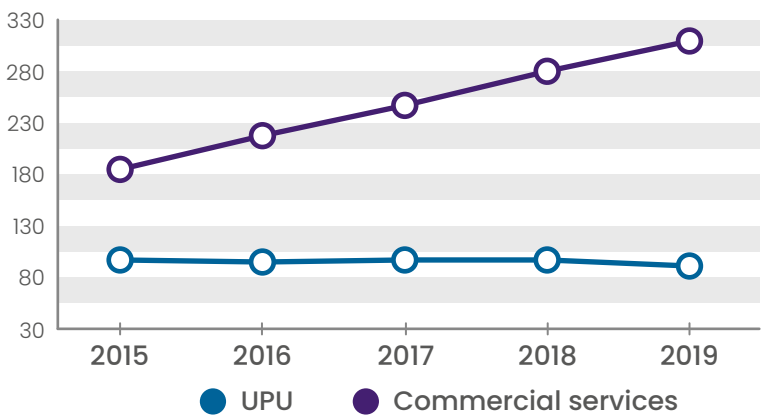


Table 13.12. shows revenues over the last five years.

Postal service revenues in 2019 saw an increase by 8.1% compared to 2018.

An increase in the revenues from UPS has been recorded for the third year in a row, amounting to 1.8% in 2019.

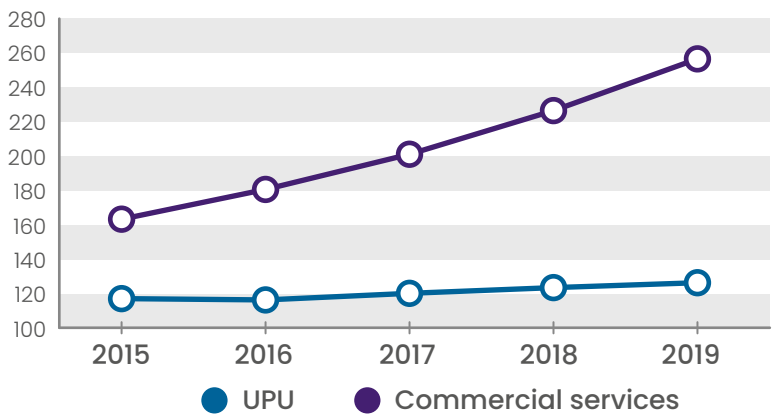
Revenues from commercial services have been continuously on the rise, with an increase by 57% over the last five years. Only compared to 2018, the growth was 13%.

Table 13.13. UPS and commercial services income

UPS and commercial services income 2015 - 2019									
Type of service	Income in million dinars					Positive/negative income growth			
	2015	2016	2017	2018	2019	16/15	17/16	18/17	19/18
UPS	8,264	8,197	8,473	8,756	8,916	-0.8	3.4	3.3	1.8
Comm. services	7,809	8,639	9,605	10,851	12,277	10.6	11.2	13.0	13.1
TOTAL	16,073	16,836	18,078	19,607	21,193	4.7	7.4	8.5	8.1

Figure 13.10. shows the trend of normalized UPS and commercial service revenues compared to reference year 2011.

Figure 13.10. Trend of normalized UPS and commercial service revenues



Herfindahl-Hirschman index (HHI)[12]

The HHI index 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 theoretical HHI value is 10,000, while the minimum is close to zero. The maximum value is reached only in case of an absolute monopoly and the minimal in case of an ideal competition.

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

In case of a separate express services market compared to the UPS market where there is a PPO monopoly, within the total volume of express services in the Republic of Serbia (domestic and international), the HHI in the Republic of Serbia for 2019 was 1.881, which means that the express services market is highly concentrated. Compared to 2018, the HHI is slightly higher but the situation in terms of market competition has remained unchanged. Seven postal operators have shares of more than 1% in express services' volume, based on which the HHI is calculated. Different economy sectors use different value intervals for HHI, nonetheless the HHI value of 1.881 corresponds in most of the cases to a competitive market.

Conclusion

A substantial drop in the volume of universal postal service (by 7%) as a dominant category compared to 2018, led to a drop in the total volume of postal services in the Republic of Serbia by 5%, despite an increase of the volume of commercial services by 10%. This has been the biggest drop in the postal services volume since the Agency started to monitor the postal markets. A trend already present in the European countries has occurred the postal market in Serbia during 2019 – decrease in the volume of letterpost items (by 7%) and increase in the volume of parcel services. Parcel services are only performed by the PPO (both in the UPS and commercial service segments) and were growing in 2019, compared to the previous period. The share of parcel services is smaller in the total volume of services, with smaller growth compared to that recorded in the European countries.

Postal service users in the Republic of Serbia usually opt for express services, which are only slightly more expensive than parcel services, unlike express services in the EU, where their cost is several times the price of a parcel service (therefore, parcels are much more present among postal services there).

12 HHI – Herfindahl-Hirschman index – measurement showing the level of competition within a market. https://www.modernanalyst.com/Careers/InterviewQuestions/tabid/128/ID/1003/What-is-the-Herfindahl-Hirschman-Index-HHI-and-why-would-you-use-itaspx

The portion of the postal market experiencing the most impressive development and growth is the market of express services, with remote sale items being dominant. This service category had a growth by 28% in 2019, in domestic postal traffic. According to the available data[13], 45.4% of Internet users in the Republic of Serbia have never used e-commerce to purchase goods and services. Also, only 5.6% of online buyers shop online more than 10 times in three months, which is substantially different from the situation in the EU, where 15% of buyers shop online more than 10 times in three months. This indicates that in the Republic of Serbia there is a big space for further improvement of remote commerce that will consequently lead to an augmented volume of postal items, especially in the segments of parcels and express services. The growing trend in the volume of express services has resulted in the rise of the number of workers employed at the operators providing such services over the last five years.

Major oscillations in the number of postal operators have been recorded with courier service providers, which have been marking a significant drop in the volume of services for the second year in a row, also followed by a decrease in the revenues. This is a provider category the most affected by disloyal competition, ever more present in the form of different associations for delivery and transport.

Overview of postal markets in the EU based on ERGP Report[14]

One of the aims of ERGP (European Regulators Group for Postal Services) is to analyze and publish reports on the EU market main indicators, so as to identify the most important postal market development trends and give timely expert advice to the European Commission (EC) regarding future development of the regulatory frame. The data used for the analysis and elaboration of the report on key indicators are collected by means of questionnaires sent out to all EU member countries including candidate countries. In 2019, 33 countries, members of ERGP, submitted their data for period 2014-2018.

For the sake of an easier monitoring, the totality of EU markets is divided in 4 areas:

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

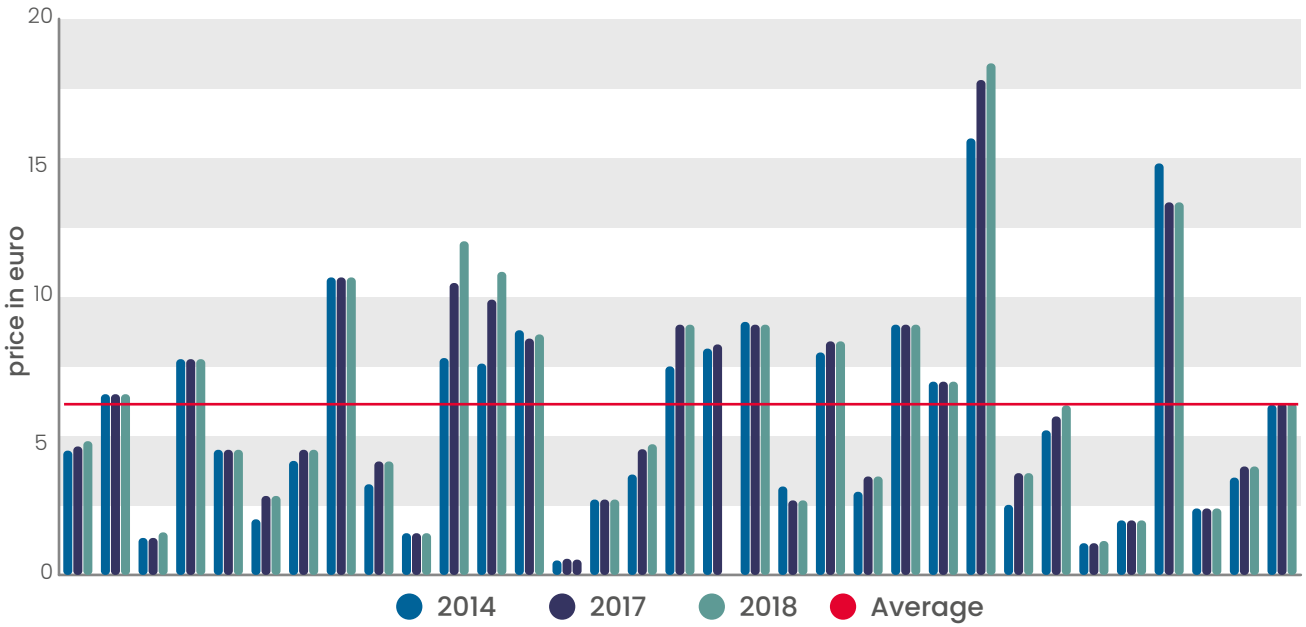
One of the traced and analyzed parameters is the USP parcel postage fee in domestic postal traffic. There has been a large scale of different parcel postages in Europe. Norway is at the top of the list with parcel postage of 18.4 EUR and the Republic of North

13 https://mtt.gov.rs/download/program(2).pdf

14 ERGP PL II (19) 37 –Report on postal core indicators

Macedonia at the bottom, with 0.58 EUR. Interestingly, several European countries, including the Republic of Serbia, have not raised their parcel postages over the last four years – BE, CH, CY, MT, NL, RS, SI. Postages are displayed in Figure 13.11.

Figure 13.11. Domestic priority parcel postages in domestic traffic for 2014, 2017 and 2018



	AT	BE	BG	CH	CY	CZ	DE	DK	EE	EL	ES	FI	FR	FY	HR	HU	IE	IS	IT	LT	LU	LV	MT	NL	NO	PL	PT	RO	RS	SE	SI	SK	UK
2014	4.47	6.50	1.33	7.76	4.50	2.00	4.10	10.7	3.26	1.50	7.80	7.60	8.80	0.52	2.71	3.61	7.50	8.14	9.10	3.18	8.00	2.99	9.00	6.95	15.7	2.52	5.20	1.14	1.96	14.8	2.39	3.50	6.12
2017	4.62	6.50	1.33	7.76	4.50	2.84	4.50	10.7	4.08	1.50	10.5	9.90	8.50	0.58	2.71	4.52	9.00	8.29	9.00	2.68	8.40	3.54	9.00	6.95	17.8	3.66	5.70	1.14	1.96	13.4	2.39	3.90	6.18
2018	4.81	6.50	1.53	7.76	4.50	2.84	4.50	10.7	4.08	1.50	12.0	10.9	8.65	0.55	2.71	4.70	9.00		9.00	2.68	8.40	3.54	9.00	6.95	18.4	3.66	6.10	1.22	1.96	13.4	2.39	3.90	6.18
Average	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14	6.14

The average price for sending an international parcel up to 2 kg via USP in 2018 within Europe was 18.60 EUR. In comparison with 2017, this shows an increase by 1.1%. The discrepancy between prices of parcels in domestic and international traffic is still present (international parcel is more expensive by 356% on average). The high price caused the EC to undertake steps in order to harmonize these postages, by adopting a regulation on cross-border parcel delivery services.

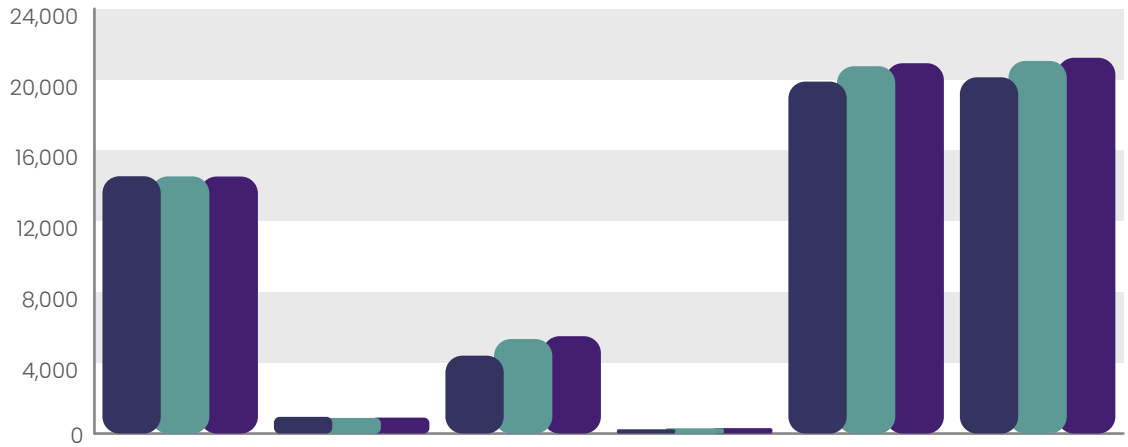
Letterpost items also display moderate price differences.

Based on HHI[15] the European postal market is highly concentrated, with lower market concentration level in Eastern Europe compared to the rest of Europe. Since HHI does not show significant variations, the European postal market is considered as stable.

15 HHI – Herfindahl-Hirschman index – measure of market concentration. It also reflects the level of market competitiveness. https://www.modernanalyst.com/Careers/InterviewQuestions/tabid/128/ID/1003/What-is-the-Herfindahl-Hirschman-Index-HHI-and-why-would-you-use-it.aspx

In the observed period, the number of postal operators in the European market has grown by 1103 providers compared to 2014 (by 5,5%). The most significant increase in the number of postal operators is recorded in Southern Europe (Figure 13.12).

Figure 13.12. Active postal operators 2014-2018



	WESTERN	EASTERN	SOUTHERN	NON-EU	EU SUM	ALL COUNTRIES SUM
2014	14,538	945	4,402	242	19,885	20,127
2017	14,530	883	5,341	297	20,754	21,051
2018	14,521	902	5,501	306	20,924	21,230

Over the past years, the total postal volume in all ERGP countries started to drop and as of 2014 the average decrease has been around 3%. The biggest drop is recorded in letterpost items, where the total volume, despite this category being the most numerous one, continues to plunge. By contrast, parcel services continue to grow. Table 13.14. shows volumes and percentages referring to 2017-2018 and 2014-2018.

Table 13.14. Total volume of postal services: average annual change 2017-2018 and 2014-2018

	2014 (million)	2017 (million)	2018 (million)	% change 2017-2018	Annual change% 2014-2018
Total postal volumes	80,031	72,706	69,590	-4%	-3%
Letterpost volumes	73,004	64,604	60,399	-7%	-5%
Parcel service volumes	7,027	8,103	9,190	13%	7%

The decreasing trend in the letterpost services is present across the majority of European countries. Beside the Republic of Serbia, exceptions to this trend were recorded also in Bulgaria, Cyprus, Germany, Iceland, Lithuania, Poland and Romania. As for the parcel

services, the majority of the countries have seen a growth, with the exception of Hungary and Poland, where these services marked a decrease compared to 2017.

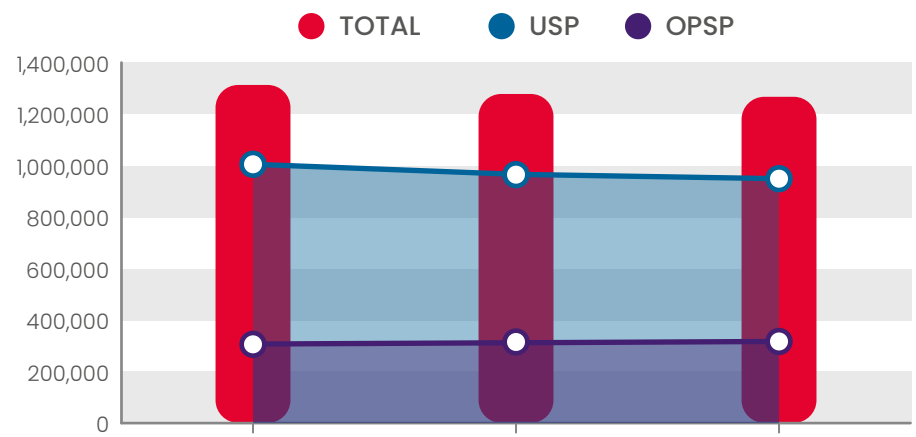
Unlike the volumes, the total revenues have grown by 1% compared to 2017, mainly thanks to an increased parcel service income – in 2018, it accounted for approximately 57% of the total revenues. The income generated by the letterpost services is on the decline (Table 13.15).

Table 13.15. Total income from postal services: average annual change 2017-2018

	2014 (million)	2017 (million)	2018 (million)	% change 2014-2018	% change 2017-2018
Total postal revenues	79,467	79,707	82,148	+ 3%	+ 1%
Letterpost revenues	38,246	36,534	35,263	- 3%	- 2%
Parcel service revenues	41,221	43,173	46,885	+ 9%	+3%

During 2014-2018, the total employment plunged by approximately 3.5%, the reason being a gradual reduction of the USP number of employees by roughly 5.6% in the observed period. On the other hand, the number of employees with other postal operators is continuously and slightly increasing (around 3.2%). The share of the USP employees compared to the total number of postal employees has remained almost the same – 76.6% in 2014 and 75% in 2018. The number of the USP employees is several times higher than that of other operators' (Figure 13.13).

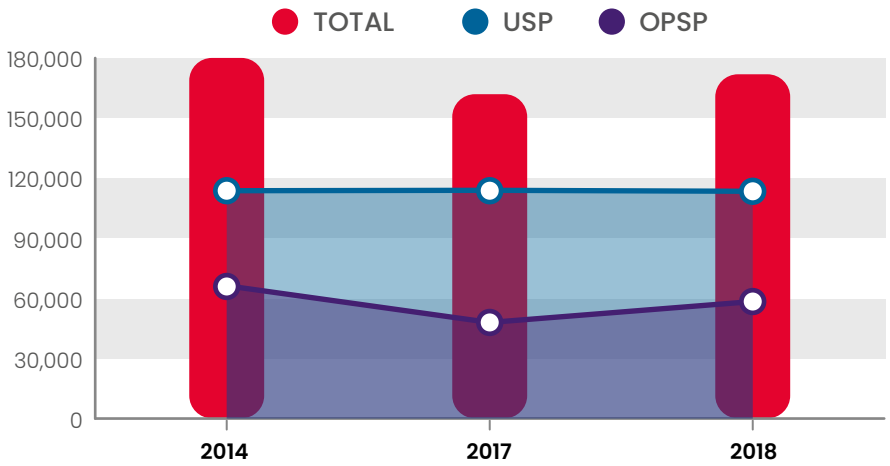
Figure 13.13. Total number of employees at USP and other postal operators 2014-2017



	2014	2017	2018
TOTAL	1,313,212	1,278,714	1,267,353
USP	1,005,790	966,063	949,963
OPSP	307,422	312,651	317,390

As shown in Figure 13.14, during 2014-2018, the total number of postal network units decreased by 4.5%. At the USP this decrease was negligible (-0.3%) whereas a more significant drop in the number of postal network units was recorded with other postal operators (-11,9%).

Figure 13.14. Total number of postal network units at USP and other postal operators 2014-2018



	2014	2017	2018
TOTAL	180.034	161.923	171.868
USP	113.737	113.946	113.452
OPSP	66.297	47.977	58.416

As regards the number of the USP postal network units, it has practically remained the same as during the two previous years. As for other postal providers, 2018 saw an increase in the number of postal network units compared to the previous year (by 21.8%), contrary to the decreasing trend of 2014-2018.

Changes to regulatory framework

The advisory role of ERGP is reflected in providing recommendations and proposing measures to the European Commission (EC) in order to maintain and strengthen the EU single postal market. Since the last change to the postal directive occurred in 2008, all ERGP WGs have now directed their attention to tackle the challenges presented to the operators and users by the modern market. The users changed their year-long habits, every year a growing number of new customers who shop online is being recorded, resulting in a surge in the volume of parcel services. The traditional letterpost services have been on a constant slide for quite some time leading to many questions being raised as to the applicability of the directive's solutions in the modern world.

Digital age along with modern user's habits reveal that the present approach which focus on the sender is now beginning to shift toward the recipient.

This represents a major challenge for the regulators, who are expected to adapt their regulatory tools to a specifically segmented market.

To that end, ERGP formed a group dealing with regulations, tasked with researching the potential of the present regulatory frame and proposing further steps.

This assignment is of great importance, since through its report the future guidelines for the regulatory frame development and propositions to the EC are to be defined[16]. In the report entitled „Opinion on the review of the regulatory framework", the ERGP expert group made the following recommendations to the EC:

1. use „greenfield" approach in the creation of new regulatory frame;
2. switching of focus from the universal service regulation to an appropriate functioning of the entire postal market and competition;
3. establish clear limits of the postal industry in relation to other similar activities such as logistics and transport;
4. include comparable services into the same regulatory frame;
5. strengthen and secure – harmonization of the NRA competences allowing them to intervene on the market;
6. guarantee the availability of the selected postal service scope to all European citizens, taking into account specific national circumstances;
7. harmonize the consistency of the new regulatory frame with other regulatory frames in the segments such as user protection, data protection, safety of goods etc;
8. strengthening and harmonization of the NRA competences – NRAs should have authority to monitor the markets (collection of all types of data), enforce penalties and sanctions, protect users and be independent in performing their duties;
9. strengthen the institutional frame in order to establish cooperation between the NRAs and enable consistent and coherent implementation of the regulatory frame;
10. tasks of the NRAs and ERGP as an independent body should by all means be recognized in the new regulatory frame.

16 ERGP PL I (19) 12 Opinion on the review of the regulatory framework

14 QUALITY OF UNIVERSAL POSTAL SERVICE PROVISION

Pursuant to the Rulebook on changes and amendment to the Rulebook on quality parameters for the provision of postal services and on the minimum quality standards for the provision of universal postal service ("Official Gazette"of RS, no. 098/2017 of November 3, 2017) the Agency has set an obligation for the PPO to perform an independent measurement of quality of service during 2019, referring to the entire year. The Rulebook stipulates the obligation to apply standards SRPS EN 13850:2014 and SRPS EN 14012:2014 as of January, 2019.

In 2019, the PPO undertook a continuous independent measurement in domestic postal traffic according to standard SRPS EN 13850:2014, along with independent internal measurement of non-recorded letter-post transit times with internal panellists, using RFID equipment (so-called AMQM)[17].

The UPS quality assessment was carried out based on the data obtained in an independent measurement, internal PPO measurement and the data from the Agency questionnaire, including the following indicators:

- availability of universal postal service,
- speed and reliability of postal items transmission and delivery,
- security of items,
- efficiency of complaint handling,
- service users' satisfaction and availability of information, etc.

17 Internal measurement carried out by the PPO is performed in line with a PPO internal act „Methodology for QoS monitoring in postal traffic" (hereinafter: Methodology). The Annual Report on the independent measurement of non-recorded letter-post transit times for 2019 was elaborated by company „Central".

Availability of universal postal service

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

Table 14.1. Availability of post offices and letter boxes

Postal network capacities	Year					Trend (%)			
	2015	2016	2017	2018	2019	16/15	17/16	18/17	19/18
Number of post offices	1,491	1,516	1,530	1,534	1,526	1.68	0.92	0.26	-0.52
Number of letter boxes	2,000	1,964	1,958	1,935	1,969	-1.8	-0.31	-1.17	1.76

The first year after a set of years marked by a drop in the number of post offices compared to the previous year is 2019. Compared to 2018, the number of post offices was reduced by approximately 0.52% (Table 14.1.).

The average number of inhabitants per post office is roughly 5,000, which is slightly above the European average (around 4,500 inhabitants per post office). Due to the high population density in the city of Belgrade, there are less post offices per inhabitant there. Post offices in Belgrade, on the other hand, have broader service provision capacities, which, to a certain extent, eliminates the impact of more inhabitants than the Serbian average being served by one post office and therefore preserves the quality of service.

The number of letter boxes has been declining for several years, until 2018. After a prolonged period, the number of letter boxes in 2019 compared to 2018 increased by 34, i.e. by around 1.76%. Pursuant to the prescribed Methodology for QoS monitoring in postal traffic, the PPO shall, at least once a year, carry out an analysis of the number of items inserted in letter boxes. Based on a one-month screening, a daily average volume is determined and an analysis of justifiability regarding presence of the letter box at a certain location is performed. If the number of items is found to be inferior to the projected volume, the mounting of the letter box is to be performed at another location or the demounting of the existing letter box at the analyzed location is carried out, provided that the minimum letter box number criterion for the concerned area is satisfied.

Nevertheless, it is clear that the provisions of Article 13 of the Rulebook on conditions of the commencement of the postal service activity, adopted by the line ministry („Official Gazette of RS", No. 51/10), pursuant to which the USP is required to provide at least 2,000 letter boxes as a means of postal network for the collection of non-recorded postal items, are not being applied.

Working hours of post offices

One of the criteria for the quality of postal service access are the working hours of post offices, showing the time (how many hours a day) during which the post offices are available to their customers.

Out of the total of 1,526 post offices 994 (65.14%) are in rural, and 532 (34.86%) in urban areas. Further analysis revealed that 1,097 post offices (71.89%) are open for customers 7 hours a day, 399 (26.15%) have 7 to 12 hrs working time, 18 (1.2%) are open for more than 12 hours, whereas 12 post offices (0.8%) work around the clock.

Working hours in densely populated communities are longer, therefore in urban areas, with 532 post offices available to customers, there are more post offices working 7 to 12 hours daily (63%), whereas in rural areas, with 994 post offices, 92.1% are open for customers 7 hours a day. This analysis has shown that the PPO reached the objectives set out in the Methodology in respect of the quality of UPS availability in terms of the „working hours of post offices" criterion.

Availability of postal counters

The availability of postal counters to customers regarding the provision of universal postal service is determined by screening the waiting time of customers in line, in front of the counter for letter-post collection. In 2019, the average waiting time was 2 minutes and 49 seconds, which is by 54 seconds shorter compared to the value measured last year. This result indicates that the criterion of counter availability is highly satisfactory, having in mind that the limit defined in the Methodology is 10 minutes.

Availability of postal items delivery

The Postal Directive prescribes the delivery of postal items to all inhabitants at least 5 days a week, to be organized by the USP, with possible exceptions determined by the regulator. On the EU postal market, these exceptions concern up to 10% of the population, which applies only in countries with specific geographic configuration. The law in the Republic of Serbia also prescribed a 5-day delivery, i.e. every working day, with possible exceptions.

Table 14.2. Volume of inhabitants and households per delivery area

Delivery area	Number of inhabitants	Number of households	% inhabitants	% households
Local	4,893,688	1,984,613	68.09	69.05
Larger	1,550,083	577,062	21.57	20.08
Largest	742,930	312,567	10.34	10.87
Total	7,186,701	2,874,242	100	100

The analysis of the data on the population and number of households per delivery area (Table 14.2) shows that approximately 68.09% of the inhabitants and 69.05% of the households are covered by every-day delivery. In larger delivery areas, there are around 21.57% of the inhabitants and 20.08% of the households covered by a 2-day or 3-day delivery a week. Around 10.34% of the inhabitants and 10.87% of the households are situated in the largest delivery area, with one delivery per week.

Speed and reliability of postal items transmission and delivery

Speed and reliability of transmission and delivery of postal items in the Republic of Serbia are measured by means of transmission and delivery times of domestic non-recorded letter post items and international priority and air letter-post items. Delivery standards for the domestic traffic are prescribed by the Agency and in the international postal traffic, delivery standards are prescribed by the Universal Postal Union (UPU) or by the Association of European Public Postal Operators (PostEurop).

In the public procurement procedure for purchasing Independent measurement of transit times of non-recorded letter-post items in domestic traffic, the PPO hired company „Central" to perform a continuous testing of the above processes during a three year period, namely from 2019 till 2021. „Central" carried out the continuous testing between January 1 and December 31, 2019, using standard SRPS EN 13850: 2014.

The Table 14.3 data regarding the independent measurement results show that a major quality discrepancy (by 29.08%) was seen during D+1 transit time, followed by that amounting to 12.7% for D+2, whereas the least discrepancy (by 6.45%) was measured for D+3 transit time. The above data indicate that in 2019 the PPO did not manage to reach the quality target prescribed by the Rulebook, achieving only significantly lower values of D+1 transit times than required.

During the internal AMQM screening, a significant discrepancy has also been observable for D+1 transit times, whereas for D+2 and D+3 the quality has been somewhat above the prescribed level. The overall achieved results are lower than during the 2018 screening.

The significant difference between the independent and internal quality screenings confirms the fact that independent screening results are almost always below those obtained during an internal screening.

The above data show that the PPO needs to improve its D+1 transit times, equally low in both testing, while transit times D+2 and D+3 are still achievable in the fulfilment of standard SRPS EN 13850:2014.

The results of the domestic transit times for 2019 are in decline compared to 2018. A possible reason for that is the strike of the employees, by default reflecting on the transit time screening and subsequently the quality itself.

Table 14.3. Transit times in domestic letter-post traffic

Transit time	AMQM					Independent annual measurement	Rulebook quality targets	SRPS EN 13850:2014
	2015	2016	2017	2018	2019	2019	2019	
D+1	71.05%	77.66%	67.12%	67.16%	57.55%	50.92%	80%	85%
D+2	93.58%	95.04%	89.52%	91.42%	85.24%	72.30%	85%	90%
D+3	97.82%	98.21%	95.56%	96.78%	93.16%	83.55%	90%	95%

The international standard prescribed by the Universal Postal Union (UPU) is J+5 for 85% of items, while PostEurop has set the J+3 standard for at least 85%, and the J+5 for at least 97% of items.

For the measurement results of the transit times to be valid and comparable, the EN 13850 standard for *Postal Services - Quality of Services - Measurement of the transit time of end-to-end services for single piece priority mail* and first class mail has been prescribed. This standard defines the preparation manner of screening and analysis of the obtained data. The prerequisite for obtaining the quality data is a continuous screening of the transit times, organized by an independent body that cannot be influenced by the PPO.

The data regarding transit times for inbound international items in 2019 are shown to have deteriorated in comparison to 2018 (Table 14.4).

Table 14.4. Transit times in international inbound letter-post traffic

Transit time	Year					Standard EU	Standard UPU
	2015	2016	2017	2018	2019		
J+3	56.20%	58.45%	48.10%	40.61%	33.10	85%	/
J+5	83.35%	87.90%	82.94%	80.81%	70.90	97%	80%

Based on the provided data, it can be concluded that the quality of transit times is not on a satisfactory level, both domestically and internationally.

Security of items

An overview of the number of lost and damaged postal items during 2015-2019 is shown in Table 14.5.

Table 14.5. Lost and damaged postal items

TYPE OF ITEM	2015	2016	2017	2018	2019
REGISTERED LETTERS					
- lost per 100,000 items	7	8	9	16	35
- damaged per 100,000 items	0	0	0	0	0
RECORDED DELIVERY ITEMS					
- lost per 100,000 items			4	3	2
- damaged per 100,000 items			0	0	0
COURT LETTERS					
- lost per 100,000 items			12	11	12
- damaged per 100,000 items			0	0	0
INSURED LETTERS					
- lost per 100,000 items	0	0	1	0	0
- damaged per 100,000 items	0	0	0	0	0

TYPE OF ITEM	2015	2016	2017	2018	2019
PARCELS					
- lost per 100,000 parcels	0	0	2	0	2
- damaged per 100,000 parcels	0	0	2	2	1
MONEY ORDERS					
- lost per 100,000 items	0	0	0	0	0
SECURITY LEVEL OF ITEMS	0.006	0.007	0.008	0.01	0.011

The analysis of the data by the type of postal items has shown that there was an increase in the security level concerning recorded delivery items, but also a significant deterioration in the security levels of registered letter-post items. Since this type of mail is the most numerous type of recorded mail, the increase in the volume of lost registered mail had an automatic negative impact on the security levels of all postal items, namely from 0.01% to 0.011%.

Table 14.6. gives an overview of damage compensation by the type of recorded domestic postal items during 2015-2019.

Table 14.6. Paid damages by type of domestic postal items

Domestic postal traffic	2015		2016		2017		2018		2019	
	VOL.	RSD	VOL.	RSD	VOL.	RSD	VOL.	RSD	VOL.	RSD
Registered items	452	349,982	433	347,304	568	446,258	946	805,151	2,313	983,195
Insured letters	5	10,262	3	5,371	3	3,896	5	4,980	2	8,085
Parcels	3	28,592	5	6,857	15	38,817	7	23,741	11	22,945
Money orders	3	6,140	0	0	2	32,540	1	3,000	1	2,000
TOTAL	463	394,976	441	359,532	588	521,511	959	836,872	2,327	1,016,255

In 2019, damage compensation was paid for 142.64% items more than in 2018, the amount of the compensation being higher by 21.43%. This is due to an increase in the volume of lost registered items and the corresponding damage compensations.

Damage compensation was paid for 44 items in international postal traffic, compared to 22 items during 2018, with the compensation amount being higher by 23.33% (93,649.21 dinars in 2018, 115,503.00 dinars in 2019). This is due to the payment of damage compensation for 25 registered items more than the previous year.

Efficiency of complaint handling

During 2019, 1,583 written complaints were sent to the work, regional and local PPO's units, which is by 1.73% less than in 2018, when 1,611 complaints were filed. Out of 1,583 claims, 60.64% refer to delivery, 17.88% to at-the counter business and 21.48% on other complaints. 50% of the complaints were deemed justified.

In 2019, 19,866 inquiries were sent through the PPO's corporate website, which is an increase by 34% compared to the previous year. Out of the total number of inquiries, 18,549, (93%) is about service information and only 1,317 (7%) inquiries are actual complaints. 844 complaints were about the delivery of items (56% deemed justified), 54 complaints (3% justified) about at-the counter business and 319 other complaints (20% justified).

As for the complaint handling procedures carried out in 2019, claims concerning domestic traffic were resolved in average in 3 days, which is one day shorter than in 2018. The duration of the resolution of damage procedures was reduced by 4 days, from 15 to 11 days (Table 14.7), which complies with the prescribed deadlines.

Table 14.7. Average time for complaint resolution, realization and payment of indemnities in domestic postal traffic

Year	Resolution of damage claim	Compensation realization	Payment of indemnities	Total for resolution and indemnity payment
	(days)	(days)	(days)	(days)
	1	2	3	4=2+3
2015	4	7	6	13
2016	3	10	4	14
2017	4	9	4	13
2018	4	10	5	15
2019	3	6	5	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 level of service users' satisfaction and the availability of information on products and services. The PPO has conducted a survey on the Index of satisfaction regarding legal persons, 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 telephone, via website, by mail, directly at post office counters). By its new internal act, the PPO is aiming to improve its communication with users via its Call Center, corporate website and Facebook page. All these measures are expected to contribute to a better availability of information, user's interface of the complaint and inquiry filing procedure and an overall quality level in this segment of activities.

In the PPO Report on the quality of universal postal service for 2019, the Agency was informed that during that year a set of standardization activities had been undertaken by the PPO, ranging from unique types of postal facilities, means of work, transport vehicles and other postal equipment, through regulations – adoption and implementation of bylaws and rulebooks, correct addressing of postal items and education of the population encouraging them to use the postal address code (PAC), to standardization of the official documents, both in internal and external communication, introduction of unique visual identification and default user information, including installation of access gates for disabled persons.

CONCLUSION

Taking into account the overall analysis of the reached quality levels of the UPS provision, the following can be concluded:

- even though in 2019 the increasing trend of the number of post offices discontinued, the post office availability remained on a satisfactory level, positively impacting the quality of universal postal service provision;
- the number of letter boxes has increased, despite still being below the prescribed minimum due to removing some of the letter boxes deemed by the PPO unnecessary on account of very low daily average of inserted items, over the previous years. It should be therefore assessed how many letter boxed are to be installed as a prescribed minimum, taking into account the drop in the volume of items mailed through letter boxes, and to include these data in the bylaw governing the postal services;

- the average waiting time of customers in front of a counter for letter-post collection has been reduced compared to the previous year, suggesting an improvement of QoS in this segment;
- the results obtained during an internal measurement by means of the AMQM system (Automatic Mail Quality Measurement) have shown that, in 2019, there was a deterioration in the measured values of domestic transit times, equally for D+1 items and D+2 and D+3 items. The obtained results for D+1 items remain significantly below the prescribed standard SRPS EN 13850:2014, which is projected to be reached in 2021. The Agency is of an opinion that the strike of part of the PPO employees has caused the drop in the quality of service demonstrated during the measurements. In the international traffic the defined and prescribed quality targets have not been reached;
- there was a deterioration in the segment of overall security of postal items, due to an increase in the volume of lost registered letters, even though the security of other postal items (insured letters, postal item with confirmed delivery) has not significantly changed;
- complaint handling procedure is shorter than that measured last year;
- availability of information is on a satisfactory level, due to the existence of numerous access channels.

Complaints regarding commercial services

Commercial postal services are provided, beside the PPO, by other postal operators as well. According to the data provided by eight postal operators, the structure of complaints referring to domestic commercial services is given in Table 14.8.

The majority of complaints in 2019 were unfounded (almost 45%), followed by those filed on account of rifled or damaged items (slightly over 40% of the total number of complaints filed, and 73% of the resolved claims), followed again by complaints on account of transit time overrun (transit times are set under the postal operators' special terms and conditions), while the least complaints were filed on account of loss.

When comparing the number of complaints referring to the UPS commercial segment with the data from 2018, the drop in the total volume of complaints is evident, with a remark that this year's count of postal operators is reduced by one provider. Also, in 2019 the number of unjustified claims was increased by somewhat over 23% compared to 2018, while the complaints on account of transit time overrun have also surged by approximately 36%.

Table 14.8. Structure of complaints regarding domestic commercial services

Total number of complaints filed	Unfounded	Resolved as:			Indemnity Amount (in thous. dinars)
		Loss	Rifled and damaged	Deadline expiration	
(1=2+3+4+5)	2	3	4	5	6
29,925	13,332	2,223	12,076	2,294	105,862

During 2019, 154 complaints were filed in the international commercial postal traffic, out of which about 30% account for the claims on the grounds of loss, 27% are unfounded, and 25% are filed on account of damage. Compared to 2018, the number of complaints in the area of commercial services dropped by almost 62%.

Quality of service, user protection and complaint handling in the EU[18]

ERGP continuously monitors the liberalization effects on the postal market, using, among other, special indicators such as QoS measurements to assess postal development, user 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 32 member countries in 2018 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.

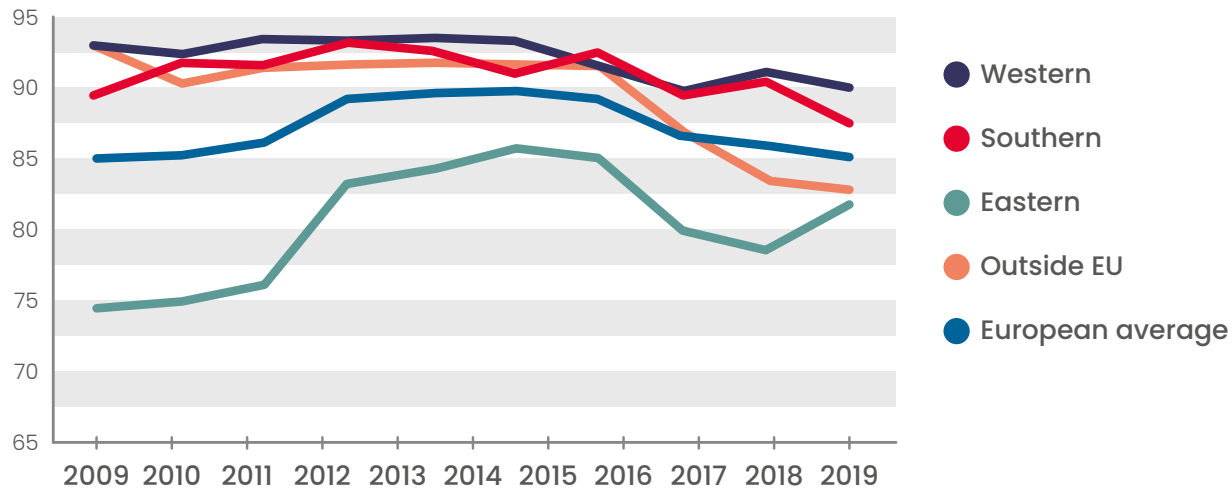
There are six key issues regarding the quality of service and user satisfaction that are being analyzed:

1. measurement of quality of service concerning routing times, regularity and reliability of services,
2. collection and delivery,
3. access points,
4. monitoring of consumer satisfaction ,
5. surveys regarding customers' needs ,
6. the impact of E-commerce on the postal field

18 ERGP PL II (19) 35 – Report on the quality of service, consumer protection and complaint handling

Figure 14.1. shows the movement of the priority letter QoS (D+1) during 2009-2018. Eastern European countries showed positive trend in 2018, unlike the rest of the countries. It is also observable that this service's quality peaked during 2012-2014. In 2018, 26 countries used EN 13850 standard for the measurement of priority letters transit times.

Figure 14.1. Average values of priority letter QoS (D+1)[19]



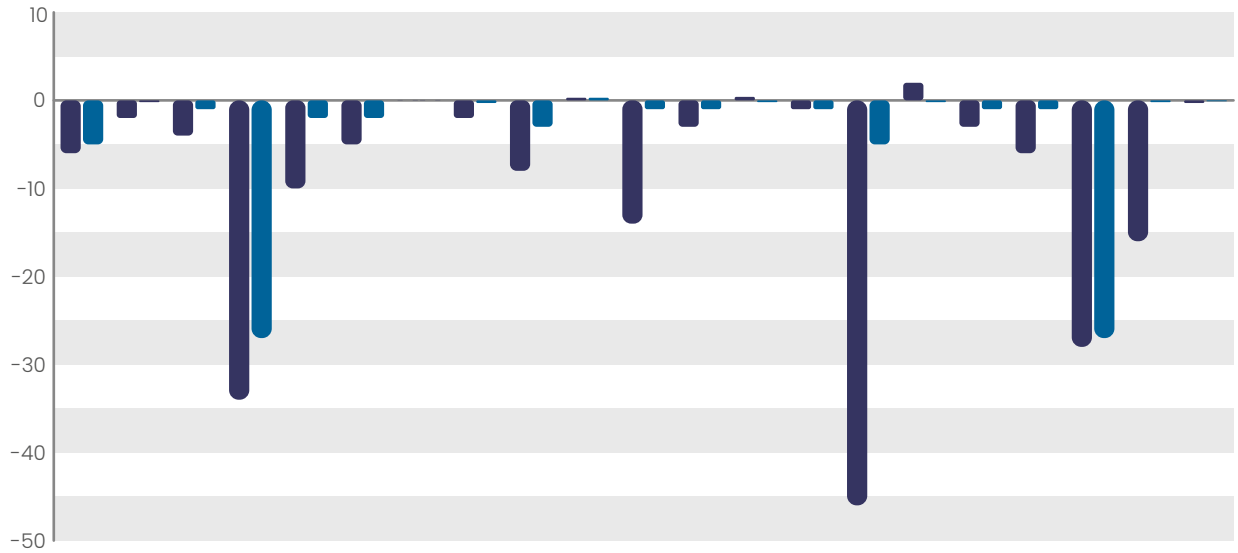
Eighteen countries have defined their regulatory targets for non-priority letters. Eleven countries used European standard EN 14508, whereas five countries used EN 13850 for the measurement of transit times of non-priority mail.

As for the measurement of transit times for parcels, different methodologies were used. Four countries used technical report TR 1547, five countries used standard EN 13850, while four countries used another methodology.

As shown in Figure 14.2, since 2014 the majority of ERGP countries have seen a decline in the number of post letter boxes. Only a few countries were an exception, with a negligible rise in letter boxes (PT, LV, IE). The only country whose number of post letter boxes increased in 2018 was Ireland. Also, a great deal of counties saw an increase in the number of parcellockers.

19 Western: BE, DE, FR, IE, NL, UK; Southern: CY, EL, IT, MT, PT; Eastern: BG, CZ, EE, HR, HU, LT, LV, PL, SI, SK; Outside EU: CH, IS, RS

Figure 14.2. Changes with respect to number of letter boxes 2014-2008 and 2017-2018



	BG	CH	CZ	EE	EL	FR	MK	HR	HU	IE	LT	LU	LV	MT	PL	PT	RO	RS	SI	SK	UK
Var 2014-2018	-6%	-2%	-4%	-34%	-10%	-5%	0%	-2%	-8%	0,3%	-14%	-3%	0,4%	-1%	-46%	2%	-3%	-6%	-28%	-16%	-0,3%
Var 2017-2018	-5%	-0,2%	-1%	-27%	-2%	-2%	0%	-0,3%	-3%	0,3%	-1%	-1%	-0,2%	-1%	-5%	-0,2%	-1%	-1%	-27%	-0,2%	-0,1%

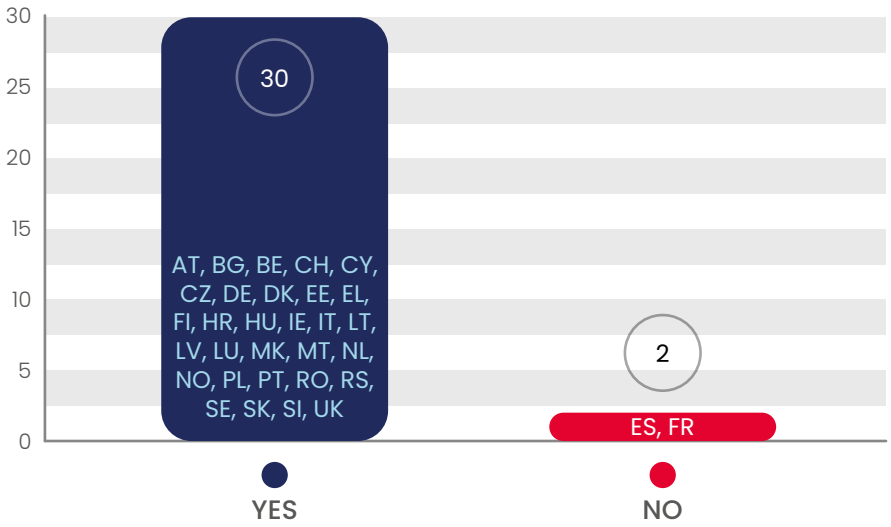
Access points are defined in the Postal Directive[20] as the postal network physical facilities where postal items can be dropped off for further handling by the postal providers. The ERGP Report deals with two access point components – collection letter boxes and points of contact.

The majority of countries have defined the standards prescribing adequate volume of post letter boxes to be provided by the USP (more than 94%, Figure 14.3.). These standards differ from country to country and include, among other, the following criteria:

- one post letter box per certain number of inhabitants (depending on whether the area is urban or rural);
- maximum distance between letter boxes and number of inhabitants per letter box;
- maximum distance between post letter boxes;
- maximum distance between the letter box and user; etc.

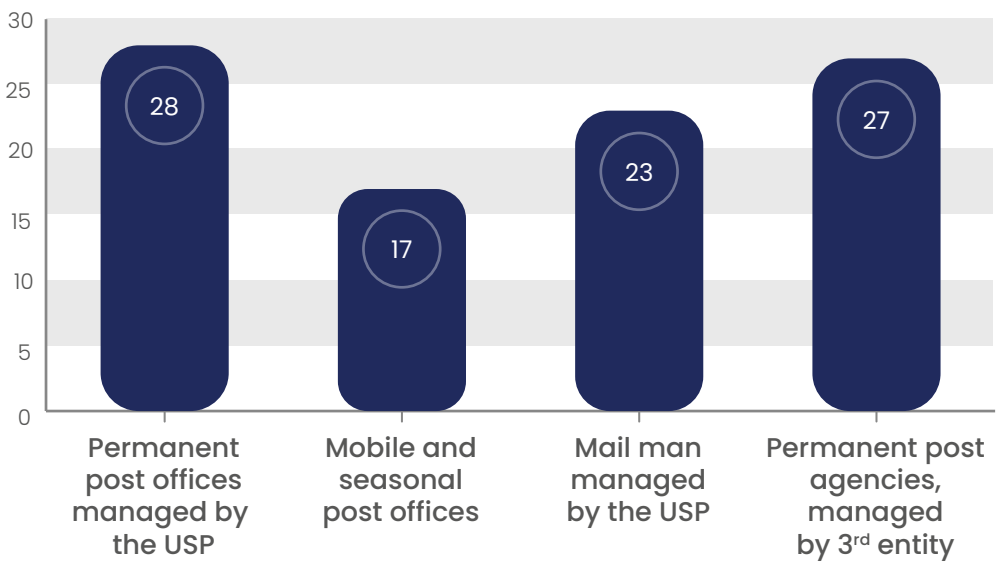
20 Article 2, Directive 2008/06/EC

Figure 14.3. Countries with defined standards on the volume of postal letter boxes



With respect to different types of points of contact, it is obvious that dominant among them are permanent postal network units managed by the USP, followed by permanent postal „agencies" managed by third entities (Figure 14.4.).

Figure 14.4. Types of points of contact/postal network units



15 SECURITY RISKS IN ICT SYSTEMS

The rise in popularity of the cloud technologies and use of networked smartphones led to an increased frequency of malicious hackers' attacks. There have been no immune companies, whether big or small, in terms of resistance to cyber attacks in 2019. The attacks are becoming more sophisticated and the so-called spearphishing targeting more present than ever. During 2019, a significant number of state organizations world-wide have been exposed to ransomware attacks, many of which had to discontinue their activities on account of massive sensitive information leakage and loss of services. In order to reduce the risks and consequences of the attacks, a research in the area of detection and prevention of attacks has been undertaken in the course of the previous years. These measures represent the basics of the protection against cyber threats, with early detection as an imperative step in an efficient preventive and defensive combat in the cyberspace.

The National CERT coordinates the activities of prevention and protection from security risks in the ICT systems in the Republic of Serbia, on the national level. It also collects and exchanges the information on the security risks in ICT systems and events threatening the security of those systems, and accordingly informs, provides support, notifies and gives advice to the persons managing the ICT systems in the Republic of Serbia, including the public.

This year's Market Overview for 2019 provides statistical data based on the applications filed with the National CERT from January 2019 to December 2019, information of the Special Prosecution Office for High-Tech Crime and research of the renowned companies in the area of cyber security.

Cyber security worldwide

In 2019, there has been a significant change in the attackers' behaviour and diversity of the attacks. According to the report[21] of the Check Point company, offering the analysis of incidents between January and December 2019, an increase in the following types of attacks has been observed:

- **indirect attacks,** searching to compromise the infrastructure of the electronic communications provider or business partners of the targeted organization prior to the actual attack,
- **attacks against e-commerce websites,** with the aim to steal personal data and credit card information,
- **attacks against cloud infrastructure,**
- **sophisticated attacks against mobile devices,** and
- **personalized attacks against the public and healthcare sectors using ransomware.**

The rise of **indirect attacks** is a clear sign that the attackers' strategy has changed. In October 2019, Avast reported a security breach believed to have targeted Ccleaner software[22] in order to compromise it and use it as a vehicle for attacking the companies that use the product. Apart from the software companies, the attackers also take great interest in the electronic communications providers. In the Soft Cell operation[23], a big telecommunications company was hacked with an intent to gather information about the conversations and movements of the persons identified as primary targets of the attack.

Greater money circulation through online transactions as a result of online shopping (during Black Friday, as much as 7.4 billion USD was spent in the United States only[24]) brought about massive **e-commerce website attacks**. Those are typically executed by inserting a JavaScript code, intended to steal the financial and personal user data, into the portion of the website dedicated for payments (for the companies that process the payments by themselves) or by redirecting the users to a fake page with payment instructions (for the companies using external services to deal with the payments). Big companies, such as Procter & Gamble[25], but also small and medium-sized enterprises, fell victims of this type of attack in 2019.

21 Check Point Cyber Security Report 2020
22 "Avast Fights Off Cyber-Espionage Attempt, Abiss" by Jaya Baloo, Avast Blog, October 21, 2019
23 "Operation Soft Cell: A Worldwide Campaign Against Telecommunications Providers," Cybereason Nocturnus, Cybereason, June 25, 2019
24 "Black Friday Shoppers Spend Record $7.4 Billion in Second Largest Online Sales Day Ever," by Alex Sherman, CNBC, November 30, 2019
25 "P&G Online Beauty Store First Aid Beauty Hit by Magecart Attack," by Pierluigi Paganini, Security Affairs, October 26, 2019

The number of **cloud infrastructure attacks**, as well as their consequences are equally on the rise, which is not a surprise, taking into account the expected exponential growth of this market by estimated 227 billion USD in 2019, reaching 354 billion USD in 2022[26], with 90% of the companies and SMEs today already using some kind of cloud service[27]. Although an improperly configured cloud environment can be cited as the main cause of a record number of theft-related incidents (such as the massive theft of personal data on the Facebook platform[28]), direct attacks against cloud service providers are observable. Using significant resources from the cloud service provider's infrastructure, through cryptocurrency mining, the cryptojacking campaigns try to compensate for the reduction in profitability of these attacks, due to cryptocurrency devaluation. In May 2019, several cases were reported of Microsoft Azure cloud services being used for malware distribution and C2C (Command&Control) attack implementation[29].

Sophistication and variability of **mobile device attacks** were significantly augmented in 2019. With adware malicious software still being top threat in terms of unsolicited ad distribution, there is a growing number of different types of attacks targeting specifically mobile devices. The attackers increasingly abuse the OS and apps' vulnerabilities in an initial phase of the attack or in order to escalate privileges. In 2019, among other, a WhatsApp application vulnerability[30] was reported, which enabled the attackers to take control over the user's mobile phones. During the same year, 28% of the organizations got involved in at least one cyber attack targeting mobile devices.

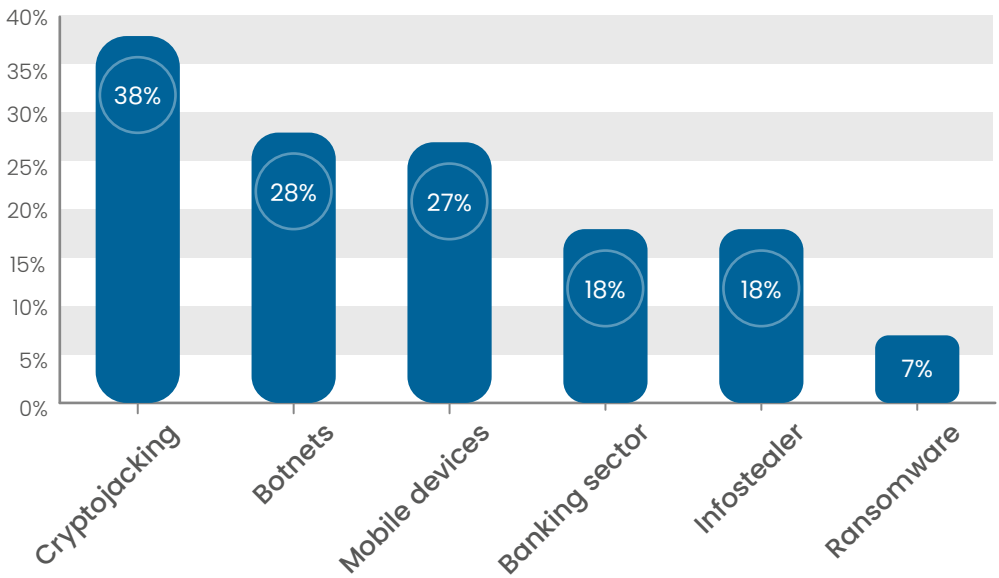
In 2019, the attackers changed their **ransomware-based attack** strategy as well. The approach dominant in 2017 and 2018, focusing on massive distribution of this software type was switched to **personalized attacks against the public and healthcare sectors**. The attackers are now turning their attention to exploring the compromised network and identifying the resources valued by the organization, before starting to encrypt their data. Despite using different initial attack vectors, due to the cooperation between the attackers, some of them enable initial access to the infrastructure (it is estimated that 28% of the organizations have already become part of botnets[31]), while the others perform the rest of the attack. The demanded ransoms, as well as costs of recovery from the personalized ransomware attacks have become substantially higher than the previous years. For example, the ransom asked from *Riviera Beach City* in Florida was 600 000 USD[32], whereas an estimate of recovery costs in Baltimore rose to 18 million USD[33].

26 "Gartner Forecasts Worldwide Public Cloud Revenue to Grow 17% in 2020," Gartner, November 13, 2019
27 "2019 State of the Cloud Report from Flexera," Flexera, 2019
28 "Hundreds of Millions of Facebook User Records Were Exposed on Amazon Cloud Server," by Jason Silverstein, CBS News, April 4, 2019
29 "Threat Actors Abuse Microsoft Azure to Host Malware and C2 Servers," by Pierluigi Paganini, Security Affairs, June 2, 2019
30 "The NSO WhatsApp Vulnerability – This is How It Happened," by Check Point Research, May 14, 2019
31 Check Point Cyber Security Report 2020
32 "The Riviera Beach City Pays $600,000 in Ransom," by Pierluigi Paganini, Security Affairs, June 20, 2019
33 "Baltimore Estimates Cost of Ransomware Attack at $18.2 Million as Government Begins to Restore Email Accounts," The Baltimore Sun, by Ian Duncan, May 29, 2019

1. Statistics of attacks by different types of malware

However, despite all the changes in 2019, the share of different malware types from the Check Point report[34] shown in Figure 15.1, cryptojacking attacks overtaking the victim's device resources in order to mine cryptocurrencies remain dominant. The botnets activity has been reported as becoming more active and botnets are now used as initial vectors for other types of attacks. On the other hand, although at the bottom of the list ransomware creates even greater damage than the previous years, despite only a mild rise in the number of attacks. Alongside the mentioned threats, during 2019, so-called infostealer malware was frequently used, specially developed to target the financial sector, mobile devices, but also designed for data collection, to be used by the attackers in the later steps of the attack.

Figure 15.1. Malware shares by type

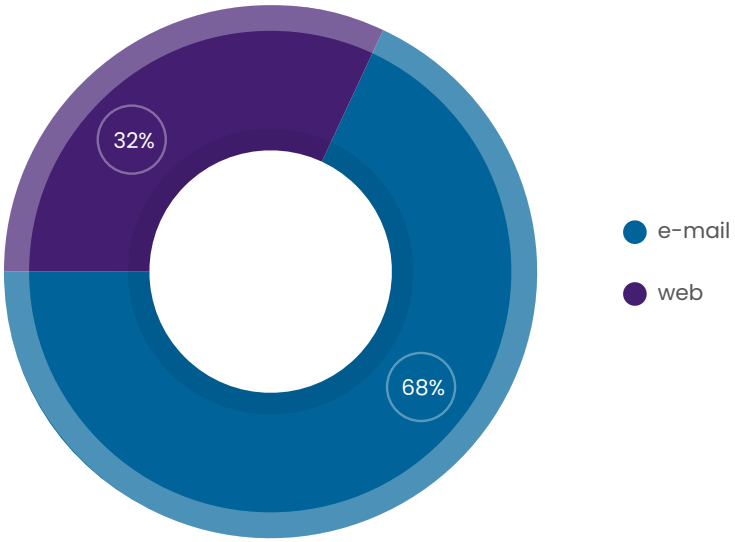


2. Ways of malware distribution

As for the ways of malicious software distribution (Figure 15.2), the attacks using e-mail remain dominant in 2019, compared to those using web pages.

34 Check Point Cyber Security Report 2020

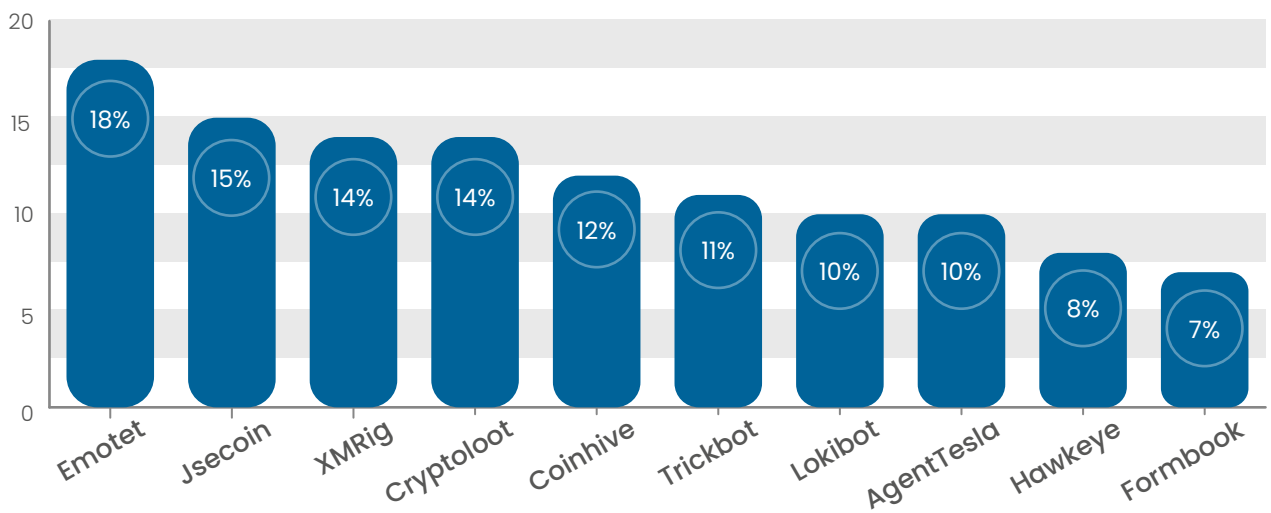
Figure 15.2. Shares of attacks using e-mail and web pages for malware distribution



3. Statistics of attacks by different malware families

The percentage of organizations infected by a specific malware family worldwide is shown in Figure 15.3. Despite malware family Emotet still being at the top of the list of infected organizations, substantial differences in its functionality persist. In 2019, Emotet evolved into a malware serving to form botnets. Such nets of infected devices can be further used for the distribution of other types of malware. The combination of Emotet malware and a ransomware (such as Trickbot) can result in a huge number of successful attacks on the public and healthcare sector.

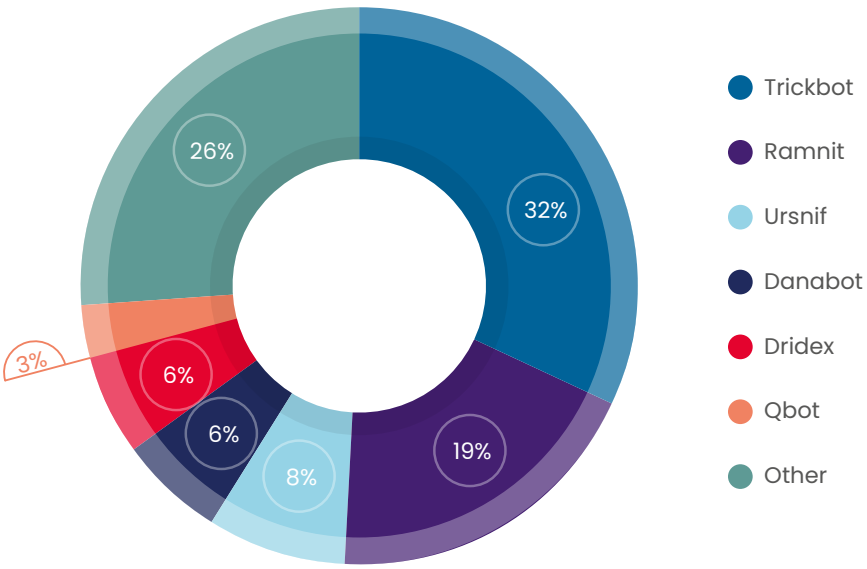
Figure 15.3. Shares of organizations having been infected by specific malware family



4. Statistics of attacks on financial sector by different malware families

Trickbot malware family, as shown in Figure 15.4, is top-ranked among the most frequent cyber attacks in the financial sector. This is the result of the attackers' change of strategy in 2019 and the malware's frequent use in the initial phase of the attack. Just like the Emotet malware family, Trickbot gained new functionalities enabling it to be used as botnets establisher, alongside its ability to steal financial information, but also for cryptojacking and other sophisticated activities used by the attackers.

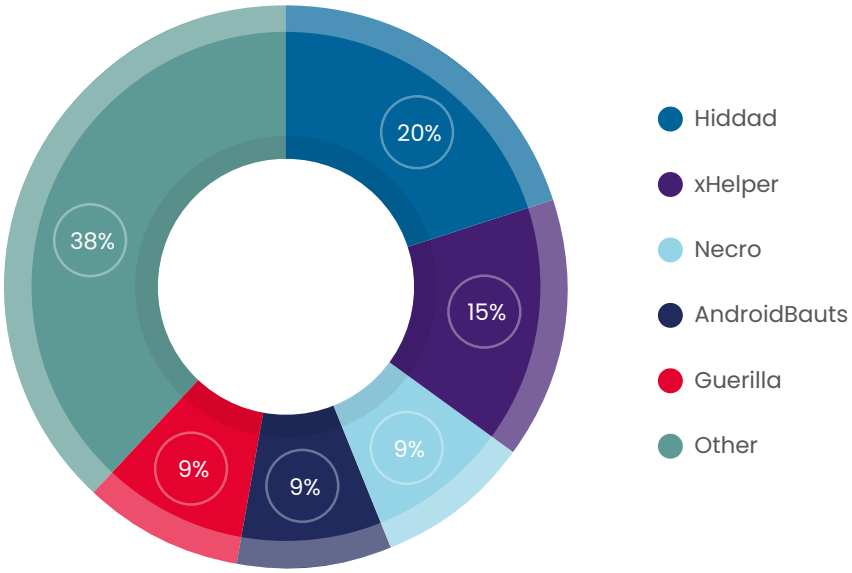
Figure 15.4. Share of different malware families in financial sector



5. Statistics of attacks on mobile devices by different malware families

Based on the share of different malwares designed to attack mobile devices shown in Figure 15.5, 2019 remains the year of the most popular adware malware family, with its primary functionality being the distribution of unsolicited ads and collection of marketing information about users' behaviour. Although all individually quoted malicious software (Hiddad, xHelper, Necro, AndroidBauts, Guerilla) belong to this malware type, the diversity of programs designed to attack mobile devices has grown significantly in 2019.

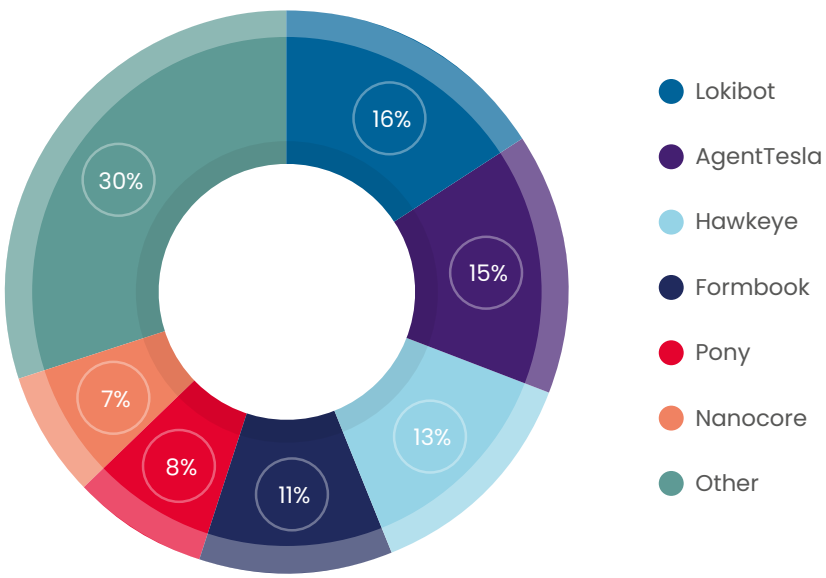
Figure 15.5. Share of different malware families designed to attack mobile devices



6. Statistics of attacks by different malware families designed for theft of user data

A malicious software named infostealer, specially designed for the theft of user data, was very popular in 2019. Figure 15.6 shows the share of different families of this type of malware. The information on the most popular malware families can be found on darknet and requires no particular skill and knowledge to be applied in practice. This does not come as a surprise, as this type of malware can be used for independent collection of data on usernames and passwords, or in the initial phase of the attack.

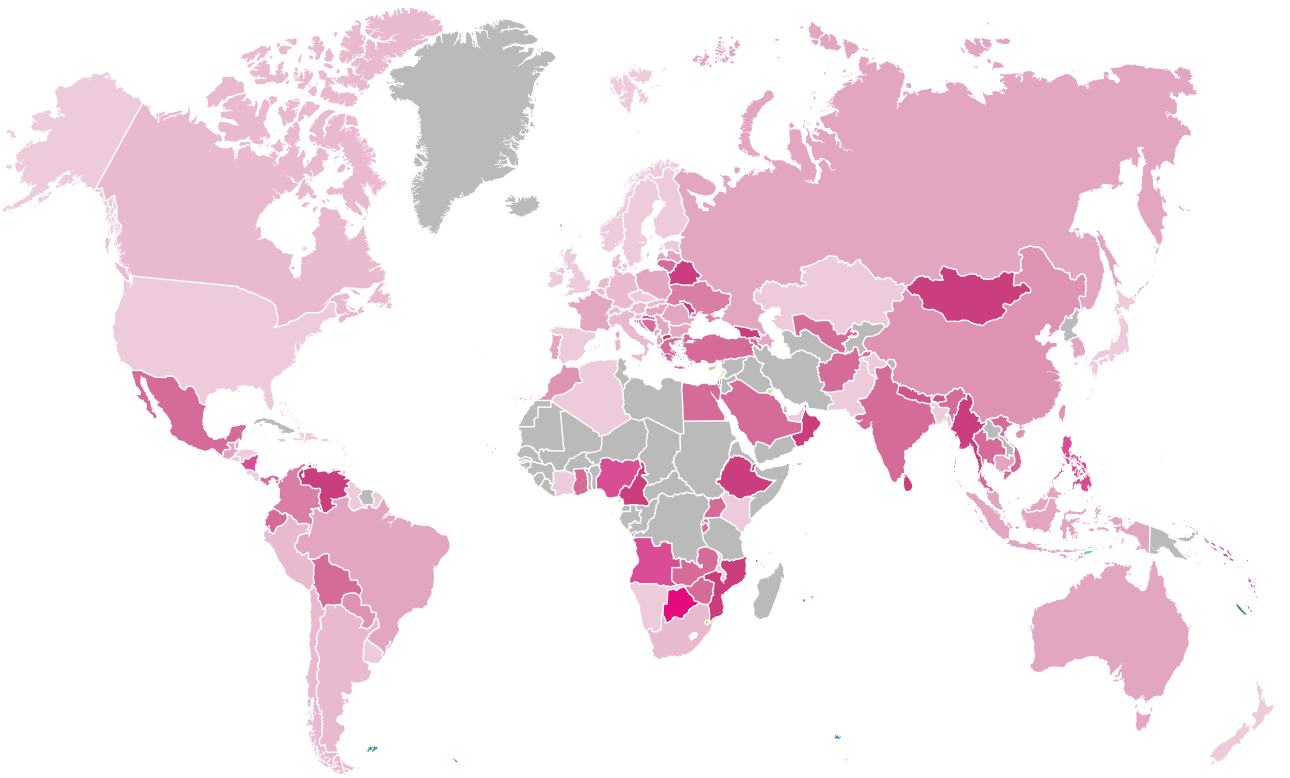
Figure 15.6. Share of different malware families designed for data theft (infostealer)



7. *Check Point Global Threat* index

Figure 15.7 offers graphical display of Check Point Global Threat index values by country, in 2019. This index is calculated based on the data on attacks gathered 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. Different countries are attributed different levels of probability of infection.

Figure 15.7. Graphical display of Check Point Global Threat index values by country



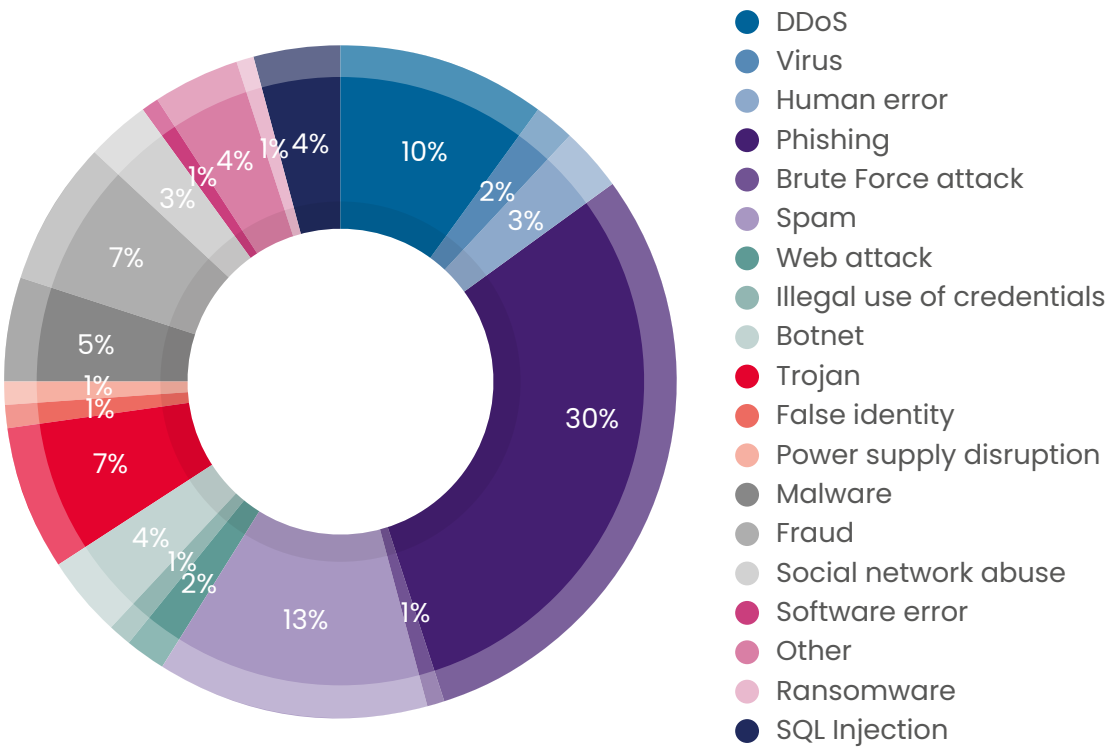
Information security in the Republic of Serbia

Pursuant to the Law on Information Security („Official Gazette of RS", 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 2019, 152 such incidents, including those detected by the International CERTs, were reported to the National CERT (Figure 15.8).

Incidents that disrupted the ICT security, if found to be accompanied by reasonable doubt of a committed criminal act, were duly reported in accordance with legal and by-law provisions or forwarded to the Special Prosecutor's Office for High-Tech Crime.

Figure 15.8. Incidents reported to National CERT



Breaches of computer and data security

In 2019, the Special Prosecutor's Office for High-Tech Crime opened 3,808 cases related to the breaches of data security. The number of known perpetrators in 2019 was 320, with however 1,409 unknown perpetrators of such acts.

An overview of the volume of cases processed by the Special Prosecutor's Office for High-Tech Crime since its establishment until now is given in Table 15.1.

Table 15.1. Overview of cases processed by Special Prosecutor's Office for High-Tech Crime up to 31.12.2019.

	Known perpetrators	Unknown perpetrators	Events	Total cases	Percentage of variability
2006	19	0	0	19	
2007	75	11	68	154	+710.53%
2008	110	14	60	184	+19.48%
2009	91	42	114	247	+34.24%
2010	116	13	443	572	+131.58%
2011	130	28	502	660	+15.38%
2012	114	65	609	788	+19.39%
2013	160	243	558	961	+21.95%
2014	294	352	770	1,416	+48.07%
2015	198	570	1,306	2,074	+45.74%
2016	240	580	1,237	2,057	-0.82%
2017	213	945	1,213	2,371	+15.26%
2018	322	1,306	1,394	3,022	+27.46%
2019	**320**	**1,409**	**2,079**	**3,808**	**+26.01%**
Total	2,402	5,578	10,353	18,333	+ 1114.26%

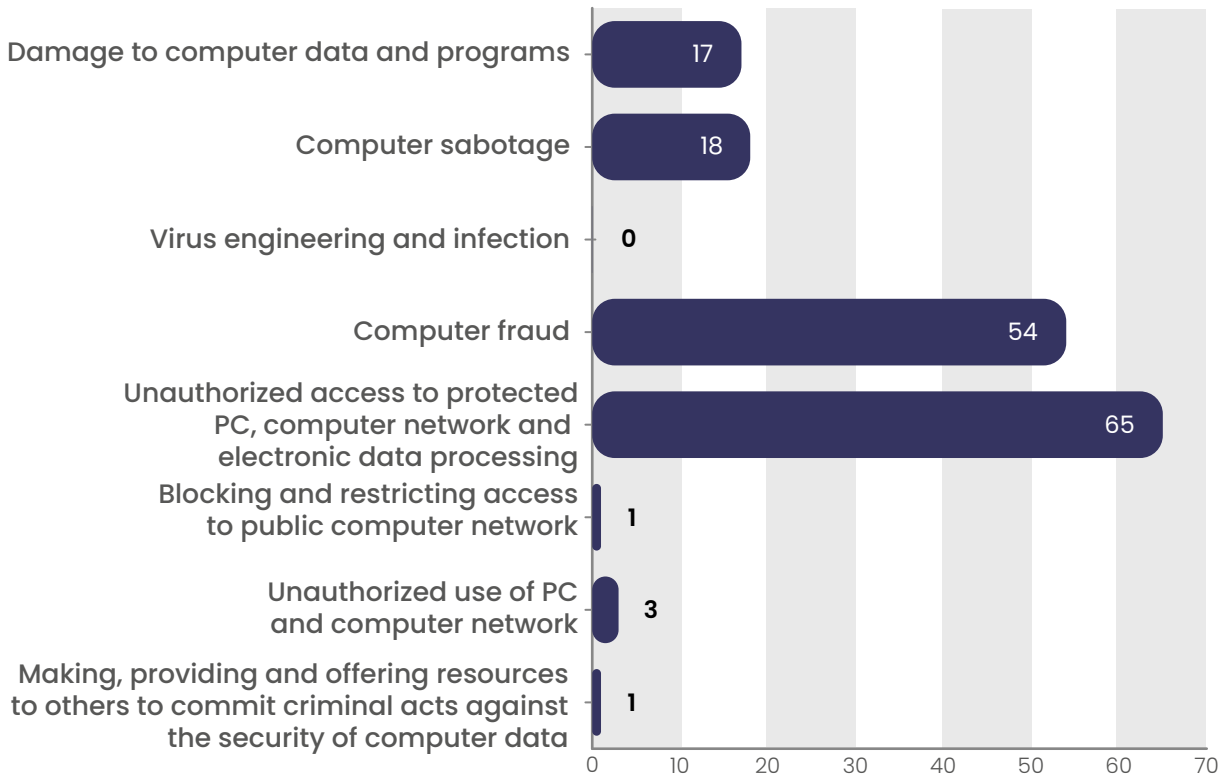
Source: The Special Prosecutor's Office for High-Tech Crime

As far as the known perpetrators regarding the above criminal offences are concerned, the numbers are as follows:

- Reported individuals – 287,
- Individuals requested to provide necessary notifications – 178,
- Individuals ordered to be investigated – 4,
- Individuals against whom evidence was demonstrated – 82,
- Individuals with proposal for indictment – 59,
- Individuals indicted – 7,
- Individuals legally sentenced – 49,
- Plea agreements – 33.

The number of issued warrants in the cases of breach of computer and data security in 2019 was 159, and the distribution by the type of violation is shown in Figure 15.9.

Figure 15.9. Number of criminal charges for committed offenses against security of computer data in 2019



Source: The Special Prosecutor's Office for High-Tech Crime

Malware presence rate

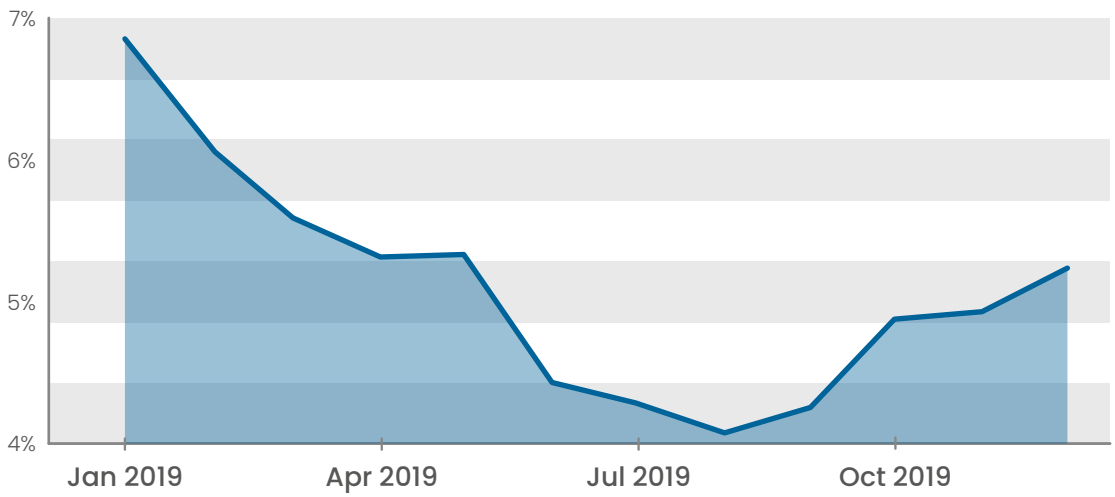
The malware presence rate indicates the level of computer hygiene and awareness of the user in terms of cyber security. Based on the research conducted by Microsoft, possible reasons for a reduced number of encounters with a malicious software in 2019 could be an increased use of antivirus programs and switching to Windows 10 OS.

Still, regardless of the reduced malware presence rate, the attackers do not sleep but relentlessly develop their techniques – the fact that should most certainly keep the rest of us, users, awake.

Figure 15.10 displays the monthly percentage of devices that encountered malware during 2019, on the territory of the Republic of Serbia.

Country	Presence rate	Monthly variation	Same month in 2018
Serbia	5.07%	0.32↑	-2.07↓

Figure 15.10. Malware presence rate in 2019



Source: Microsoft

Financial fraud

According to a report done by Kaspersky referring to the first semester of 2019, Serbia is the fifth country in the world in terms of number of financial malware attacks (Table 15.2).

Table 15.2. Top 10 countries by number of users-victims of financial malware

No.	Country*	% of attacked users**
1	China	2.30
2	Belarus	2.30
3	Venezuela	2.20
4	North Korea	2.10
5	**Serbia**	**1.80**
6	Greece	1.70
7	Cameroon	1.60
8	Indonesia	1.50
9	Pakistan	1.50
10	Russia	1.40

* 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.

In Q2 2019, Kaspersky blocked the attempts to install different malware types on the computers of 228,206 users worldwide. These malwares were designed to steal money from the bank accounts and the most frequent among them were trojans: Trojan-Banker. Win32.RTM (32.2%), Trojan.Win32.Zbot (23.3%) and Backdoor.Win32.Emotet (8.2%).

The geographic distribution of banking trojans and ATM malwares by the number of users having been faced with this problem is shown in Table 15.3, with Serbia being on position 10.

Table 15.3. Geographic distribution of banker malware attacks in Q2 2019

No.	Country*	% of attacked users**
1	Belarus	2.0
2	Venezuela	1.8
3	China	1.6
4	Indonesia	1.3
5	North Korea	1.3
6	Cyprus	1.2
7	Paraguay	1.2
8	Russia	1.2
9	Cameroon	1.1
10	**Serbia**	**1.1**

* 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.

Internet threats

During Q3 2019, Serbia occupied the 12th position regarding the threats originating from the Internet, i.e. the number of Internet users who were at least once victims of malware attacks (Table 15.4).

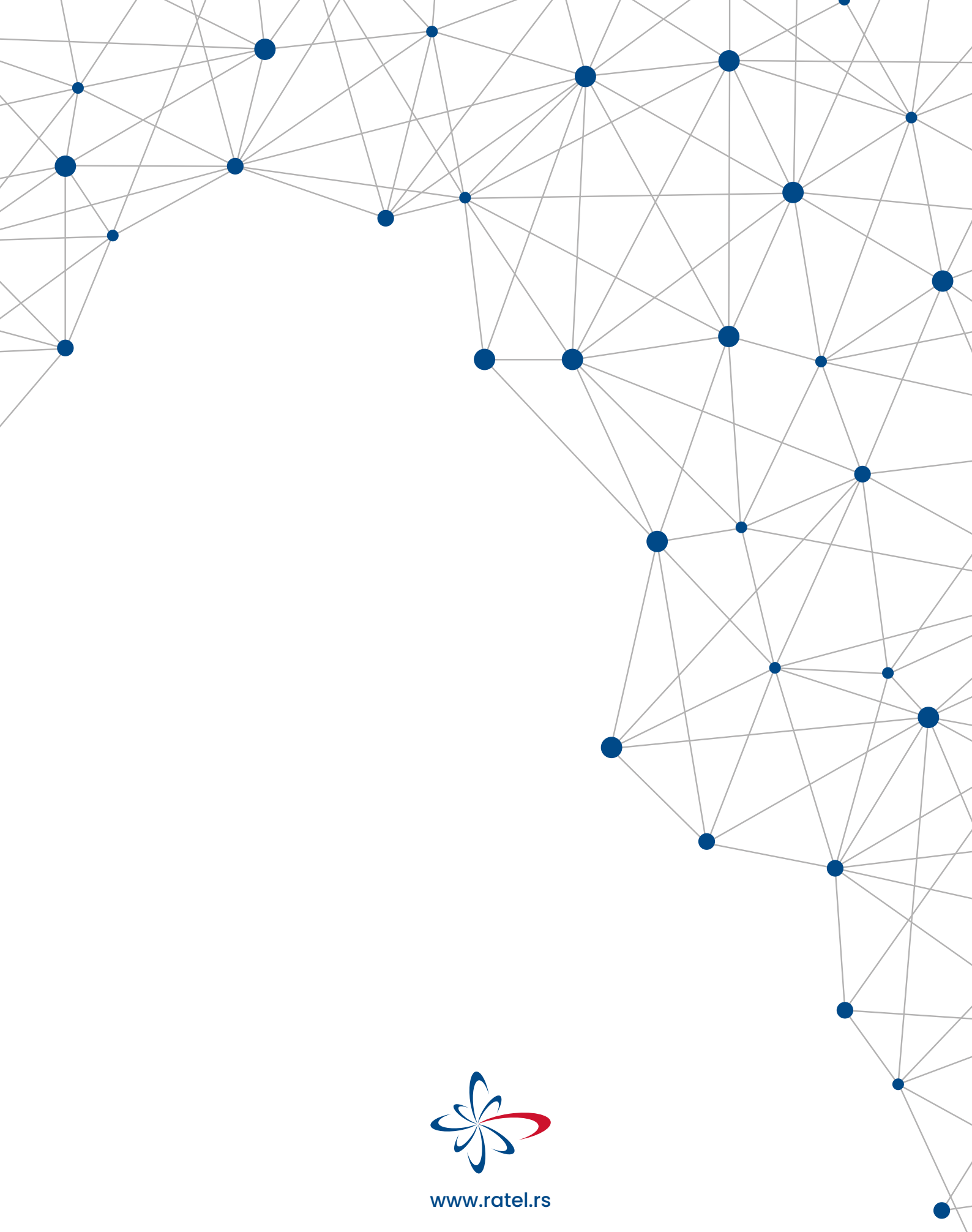
Table 15.4. Internet threats in Q3 2019

No.	Country/Territory*	% of attacked users**
1	Tunisia	23.26
2	Algeria	19.75
3	Albania	18.77
4	Reunion	16.46
5	Bangladesh	16.46
6	Venezuela	16.21
7	North Macedonia	15.33
8	France	15.09
9	Qatar	14.97
10	Martinique	14.84
11	Greece	14.59
12	**Serbia**	**14.36**
13	Syria	13.99
14	Bulgaria	13.88
15	Philippines	13.71
16	United Arab Emirates	13.64
17	Djibouti	13.47
18	Morocco	13.35
19	Belarus	13.34
20	Saudi Arabia	13.30

* 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 on their devices.



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