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

Overview of the Electronic Communications and Postal Services Market in the Republic of Serbia in 2023

RATEL

MARKET OVERVIEW

OF ELECTRONIC COMMUNICATIONS AND POSTAL SERVICES IN THE REPUBLIC OF SERBIA IN 2023

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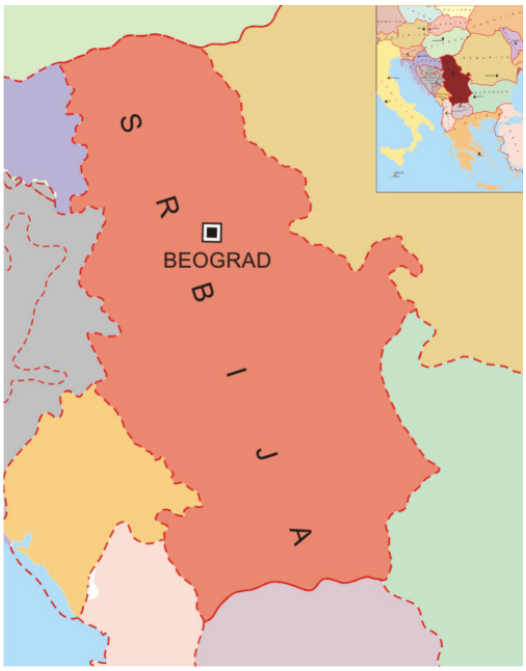
Figure 1.1. Republic of Serbia – Basic Facts



Name	Republic of Serbia
Capital	Belgrade
Area	88.499 km^2
Population (without AP Kosovo and Metohija), estimated by the Statistics Office [1]	6.641.197
Country code:	+381
Internet domain:	.rs
GDP in current prices for 2023 [2]	8.150,48 billion RSD (69,51 billion EUR)
Average net income in 2023 [3]	86.007 RSD (733,53 EUR)

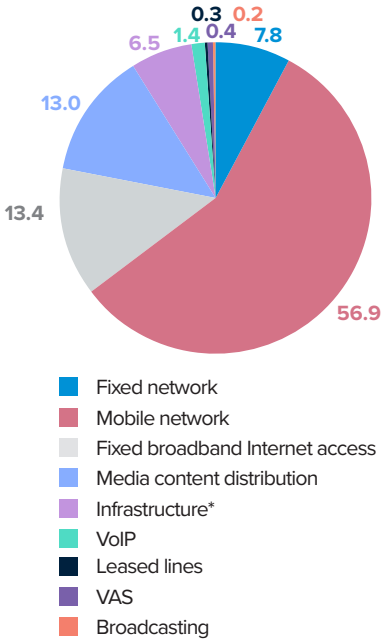
The data used for the overview of telecom market in the Republic of Serbia have been obtained based on the questionnaires provided by the telecom market participants, and they mainly refer to the territory of the Republic of Serbia without Kosovo and Metohija since this area is under the control of the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

[1] Statistics Office 2022 census data.

[2] Statistics Office estimation – as the sum of four quarters. Data taken form the publication Statistical Calendar of the Republic of Serbia, 2024, issued by the Statistics Office (the average RDS/EUR exchange rate for 2023 was 117.2513), p. 35.

[3] Ibidem, p. 42.

Figure 1.2. Structure of revenues by services in 2023



Source: RATEL

* Infrastructure revenues include revenues stemming from the provision of infrastructure services (IaaS – Infrastructure as a Service), leased antenna mast revenues, leased dark fiber revenues, colocation revenues, leased cable canalization revenues, LLU (local-loop unbundling) revenues and other revenues from leased infrastructure.

The total revenues made in the electronic communications market of the Republic of Serbia in 2023 amounted to approximately 270.5 billion dinars which is by 10.4% more than the year before. The total revenues amounted to 2.3 billion euros, which is more than in 2022 when they were around 2 billion EUR. The share of revenues from electronic communications in the Serbian GDP in 2023 was 3.3%.

In terms market share accounted for by different services in the Serbian electronic communication market in 2023, the same as in the previous years, the largest share went to mobile service provision, accounting for 56.9% of the total revenues.

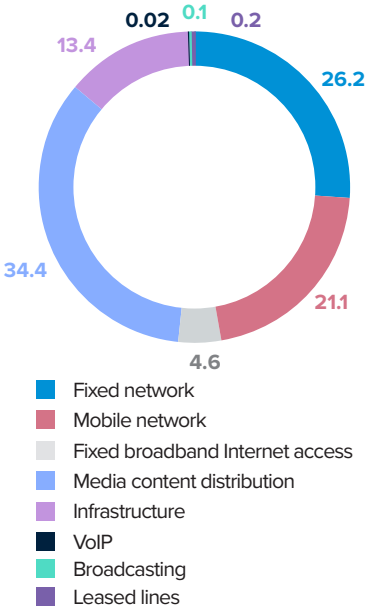
The total investments made in the electronic communications sector in 2023 amounted to 91.5 billion dinars (780 million euros), which is by 7.4% more than in the previous year when they amounted to 85.2 billion dinars. Considered in euros, the investments increased from 726 million to 780.7 million euros. Investments made in media content distribution have the largest share with more than 31 billion dinars (268 million euros) accounting for 34.4% of the total investments in 2023, while investments in fixed network of 24 billion dinars (204 million euros) accounted for approximately 26.2% of the total investments made in 2023.

A comparative overview of the number of subscribers and penetration rate of public fixed communication networks, public mobile communications networks, broadband Internet access, media content distribution systems and bundle services for the period 2019-2023 is 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 (2019-2023)

Year / Service	Indicator	2019	2020	2021	2022	2023
Fixed telephony - subscribers	Million	2.42	2.41	2.37	2.36	2.30
	Per 100 households	97.34	97.01	95.45	91.24	88.91
Fixed telephony - users	Million	8.45	8.26	8.50	8.62	8.53
	Per 100 households	121.40	119.25	123.72	129.70	128.47
Fixed broadband Internet - subscribers	Million	1.62	1.73	1.80	1.95	2.08
	Per 100 households	65.27	69.56	72.34	75.26	80.20
Media content distribution - subscribers	Million	2.00	2.10	2.14	2.21	2.33
	Per 100 households	80.42	84.51	85.94	85.53	90.02
Bundle services - subscribers	Million	1.42	1.56	1.63	1.75	1.84
	Per 100 households	56.90	62.54	65.39	67.54	71.13

Figure 1.3. Structure of investments by services in 2023



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, based on weighted average, with comparative data for 2021, 2022 and 2023. According to the collected data on natural entities and the data received from the Statistics Office on net income in 2023, the cost of the low basket equalled 1.45% and the average net salary, and the cost of the high usage basket equalled 7% of the average net salary.

Table 1.2. Low usage basket of electronic communications services

LOW USAGE BASKET	2021		2022		2023	
	Average bill (dinars)	% of the average salary	Average bill (dinars)	% of the average salary	Average bill (dinars)	% of the average salary
Fixed phone	601.16	0.91	572.28	0.76	555.82	0.65
Mobile phone (prepaid)	308.19	0.47	350.35	0.46	388.14	0.45
TV (public broadcasting service tax)	299.00	0.45	299.00	0.40	299.00	0.35
Total	1,208.35	1.83	1,221.63	1.63	1,242.96	1.45
Average net salary (RSD)*	65,864		74,933		86,007	

* 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	2021		2022		2023	
	Average bill (dinars)	% of the average salary	Average bill (dinars)	% of the average salary	Average bill (dinars)	% of the average salary
Fixed phone	601.16	0.91	572.28	0.76	555.82	0.65
Mobile phone (postpaid)	1,804.62	2.74	2,084.62	2.78	2,262.19	2.63
TV (public broadcasting service tax) *	299.00	0.45	299.00	0.45	299.00	0.35
Internet **	1,360.01	2.07	1,372.54	1.83	1,406.74	1.63
Media content distribution	1,500.50	2.28	1,490.19	1.99	1,543.28	1.80
Total	5,565.29	8.45	5,818.63	7.76	6,067.03	7.05
Average net salary (RSD)	65,864		74,933		86,007	

Notes:
* Since January 2016, pursuant to the Law on Temporary Regulation of Public Media Service Tax Collection (Official Gazette of RS, nos. 112/15, 108/2016, 95/2018, 86/2019, 153/2020 and 129/2021), 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 2023 amounted to 14.8 thousand.

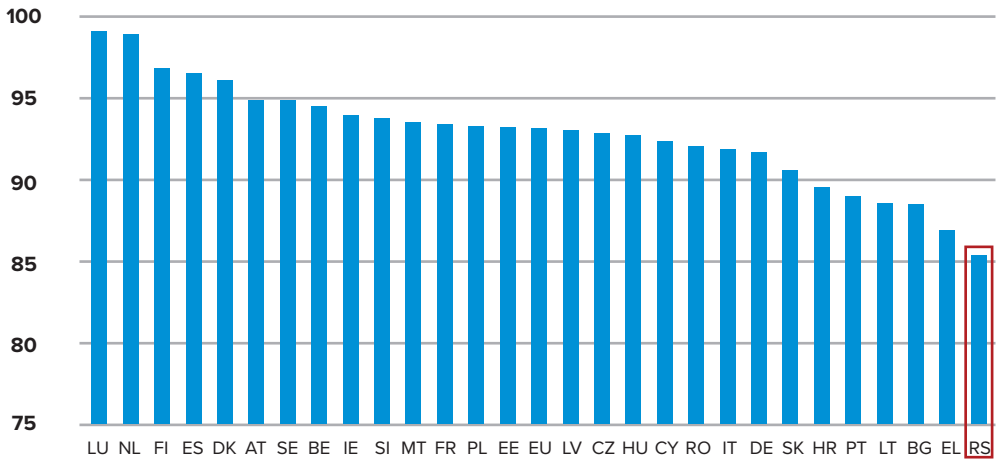
2

EU TELECOM MARKET STATE OF PLAY

Fixed broadband access

One of the digital infrastructure development indicators applied in the European Union refers to the share of households with residential Internet access. According to this indicator, countries with the biggest share of this type of households are: Luxembourg, Netherlands, Finland, Spain and Denmark (more than 95%). Lower shares of households with residential Internet access are in Croatia, Portugal, Lithuania, Bulgaria and Greece (less than 90%). The EU average is 93.1% and according to these indicators, Serbia ranks significantly below the average, with access share of 85.4%.

Figure 2.3. Share of households with residential Internet access

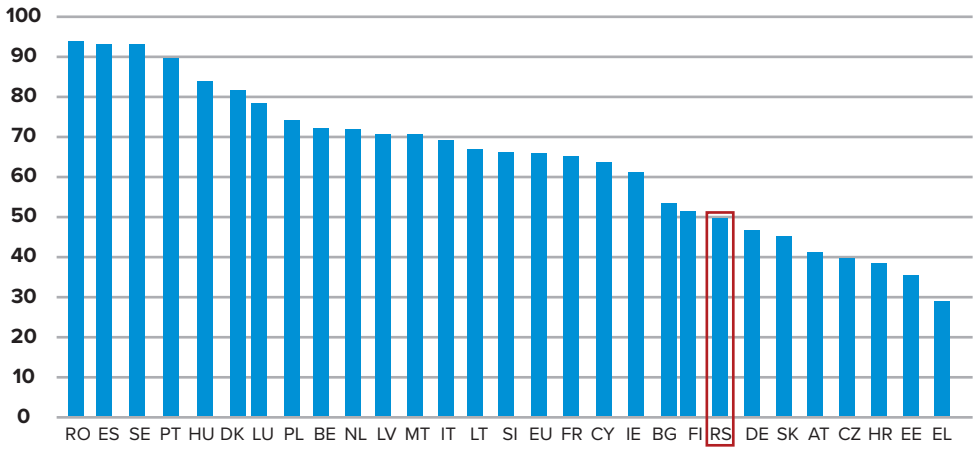


Source for the EU: EC – https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/desi-indicators as on October 28, 2024;

Source for Serbia: Eurostat

In terms of fixed broadband access rates, 65.9% of subscribers in the EU used Internet packages with the speed of at least 100 Mbps. The leading countries in this category (100 Mbps and more) are Romania, Spain, Sweden, Portugal, Hungary and Denmark, with more than 80% of high-speed access users, while this type of access is the least represented in Greece (less than 30%). In Serbia, 49% of the users had Internet access speed of at least 100 Mbps.

Figure 2.9. Distribution of users of fixed broadband access over 100 Mbps

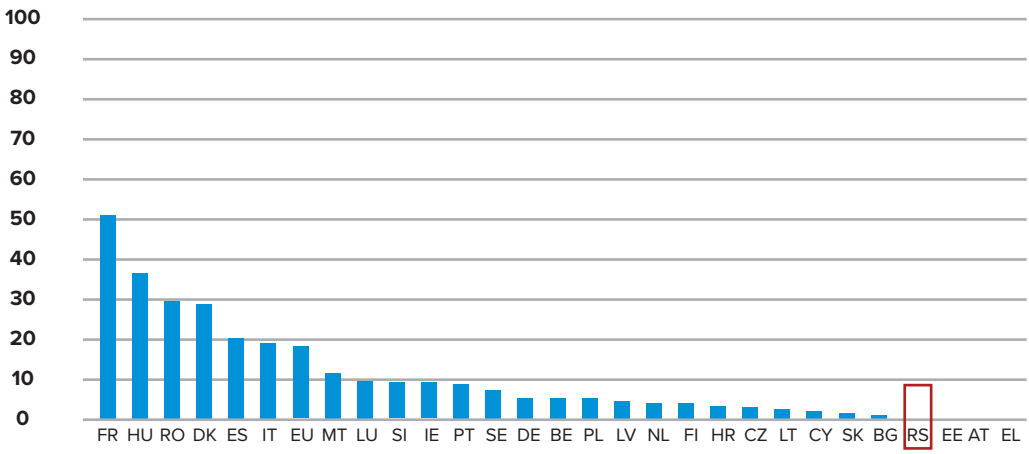


Source for the EU: EC – https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/desi-indicators, as on October 28, 2024;

Source for Serbia: RATEL

As for the speed of 1 Gbps and more, there were 18.5% of subscribers using this type of packages. The leading countries in terms of users of fixed broadband access speed of 1 Gbps and more are: France, Hungary, Romania and Denmark, with more than 20% of ultra-high-speed subscribers, whereas this type of access is the least represented in Estonia, Austria and Greece (less than 1%). In Serbia, the number of ultra-high-speed users (over 1 Gbps remains negligible and is also less than 1%.

Figure 2.10. Distribution of users of fixed broadband access over 1 Gbps

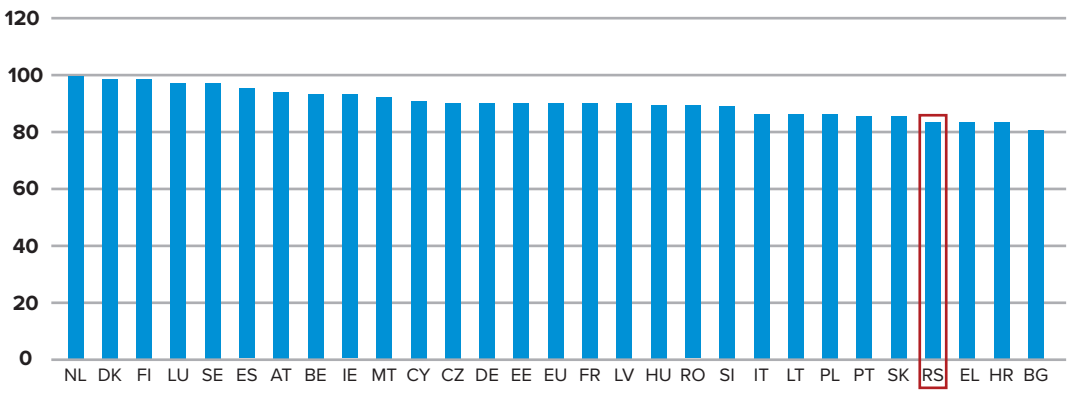


Source for the EU: EC – https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/desi-indicators, as on October 28, 2024;

Source for Serbia: RATEL

The EU mobile broadband access penetration rate per 100 inhabitants, mostly corresponds to that of fixed broadband access. The Netherlands, Denmark, Finland, Luxembourg, Sweden and Spain have more than 95 mobile broadband access subscribers per 100 inhabitants. Bulgaria has the lowest mobile penetration rate (80%). In Serbia, at the end of 2023, the number of active mobile broadband users per 100 inhabitants was around 83, which is below the EU average (90).

Figure 2.11. Mobile broadband access penetration rate per 100 inhabitants



Source for the EU: EC – https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/desi-indicators, as on October 28, 2024;

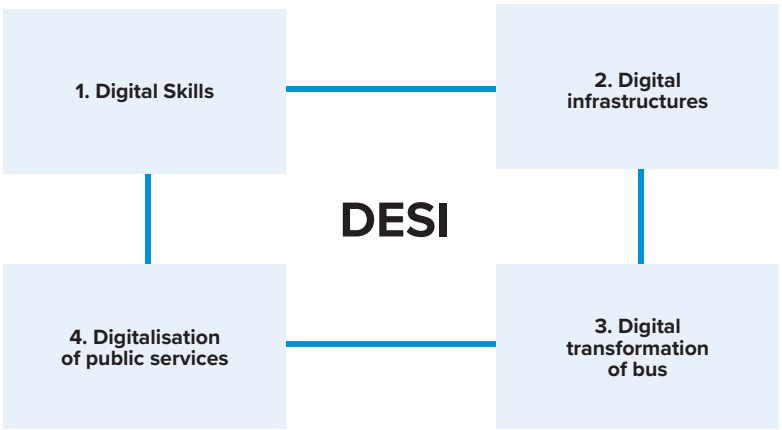
Source for Serbia: Eurostat

3

3. DIGITAL ECONOMY AND SOCIETY INDEX

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 the following categories: Digital skills, Digital infrastructure, Digital business transformation and Digitalisation of public services (Figure 3.1). It provides an insight in country's general performance and offers a simple way to identify areas with room for improvement. For the EU member states, DESI has been calculated since 2014, whereas for Serbia, it was first calculated in 2017, thus enabling the positioning of our country on the European map of digital performance.

Figure 3.1. DESI components



The adoption of the 2030 Digital Decade Policy Programme brought about the establishment of concrete general and digital transformation targets in Europe by 2030. As DESI, through the adoption of this decision, gained substantial importance in the process of monitoring the fulfillment of digital targets, its assessment methodology has become adapted to new needs, which were reflected in the alignment of individual indicatiors with digital targets, as well as in identifying the criteria representing key performance indicators (KPIs). Also, another significant change to this methodology was the absence of weighting of DESI indicators, sub-dimensions and dimensions, meaning that the calculation of final values was discontinued both for the EU member countries and for Serbia, disabling single ranking and positionning of Serbia on the European countries list. However, as DESI continues to be based on a set of indicators offering a multi-dimensional, detailed overview of the collective annual progress achieved by countries reaching for 2030 targets, it is still possible to compare individual indicator values for Serbia and the EU, placing focus on key performance indicators.

According to a new methodology, published in July of 2024, thirty-four indicators are divided into four main digital decade areas, with fifteen indicators representing KPIs for the measurement of progress toward the set targets.

The most recent methodology has undergone several changes compared to the previous one, namely regarding definitions and certain indicators, as well as thier inclusion or exclusion in/from four of the previously established dimensions (categories). One indicatator was excluded from category Digital skills, whereas four new KPIs (related mostly to the 5G network dimension representation) were included in category Digital infrastructures. Dimension Digital transformation of businesses saw the exclusion of one KPI and inclusion of two new indicators, unlike category Digitalisation of public services, where no changes occurred.

Each of the dimensions consists of several sub-dimensions along with corresponding indicators, with an overview of the current dimensions, sub-dimensions and accompanying respective KPIs featuring below.

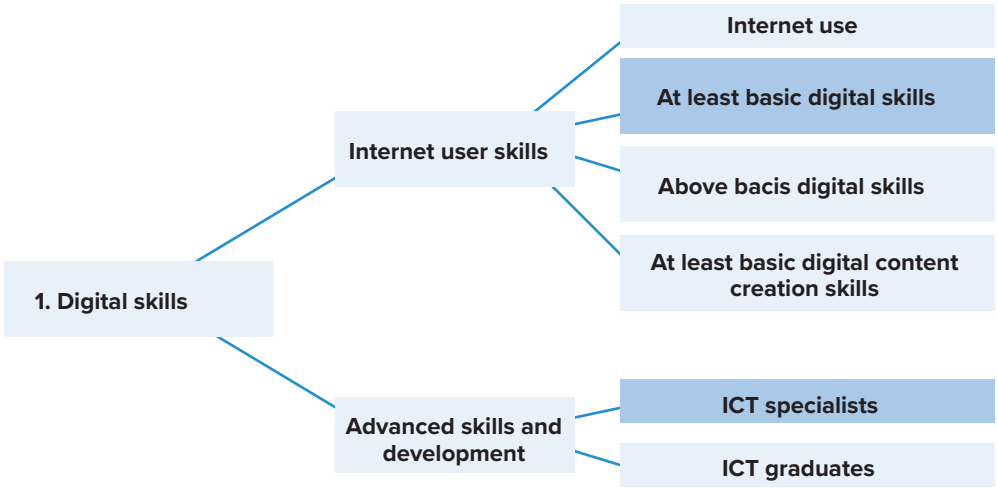
Dimension	Sub-dimension	KPI
Digital skills	Internet user skills	At least basic digital skills
	Advanced skills and development	ICT specialists
Digital infrastructures	Fixed broadband access	VHCN coverage
		FTTP coverage
	Mobile broadband access	Overall 5G coverage
		Edge nodes
Digital transformation of businesses	Digital intensity	SMEs with at least a basic level of digital intensity
	Digital technologies for businesses	Big data
		Cloud
		AI
		AI, Cloud or Big data
		Unicorns
	e-Commerce	
Digitalisation of public services	e-Government	Digital public services for citizens
		Digital public services for businesses
	e-Health	Access to e-Health records

Digital skills

This dimension comprises digital skills, from basic to advanced ones, indispensable for an active participation in digital society, as well as the number of experts with advanced digital skills. In that sense, digital skills, along with Internet access, analysed within the previous dimension, represent a necessary base for digital economy and society.

Sub-dimensions included in the Digital skills dimension and their indicators are shown in Figure 3.2.

Figure 3.2. Digital skills: sub-dimensions and their indicators



According to this dimension's indicators, Serbia ranked below the European countries, with notice, however, that it made progress for all indicators with the available 2023 data, compared to the year before, except for categories At least basic digital skills and Above basic digital skills, which mark a slight drop. For example, the share of ICT graduates is an exception to Serbia's ranking position, since this indicator is significantly higher than the EU average. Indicator At least basic digital content creation skills saw a modest progress, surpassing the European average, whereas for the rest of the dimension's indicators, Serbia scored below the average.

A comparative view of this dimension's average indicator values for the EU and the achieved values for Serbia over the two previous years is given in Figure 3.3. Since the indicators of At least basic digital skills and ICT specialists represent KPIs for the

measurement of the 2030 Digital Decade Policy Programme targets, the information regarding these indicators also includes EU target values.

Figure 3.3. Comparative view of Digital skills indicator values for the EU and Serbia

	SERBIA		EU	EU
	DESI 2023	DESI 2024	DESI 2024	2030 Target
Internet use	83%	85%	90%	
% individuals	2022	2023	2023	
At least basic digital skills	41%*	34%	56%	80%
% individuals	2022	2023	2023	
Above basic digital skills	12%	11%	27%	
% individuals	2022	2023	2023	
At least basic digital content creation skills	64%	69%	68%	
% individuals	2021**	2023	2023	
ICT specialists	3.4%	4.3%	4.8%	approximately 10% of total employment
% of total employment	2022	2023	2023	
ICT graduates	9.1%*	8.9%	4.5%	
% graduates	2022	2023	2022***	

*** The 2021 data were used, for comparative purposes with the available EU data.**

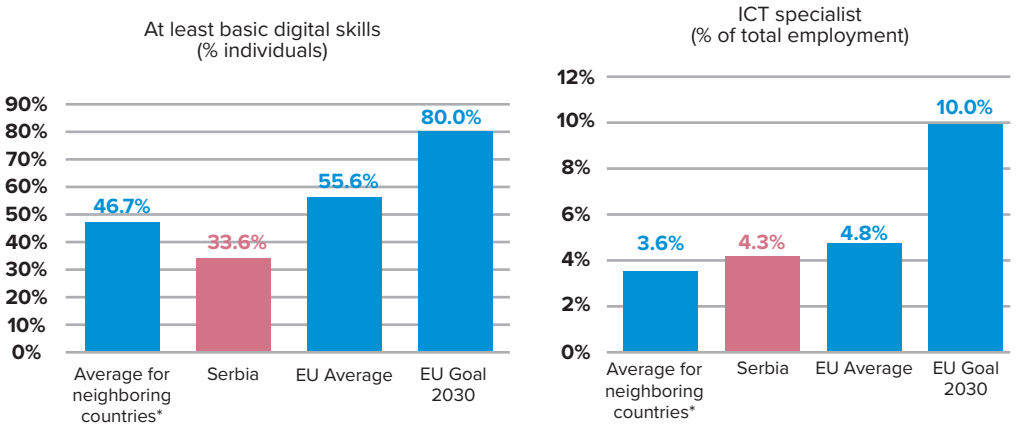
****EU data for 2023 are not available.**

Source for the EU countries: https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/desi-indicators

Source for Serbia: Statistical Office of Serbia (RZS)

To better consider the position of Serbia regarding the indicators measuring the 2030 Digital Decade targets, a comparison is made in Figure 3.4. between the current achievements of Serbia and average values of the neighbouring countries, EU member states and set targets.

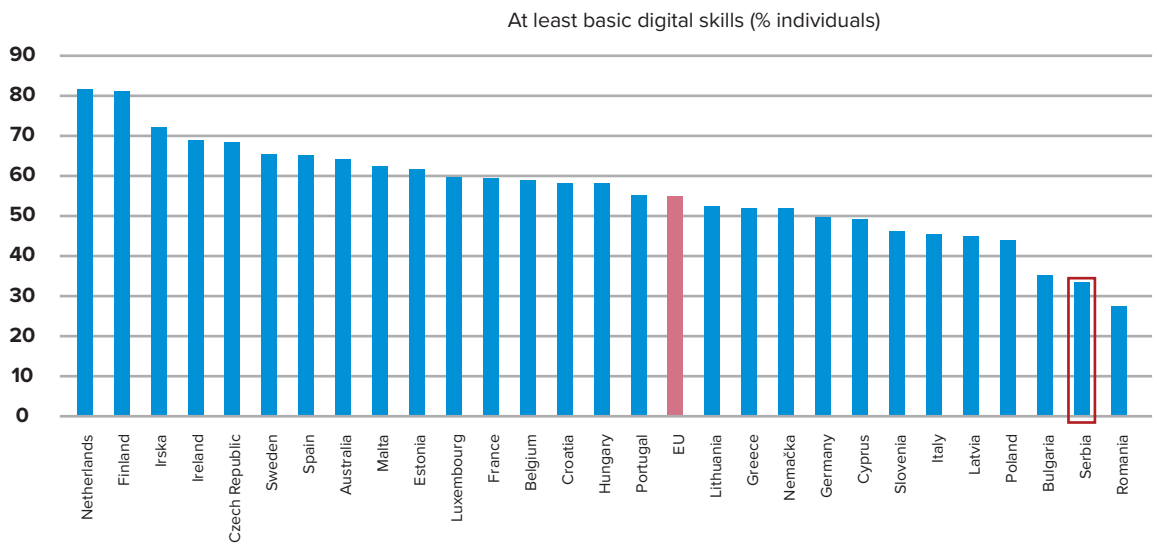
Figure 3.4. Comparative view of indicator values for the neighbouring countries, EU and Serbia



* Neighbouring countries: Slovenia, Hungary, Romania, Bulgaria, Croatia and Greece.

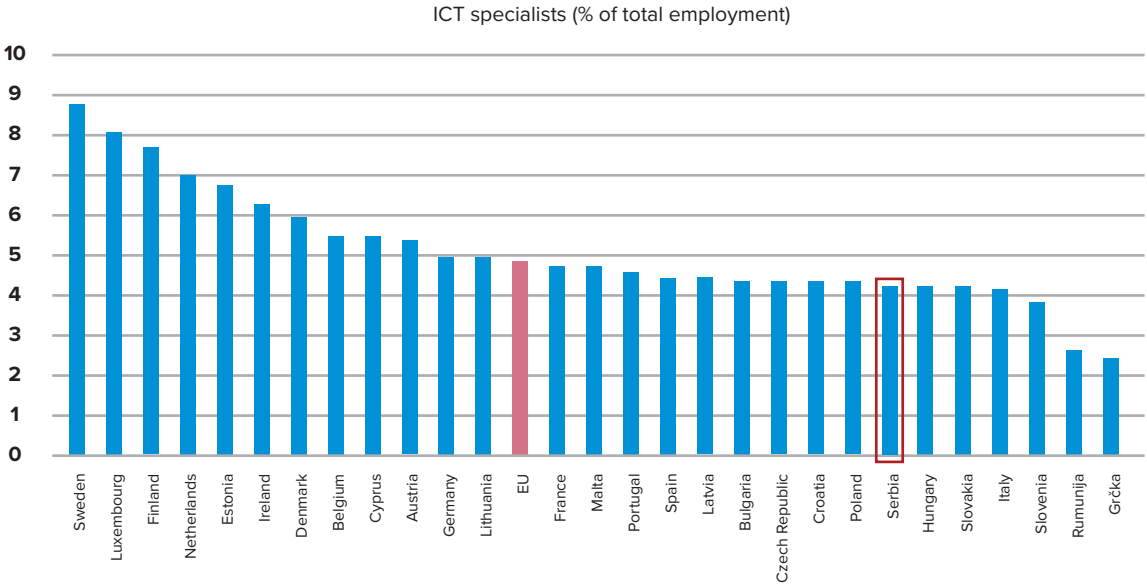
Figure 3.5. features the current values of the above two indicators for individual EU countries and Serbia.

Figure 3.5. Indicator values for the EU countries and Serbia for 2023



Source for the EU countries: https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/desi-indicators?period=desi_2024&indicator=desi_dsk_bab&breakdown=ind_total&unit=pc_ind&country=AT,BE,BG,HR,CY,CZ,DK,EE,EU,FI,FR,DE,EL,HU,IE,IT,LV,LT,LU,MT,NL,PL,PT,RO,SK,SI,ES,SE

Source for Serbia: RZS



Source for the EU countries: https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/desi-indicators?period=desi_2024&indicator=desi_ict_spec&breakdown=total&unit=pc_ind_emp&country=AT,BE,BG,HR,CY,CZ,DK,EE,EU,FI,FR,DE,EL,HU,IE,IT,LV,LT,LU,MT,NL,PL,PT,RO,SK,SI,ES,SE

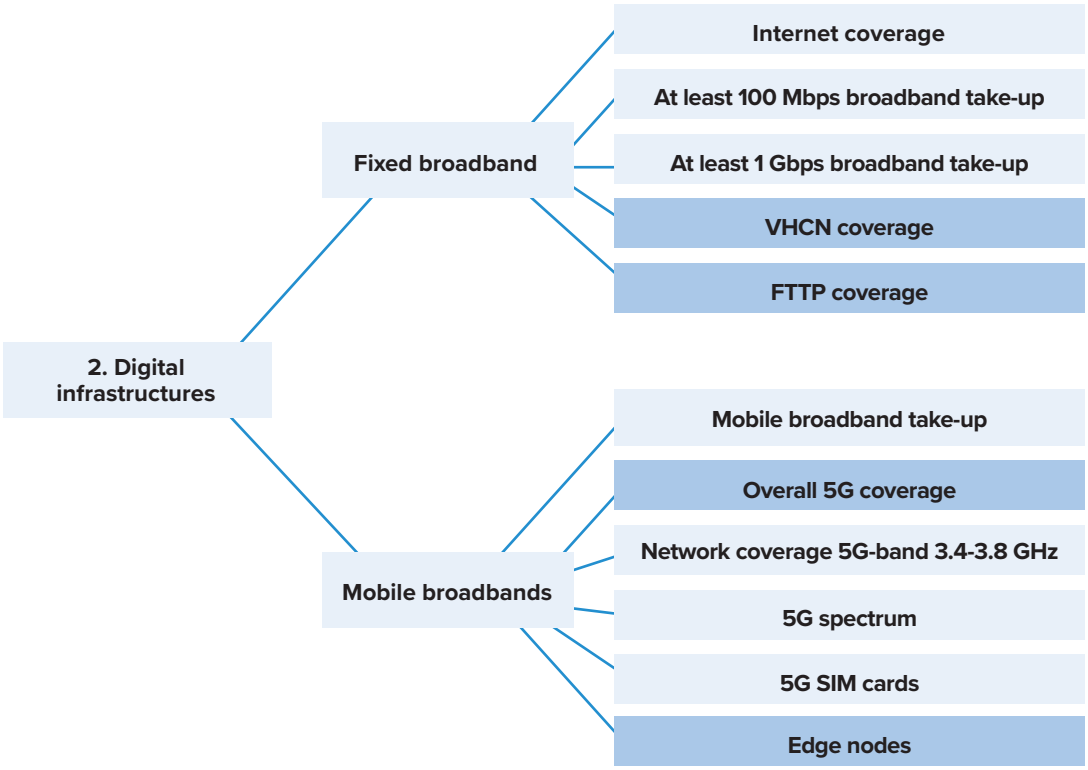
Source for Serbia: RZS

Digital infrastructures

Category Digital infrastructures refers to an efficient and sustainable infrastructure necessary for digital economy and society and gives information about types and quality of Internet access and its reach. Within this indicator dimension, fixed and mobile broadband access is analysed.

Sub-dimensions included in the Digital infrastructures dimension along with their indicators are shown in Figure 3.6.

Figure 3.6. Digital infrastructures: sub-dimensions and their indicators



According to the Digital infrastructures' indicator values, Serbia ranks below the European average, except for indicator FTTP (Fiber to the Premises) coverage, and due to its growth, in comparison to the previous year, Serbia has ranked among the above-average countries. It is noteworthy that for all indicators of this dimension with available data for 2023, comparabe or higher values were achieved, compared to the year before. A new indicator has been introduced representing Internet coverage of households in Serbia, a value somewhat lower than the EU average. Despite an increased KPI value of At least 1 Gbps broadband take-up, Serbia, due to the growing global trend of subscribers using at least 1 Gbps, has not managed to improve its position on the European countries' list and get closer to the EU average. VHCN (Very High Capacity Network) coverage both in Serbia and the EU has mildly increased, however, the previous year's position on the European countries' list has not significantly changed. Like in the previous years, Serbia marks zero values of the 5G network indicators, considering that the spectrum auction is not expected before 2025.

A comparative view of this dimension's average KPI values for the EU and the achieved values for Serbia over the previous two years is given in Figure 3.7. Since the

VHCN coverage, FTTP coverage, Overall 5G coverage and Edge nodes indicators represent KPIs that measure the 2030 Digital Decade Policy Programme targets, the information regarding these indicators also includes EU target values.

Figure 3.7. Comparative view of Digital infrastructures indicator values for the EU and Serbia

	SERBIA		EU	EU
	DESI 2023	DESI 2024	DESI 2024	2030 target
Internet coverage	83%	85%	93%	
% households	2022	2023	2023	
At least 100 Mbps broadband take-up	47%	49%	66%	
% households	2022	2023	2023	
At least 1 Gbps broadband take-up	0.25%	0.30%	18.5%	
% households	2022	2023	2023	
VHCN (Very High-Capacity Network) coverage	63%	71%	79%	100%
% households	2022	2023	2023	
FTTP (Fiber to the Premises) coverage	61%	70%	64%	100%
% households	2022	2023	2023	
Mobile broadband take-up	79%	83%	90%	
% inhabitants	2021*	2023	2023	
Overall 5G coverage	0.0%	0.0%	89%	100%
% settlements	2022	2023	2023	
Network coverage 5G-band 3.4-3.8 GHz	0%	0%	51%	
% households	2022	2023	2023	
5G spectrum	0.0%	0.0%	73%	
Assigned spectrum as the share of the total harmonized 5G spectrum	2022	2023	2023	
5G SIM cards	0%	0%	25%	
% inhabitants	2022	2023	2023	
Edge nodes	n/a	n/a	1,186	9,999
Number of edge nodes	2022	2023	2023	

* The 2021 data were used, for comparative purposes with the available EU data.

Source for the EU countries: https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/desi-indicators

Source for Serbia: RATEL, RZS

To better consider the position of Serbia regarding the indicators measuring the 2030 Digital Decade targets, a comparison is made in Figure 3.8. between the current achievements of Serbia and average values of the neighbouring countries, EU member states and set targets.

Figure 3.8. Comparative view of indicator values for the neighbouring countries, EU and Serbia

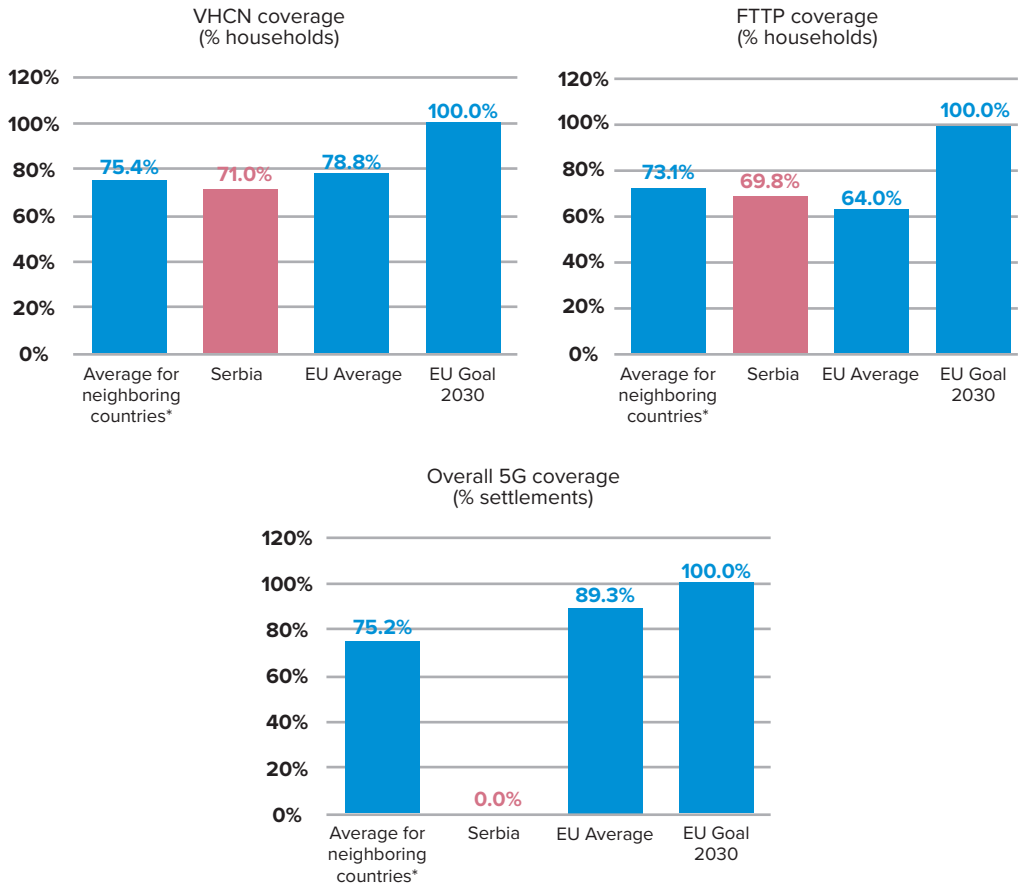
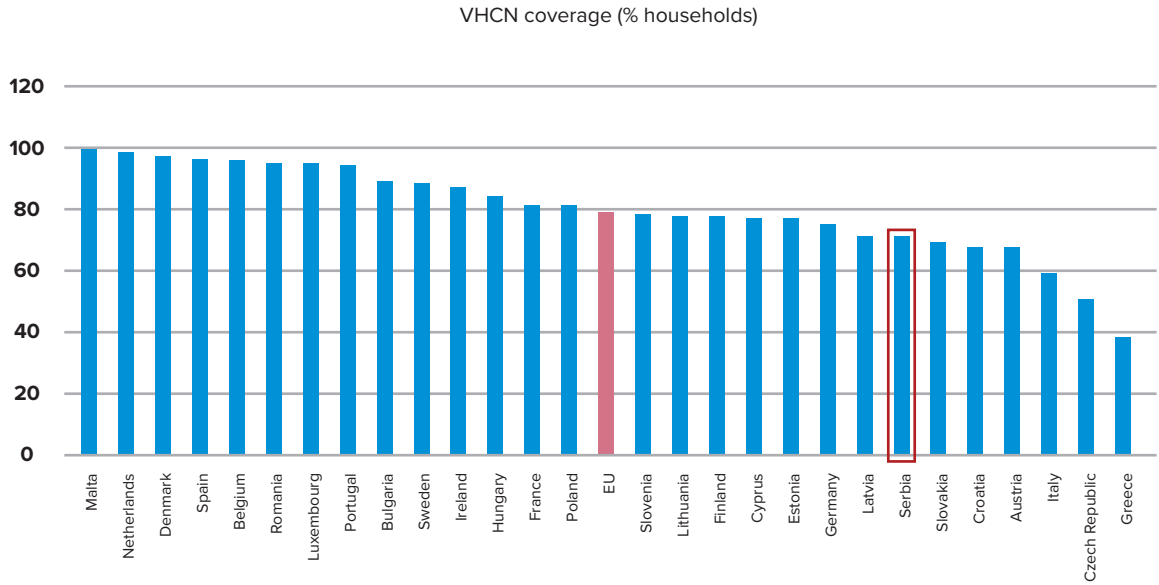


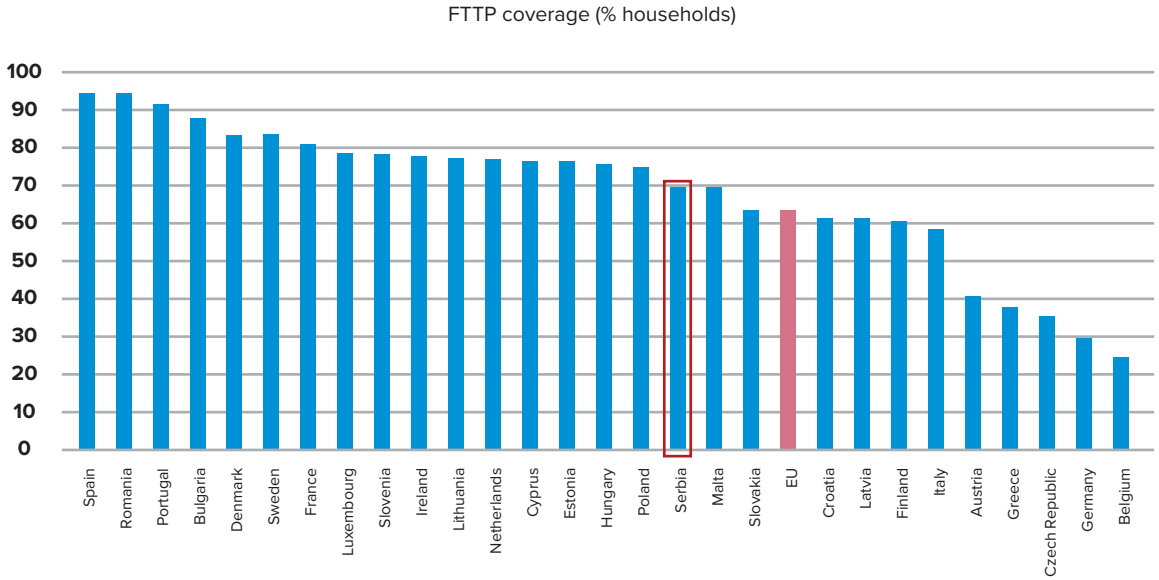
Figure 3.9. shows the current values of the above three indicators for individual EU countries and Serbia.

Figure 3.9. Indicator values for the EU countries and Serbia for 2023



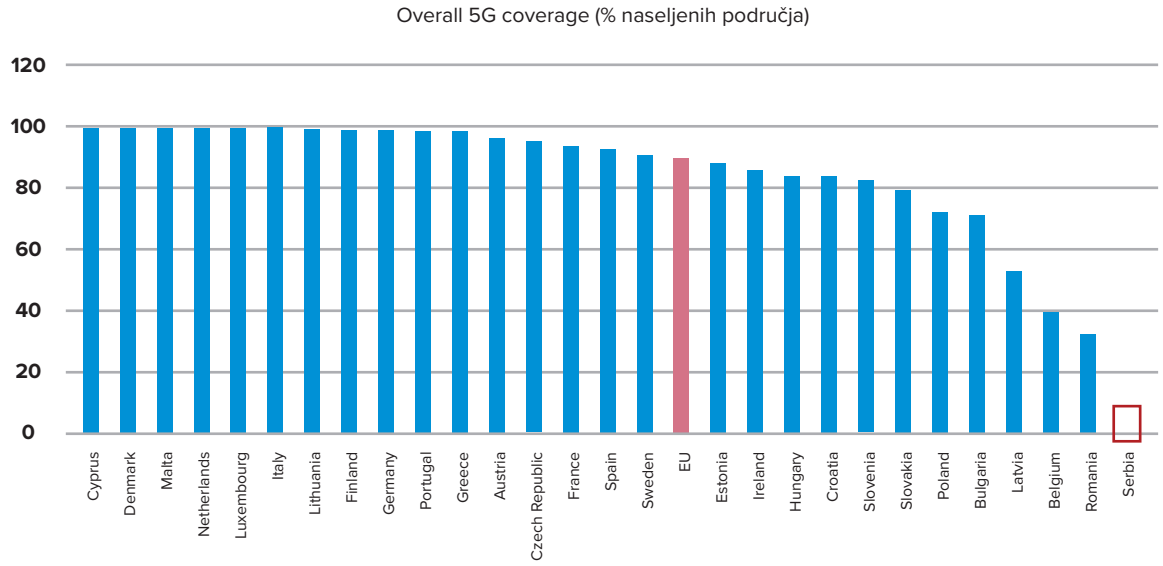
Source for the EU countries: https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/desi-indicators?period=desi_2024&indicator=desi_vhcn&breakdown=total_pophh&unit=pc_hh_all&country=AT,BE,BG,HR,CY,CZ,DK,EE,EU,FI,FR,DE,EL,HU,IE,IT,LV,LT,LU,MT,NL,PL,PT,RO,SK,SI,ES,SE

Source for Serbia: RATEL



Source for the EU countries: https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/desi-indicators?period=desi_2024&indicator=desi_fttp&breakdown=total_pophh&unit=pc_hh_all&country=AT,BE,BG,HR,CY,CZ,DK,EE,EU,FI,FR,DE,EL,HU,IE,IT,LV,LT,LU,MT,NL,PL,PT,RO,SK,SI,ES,SE

Source for Serbia: RATEL



Source for the EU countries: https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/desi-indicators?period=desi_2024&indicator=desi_5gcov&breakdown=total_pophh&unit=pc_hh_all&country=AT,BE,BG,HR,CY,CZ,DK,EE,EU,FI,FR,DE,EL,HU,IE,IT,LV,LT,LU,MT,NL,PL,PT,RO,SK,SI,ES,SE

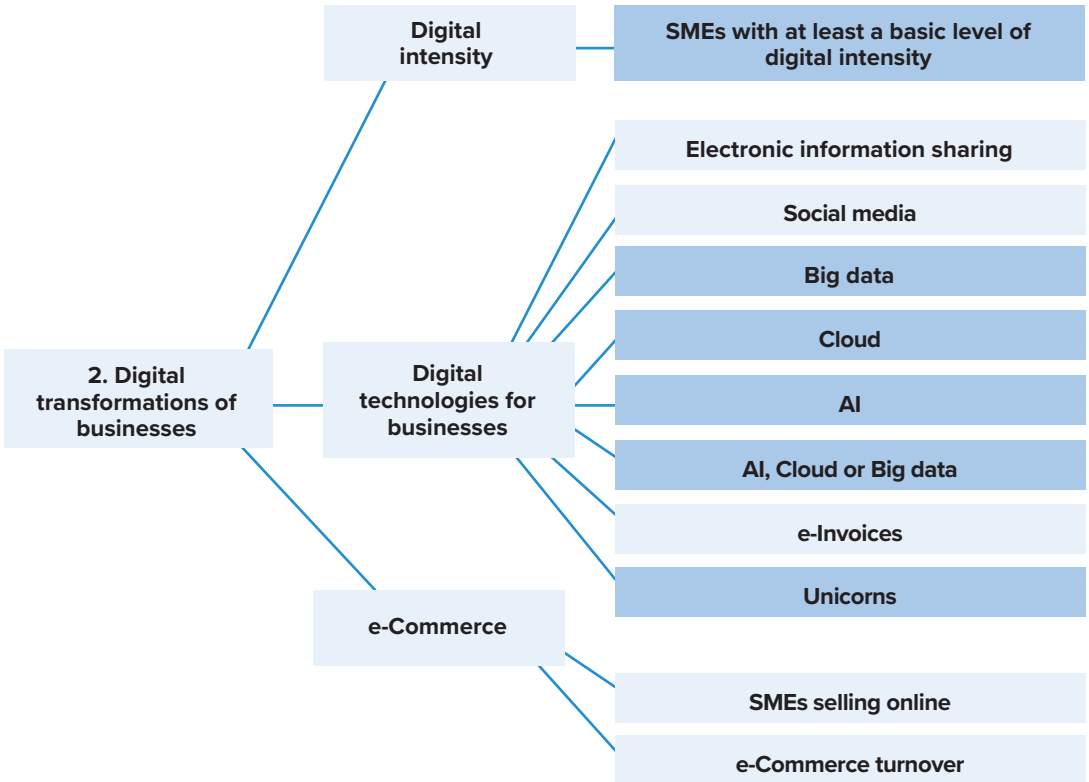
Source for Serbia: RATEL

Digital transformation of businesses

This category reflects the fact that digitalisation in business operations represents one of the main drivers of economic growth. The implementation of digital technologies (Cloud, Big Data, AI, IoT, etc) to enhance the efficacy, reduce the costs or improve the customer and business relations has become an inevitable prerequisite for competition.

Sub-dimensions included in the Digital transformation of businesses dimension and their indicators are shown in Figure 3.10.

Figure 3.10. Digital transformation of businesses: sub-dimensions and their indicators



Some of the 2023 Digital transformation of businesses KPI values are significantly different that the values of the year before. A drop in the value of the SMEs with at least a basic level of digital intensity KPI has placed Serbia below the EU average on the European countries' list, compared to the year before when only Scandinavian countries, Ireland, Netherlands and Malta scored better results. The discrepancy regarding the above KPI and the AI and e-Commerce turnover indicators compared to the year before is due to certain changes in the scoring methodology and limited data comparability, disabling the reliable assessment of true progress in this area. An increase of the 2023 e-Invoices indicator for Serbia has placed this country in the third position on the European countries' list, while a modest increase of the SMEs selling online KPI keeps it in the first third of the list, with the ninth place. For the Social media, Big Data and Cloud indicators, higher values were achieved by Serbia in comparison to the year before, however still not enough for it to reach the EU average.

A comparative view of this dimension's average KPI values for the EU and the achieved values for Serbia over the previous two years is given in Figure 3.11. Since

the SMEs with at least a basic level of digital intensity, Big data, Cloud and AI, followed by AI, Cloud or Big data and Unicorns represent KPIs for the measurement of the 2030 Digital Decade Policy Programme targets, the information regarding these indicators also includes EU target values

Figure 3.11. Comparative view of Digital transformation of businesses indicator values for the EU and Serbia

	SERBIA		EU	EU
	DESI 2023	DESI 2024	DESI 2024	2030 Target
SMEs with at least a basic level of digital intensity	42%*	49%	58%	90%
% SMEs	2022	2023	2023	
Electronic information sharing	24%	22%	42%	
% businesses	2022	2023	2023	
Social media	17%	19%	31%	
% businesses	2022	2023	2023	
Big data	NA**	25%	33%	75%
% businesses	2022	2023	2023	
Cloud	26%	28%	39%	75%
% businesses	2022	2023	2023	
AI	1%*	2%	8%	75%
% businesses	2022	2023	2023	
e-Invoices	53%	60%	39%	
% businesses	2022	2023	2023	
AI, Cloud or Big data	0%	39%	55%	75%
% businesses	2022	2023	2023	
Unicorns	0	0	263	2,731.87
Number of unicorns	2022	2023	2023	
SMEs selling online	27%	28%	19%	
% SMEs	2022	2023	2023	
e-Commerce turnover	9%	5%	12%	
% of total SME revenues	2022	2023	2023	

*Data corrected for comparability with available data for the EU and change in methodology.

** Indicator for Serbia for 2022 is not available.

Source for the EU countries: https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/desi-indicators

Source for Serbia: RATEL, RZS, Eurostat

To better consider the position of Serbia regarding the indicators measuring the 2030 Digital Decade targets, a comparison is made in Figure 3.12. between the current achievements of Serbia and average values of the neighbouring countries, EU member states and set targets.

Figure 3.12. Comparative view of indicator values for the neighbouring countries, EU and Serbia

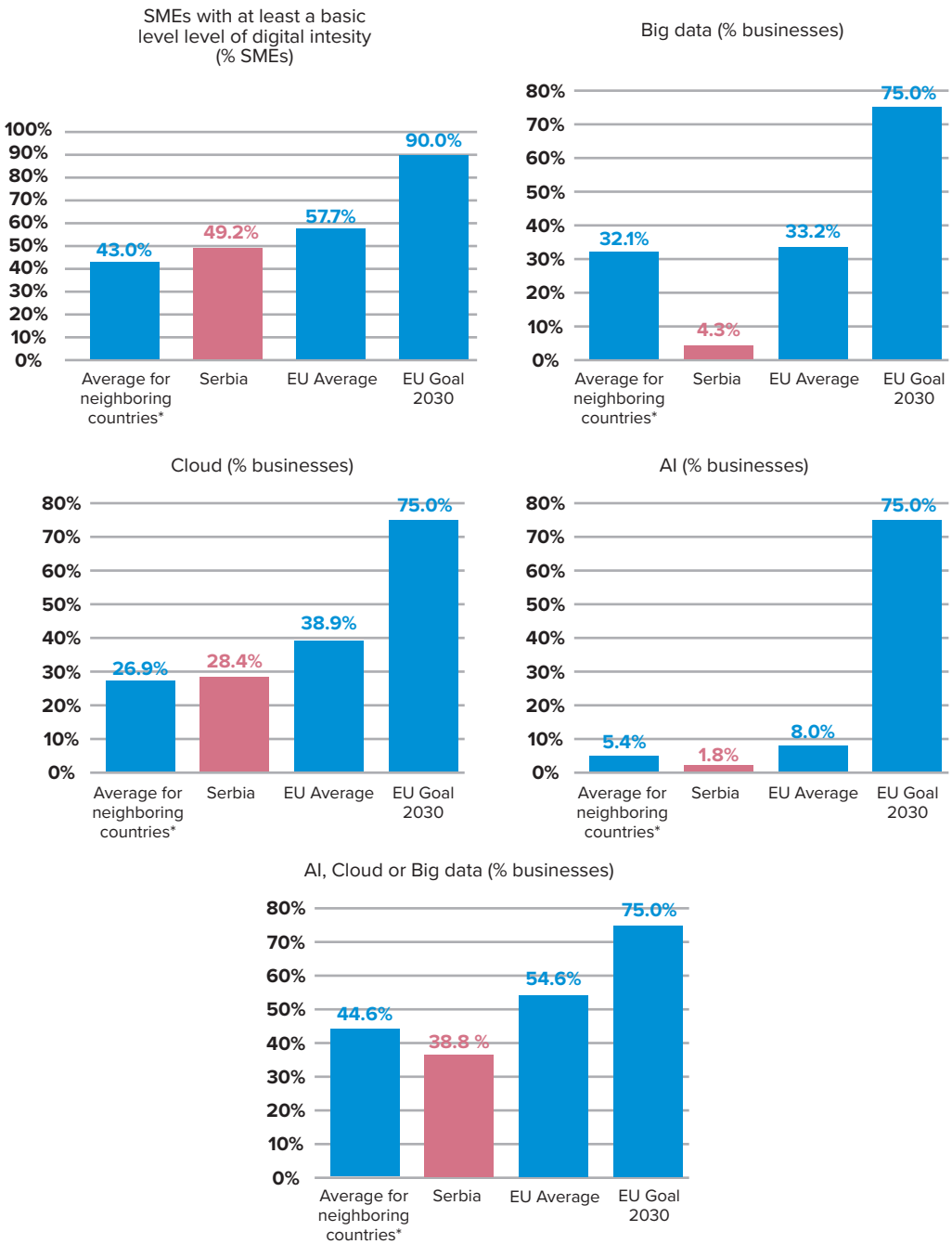
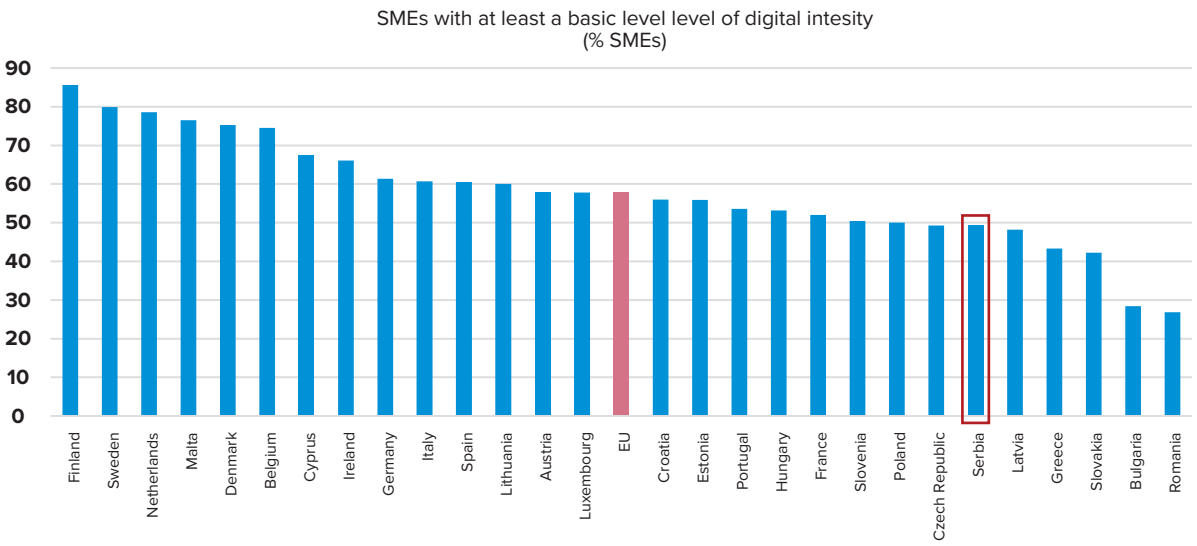


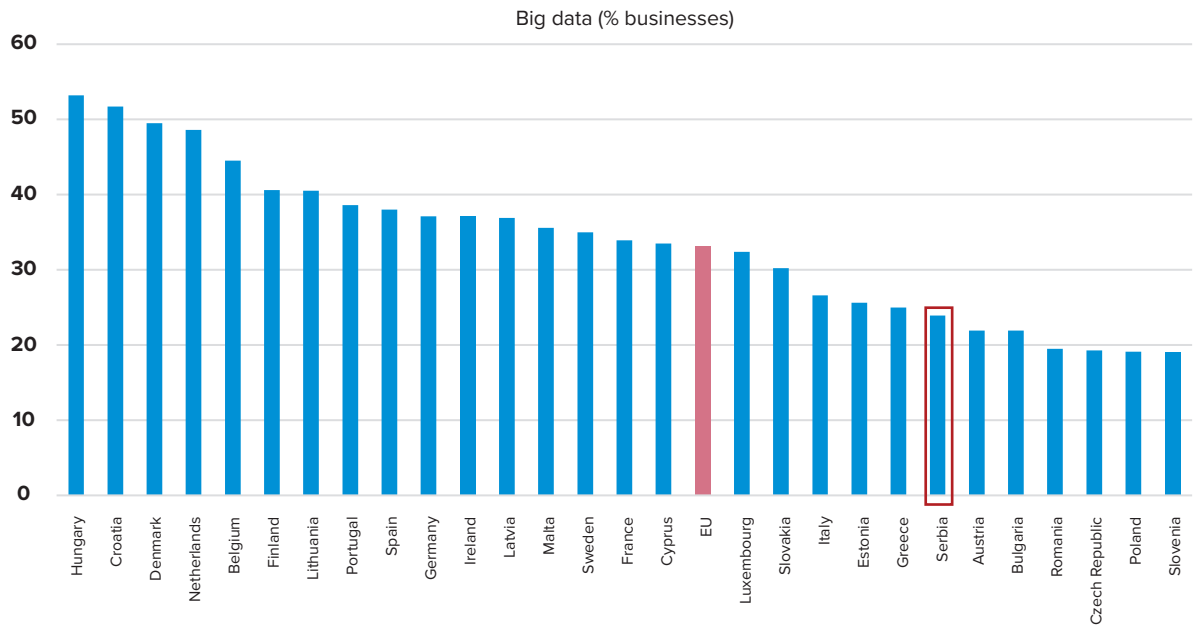
Figure 3.13. features the current values of the above five indicators for individual EU countries and Serbia.

Figure 3.13. Indicator values for the EU countries and Serbia for 2023



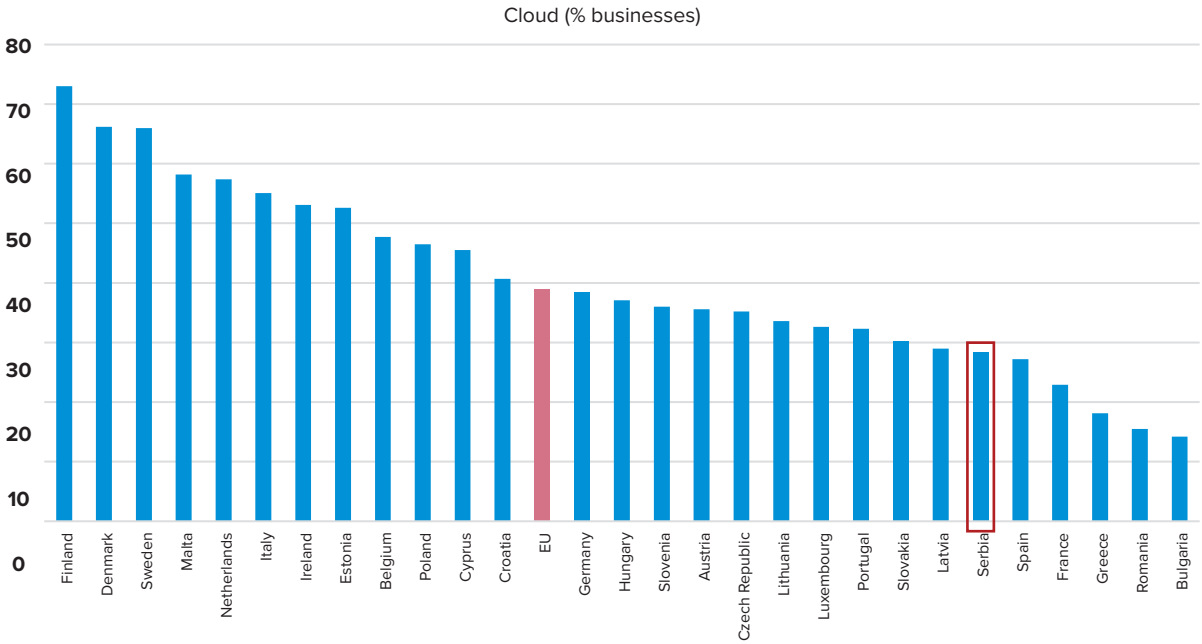
Source for the EU countries: https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/desi-indicators?period=desi_2024&indicator=desi_sme_di3_gelo&breakdown=ent_sm_xfin&unit=pc_ent&country=AT,BE,BG,HR,CY,CZ,DK,EE,EU,FI,FR,DE,EL,HU,IE,IT,LV,LT,LU,MT,NL,PL,PT,RO,SK,SI,ES,SE

Source for Serbia: RZS



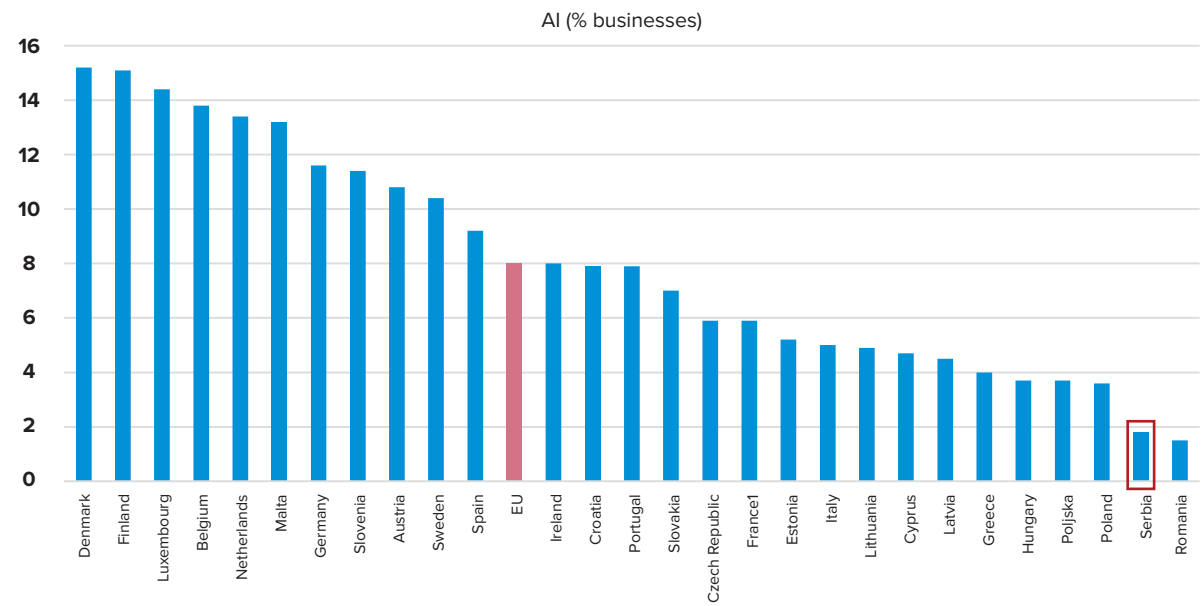
Source for the EU countries: https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/desi-indicators?period=desi_2024&indicator=desi_da&breakdown=ent_all_xfin&unit=pc_ent&country=AT,BE,BG,HR,CY,CZ,DK,EE,EU,FI,FR,DE,EL,HU,IE,IT,LV,LT,LU,MT,NL,PL,PT,RO,SK,SI,ES,SE

Source for Serbia: RZS



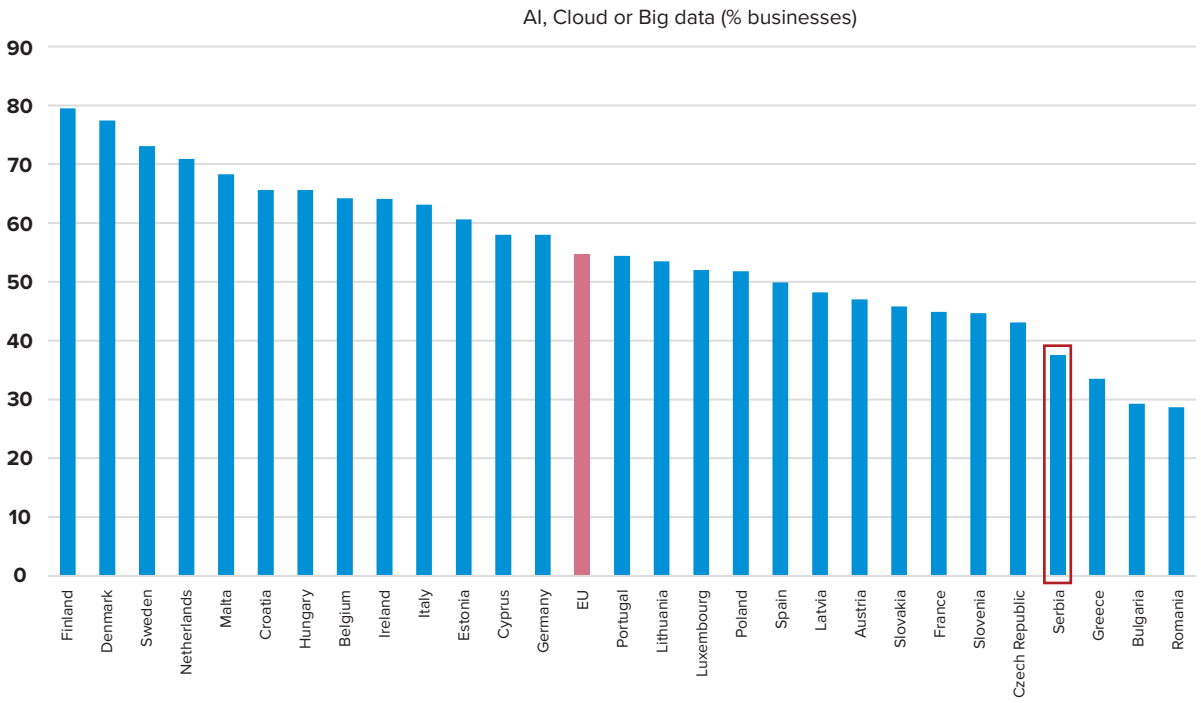
Source for the EU countries: https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/desi-indicators?period=desi_2024&indicator=desi_cloud&breakdown=ent_all_xfin&unit=pc_ent&country=AT,BE,BG,HR,CY,CZ,DK,EE,EU,FI,FR,DE,EL,HU,IE,IT,LV,LT,LU,MT,NL,PL,PT,RO,SK,SI,ES,SE

Source for Serbia: RZS



Source for the EU countries: https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/desi-indicators?period=desi_2024&indicator=desi_ai&breakdown=ent_all_xfin&unit=pc_ent&country=AT,BE,BG,HR,CY,CZ,DK,EE,EU,FI,FR,DE,EL,HU,IE,IT,LV,LT,LU,MT,NL,PL,PT,RO,SK,SI,ES,SE

Source for Serbia: RZS



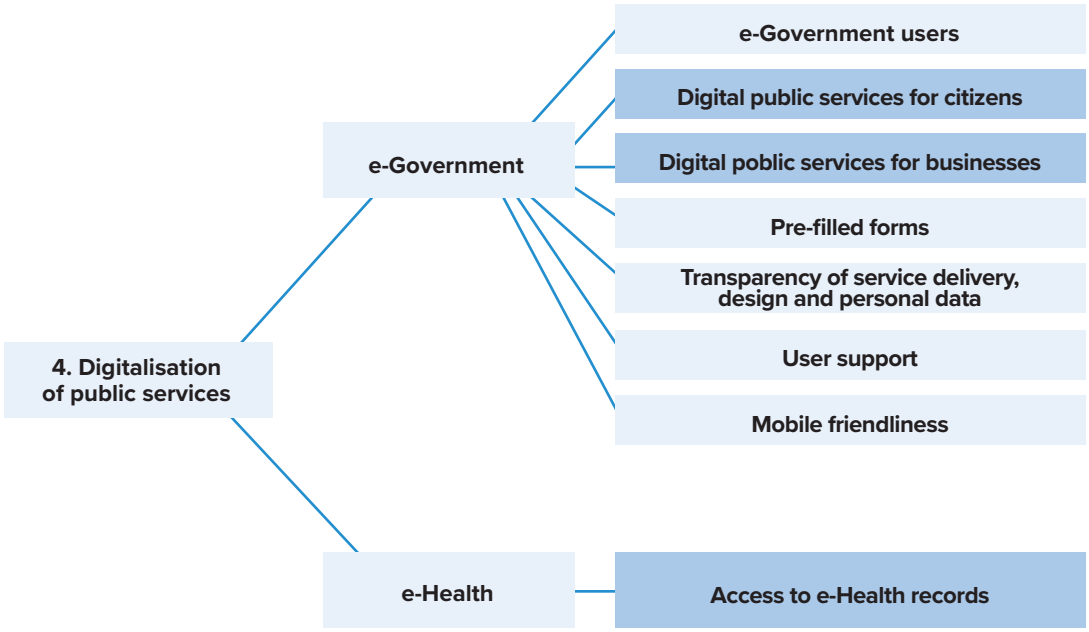
Source for the EU countries: https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/desi-indicators?period=desi_2024&indicator=desi_ai_cloud_da&breakdown=ent_all_xfin&unit=pc_ent&country=AT,BE,BG,HR,CY,CZ,DK,EE,EU,FI,FR,DE,EL,HU,IE,IT,LV,LT,LU,MT,NL,PL,PT,RO,SK,SI,ES,SE

Source for Serbia: Eurostat

Digitalisation of public services

Category Digitalisation of public services refers to digital technologies thet help advance the interaction between legal and natural persons and public administration. Sub-dimensions included in the Digitalisation of public services dimension and their indicators are shown in Figure 3.14.

Slika 3.14. Digitalisation of public services: sub-dimensions and their indicators



Category Digitalisation of public services was the least impacted by the 2024 methodology. The Mobile friendliness and Access to e-Health records KPI values were above the EU average, while the achievements regarding other indicators were below that average. Due to the value growth at the rate higher than the EU average for KPI Digital public services for businesses, Serbia got significantly closer to the EU average. On the other hand, despite a bigger increase in the Digital public services for citizens indicator, Serbia remains ranked among the least successful countries, much like KPI User support. Indicators e-Government users and Pre-filled forms have somewhat lower values compared to the year before and remain below the EU average, whereas the 2023 data for KPI Access to e-Health records are available and their average value ranks higher compared to the situation in the EU.

A comparative view of this dimension's average KPI values for the EU and the achieved values for Serbia over the previous two years is given in Figure 3.15. Since the indicators of Digital public services for citizens, Digital public services for businesses and Access to e-Health records represent KPIs that measure the 2030 Digital Decade Policy Programme targets, the information regarding these indicators also includes EU target values.

Figure 3.15. Comparative view of Digitalisation of public services indicator values for the EU and Serbia

	SERBIA		EU	EU
	DESI 2023	DESI 2024	DESI 2024	2030 Target
e-Government users	55%*	47%	75%	
% Internet users	2022	2023	2023	
Digital public services for citizens	52	62	79	100
Score (0 to 100)	2022	2023	2023	
Digital public services for businesses	80	83	85	100
Score (0 to 100)	2022	2023	2023	
Pre-filled forms	83	61	71	
Score (0 to 100)	2022	2023	2023	
Transparency of service delivery, design and personal data	57	62	67	
Score (0 to 100)	2022	2023	2023	
User support	49	51	86	
Score (0 to 100)	2022	2023	2023	
Mobile friendliness	94	96	95	
Score (0 to 100)	2022	2023	2023	
Access to e-Health records	NA**	84	79	100
Score (0 to 100)	2022	2023	2023	

*** There is no available 2022 data for Serbia.**

Source for the EU countries: https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/desi-indicators

Source for Serbia: RZS, eGovernment Benchmark, RATEL

To better consider the position of Serbia regarding the indicators measuring the 2030 Digital Decade targets, a comparison is made in Figure 3.16. between the current achievements of Serbia and average values of the neighbouring countries, EU member states and set targets.

Figure 3.16. Comparative view of indicator values for the neighbouring countries, EU and Serbia

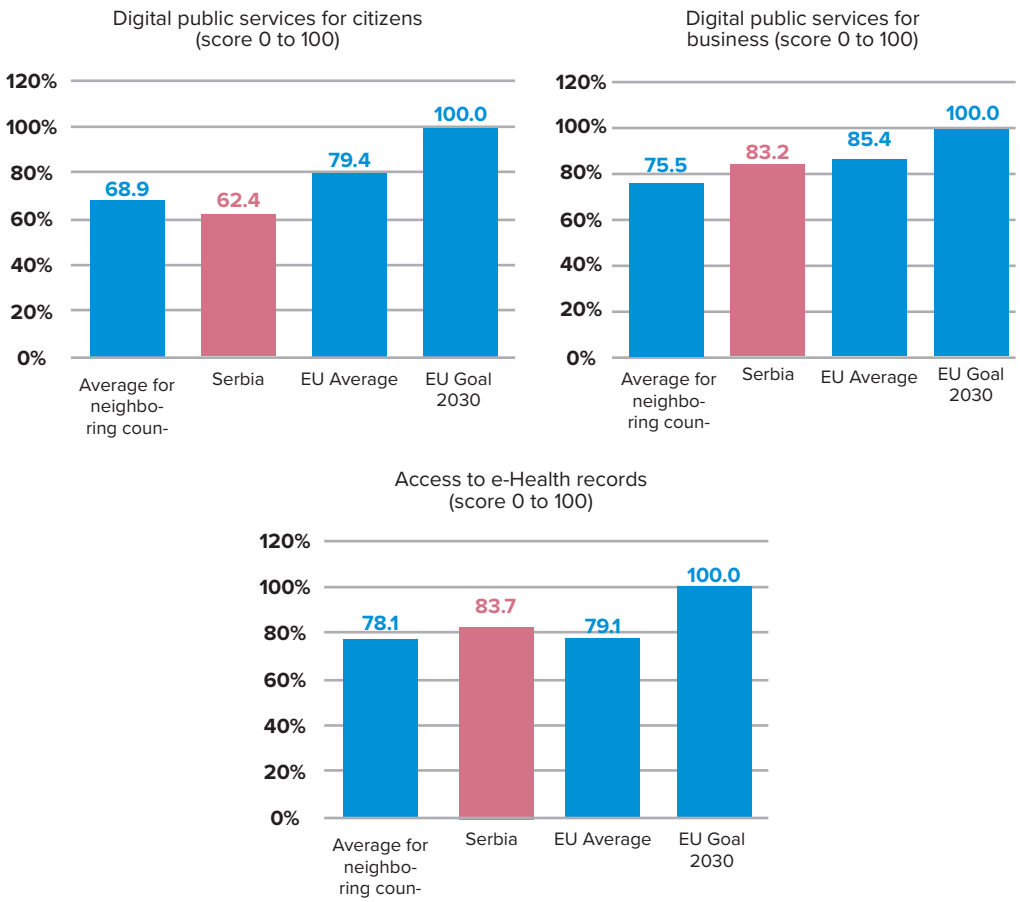
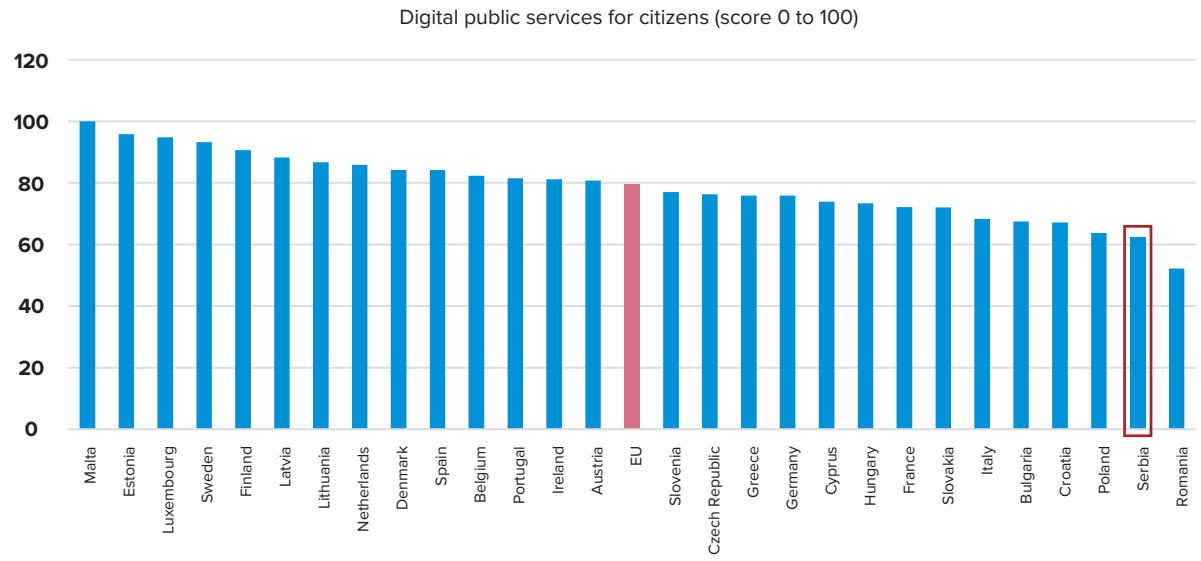


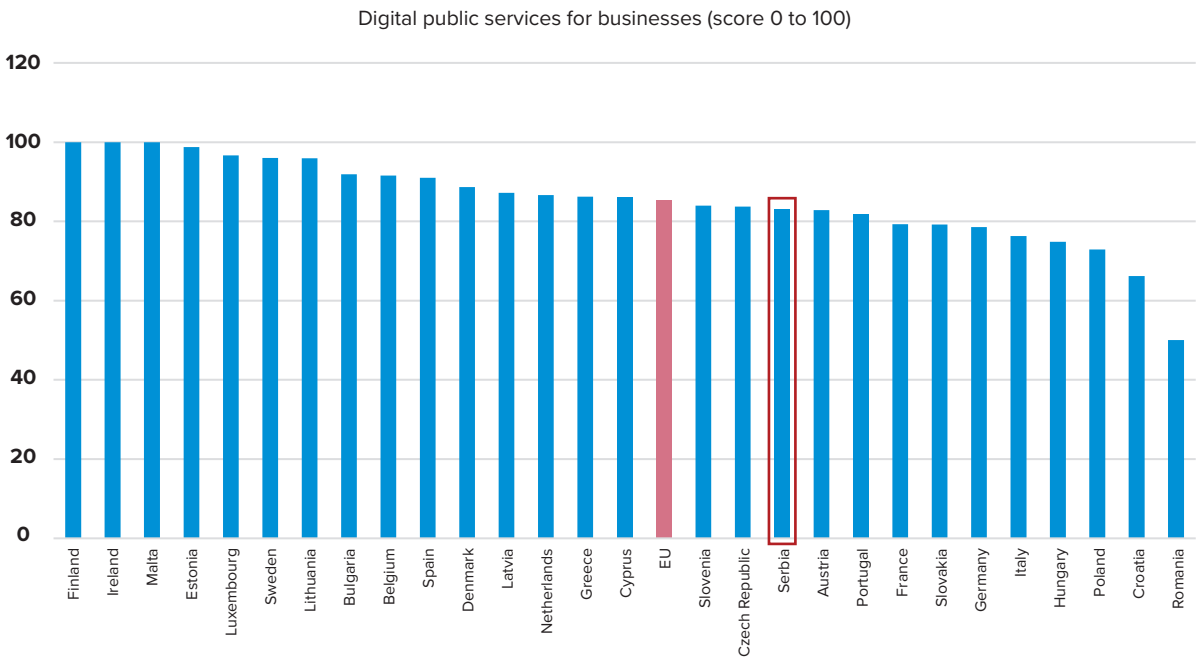
Figure 3.17. shows the current values of the above three indicators for individual EU countries and for Serbia.

Figure 3.17. Indicator values for the EU countries and Serbia for 2023



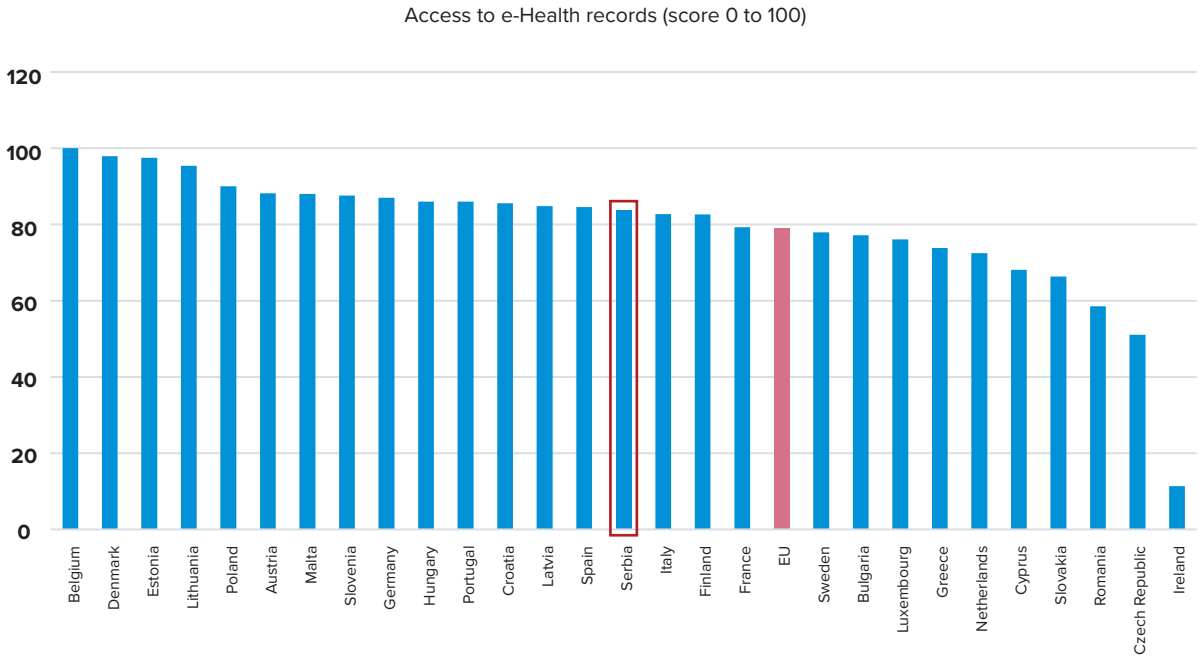
Source for the EU countries: https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/desi-indicators?period=desi_2024&indicator=desi_dps_cit&breakdown=total&unit=egov_score&country=AT,BE,BG,HR,CY,CZ,DK,EE,EU,FI,FR,DE,EL,HU,IE,IT,LV,LT,LU,MT,NL,PL,PT,RO,SK,SI,ES,SE

Source for Serbia: eGovernment Benchmark



Source for the EU countries: https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/desi-indicators?period=desi_2024&indicator=desi_dps_biz&breakdown=total&unit=egov_score&country=AT,BE,BG,HR,CY,CZ,DK,EE,EU,FI,FR,DE,EL,HU,IE,IT,LV,LT,LU,MT,NL,PL,PT,RO,SK,SI,ES,SE

Source for Serbia: eGovernment Benchmark



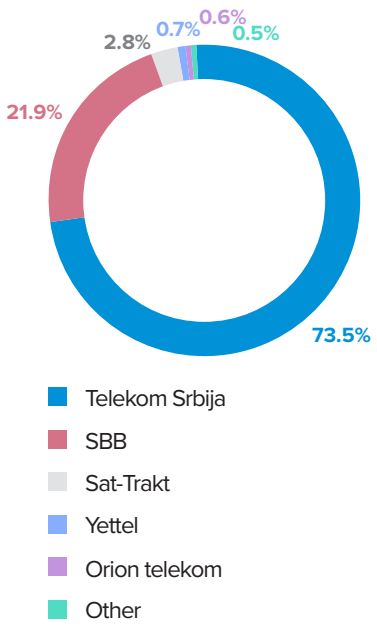
Source for the EU countries: https://digital-decade-desi.digital-strategy.ec.europa.eu/datasets/desi/charts/desi-indicators?period=desi_2024&indicator=desi_aehr&breakdown=total&unit=egov_score&country=AT,BE,BG,HR,CY,CZ,DK,EE,EU,FI,FR,DE,EL,HU,IE,IT,LV,LT,LU,MT,NL,PL,PT,RO,SK,SI,ES,SE

Source for Serbia: RATEL

Comparative indicator values for all four dimensions for Serbia suggest a general increase in the DESI values for Serbia in 2023, but also a need to apply further efforts to continue the positive trend, especially focusing on the key performance indicators measuring the 2030 Digital Decade Policy Programme targets, as well as those tied to unsatisfactory results.

4 PUBLIC FIXED TELECOMMUNICATIONS NETWORKS AND SERVICES

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

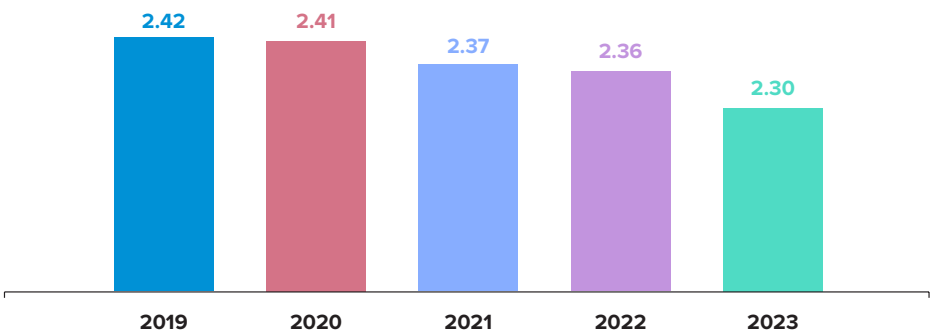


Source: RATEL

At the end of 2023, there were 22 operators registered for the public telephone service provision over fixed-line network. In 2023, Telekom Srbija had approximately 4% of subscribers less than in the previous year, but it remained the biggest public fixed telecom network operator and its business activities had the largest impact on the fixed telephony market in 2023 In the region, Telekom Srbija is present in the markets of Bosnia and Herzegovina and Montenegro. The operator SBB is the second largest fixed-line operator according to the number of subscribers, with approximately 1% more subscribers in 2023 than the year before. 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.

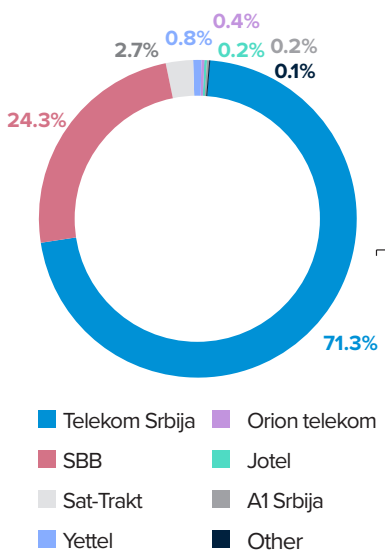
The number of fixed line subscribers in 2023 continued to decrease, amounting to 2.3 million at the end of the year. The number of subscribers also includes users of electronic communications services provided at a fixed location via public mobile networks (Cellular Local Loop - CLL) by Telekom Srbija and A1 Srbija, which take up 0.3% of the total number of subscribers in 2023. In 2023, all operators have a 100% digitalization rate. The number of payphones continued to decrease, amounting to 1,796 in 2023.

Figure 4.2. Number of fixed network subscribers (million)



Source: RATEL

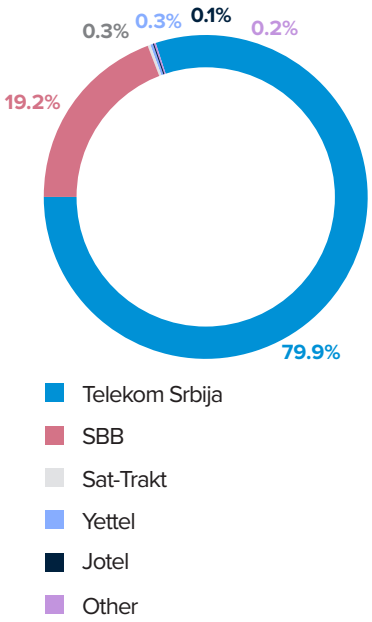
Figure 4.3. Market shares of operators in terms of number of subscribers – natural persons



Source: RATEL

Residential users are still dominant, with 87% share in the total number of subscribers and market shares of operators in terms of natural persons are shown in Figure 4.3.

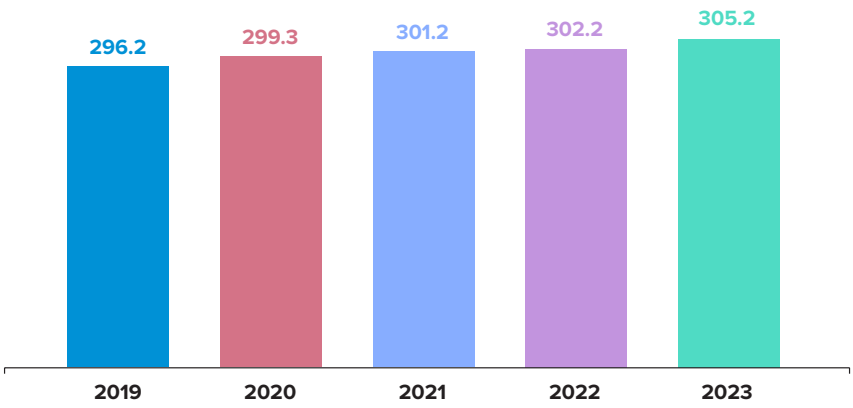
Figure 4.4. Market shares of operators in terms of number of subscribers – legal persons



Source: RATEL

The share of business subscribers in 2022 was approximately 13% and market shares of operators in terms of legal persons are shown in Figure 4.4. The subscriber trend over the years is shown in Figure 4.5.

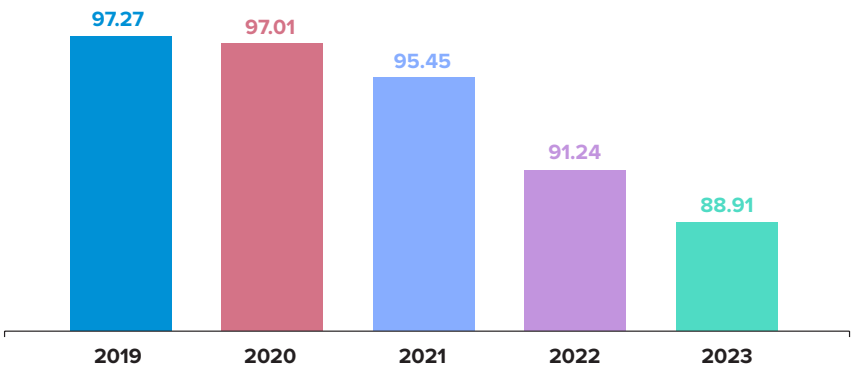
Figure 4.5. Number of fixed network business subscribers (in thousands)



Source: RATEL

Fixed telephony penetration rate, in terms of households, amounting to approximately 88.91% in 2023, is given in Figure 4.6.

Figure 4.6. Fixed line penetration rate – per 100 households

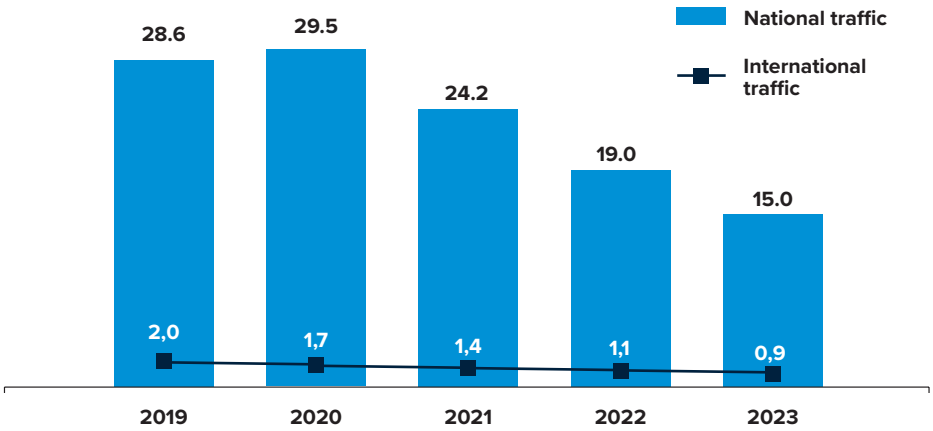


Source: RATEL

The number of ISDN subscribers in 2023 was approximately 13.1 thousand, which is by 14% less than the year before. There are almost 9% of ISDN subscribers with primary rate access, while the rest of the ISDN 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.

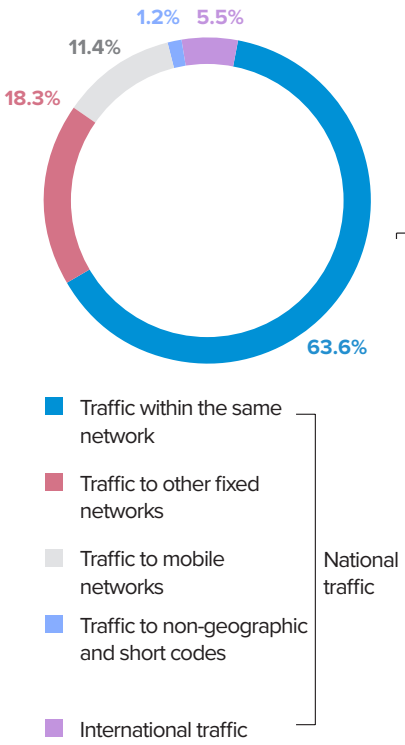
The total traffic over fixed network in 2023 decreased by 21% year on year, the national traffic being estimated to 1.50 billion of minutes and the international traffic to 86 million of minutes. The decrease seen in the total national traffic is mainly due to a decrease in traffic toward own fixed network, whereas international traffic, with 18.7% of minutes less than in the previous year, continues to drop due to the increasing trend of using VoIP applications.

Figure 4.7. Total traffic (in hundreds million minutes)



Source: RATEL

Figure 4.8. Fixed network traffic distribution in 2023



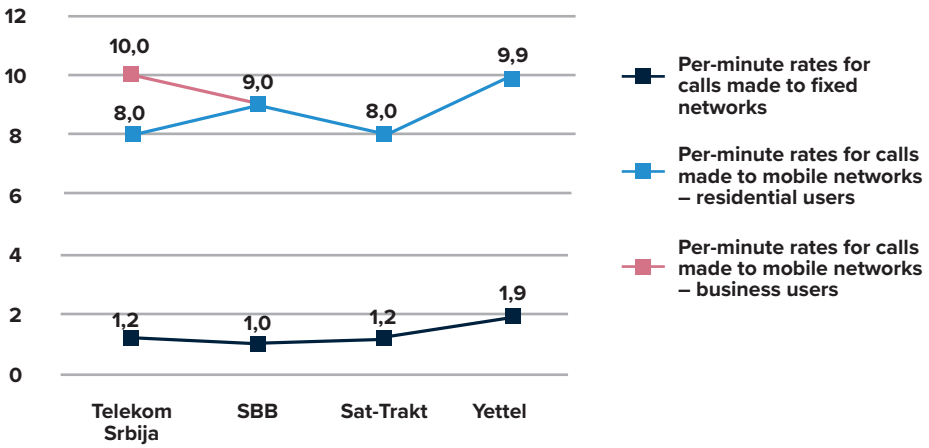
Source: RATEL

The biggest share in the total traffic still goes to the traffic made within the same network (63.6%), whereas the smallest share goes to the traffic made to non-geographic numbers and short codes (1.2%). Fixed network traffic distribution in 2023 is given in figure 4.8. 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.

The average call duration was 3.58 minutes for a call made within the same network, 1.83 minutes for a call made to mobile network and 5.13 minutes for an international call.

The total number of VoIP operators at the end of 2023 was approximately 22 thousand, which is an almost 26% decrease compared to the year before. There were 16 million of minutes of traffic and there were 128 million minutes of international transit. Per-minute rates for the calls to fixed and and mobile networks of the operators with the biggest number of subscribers are given in Figure 4.9. The rates ranged between 1 and 1.9 dinars per minute for fixed-line calls, and between 8 and 10 dinars per minute for the calls made to mobile networks.

Figure 4.9. Per-minute call rates to fixed and mobile networks in 2023, VAT included (RSD)

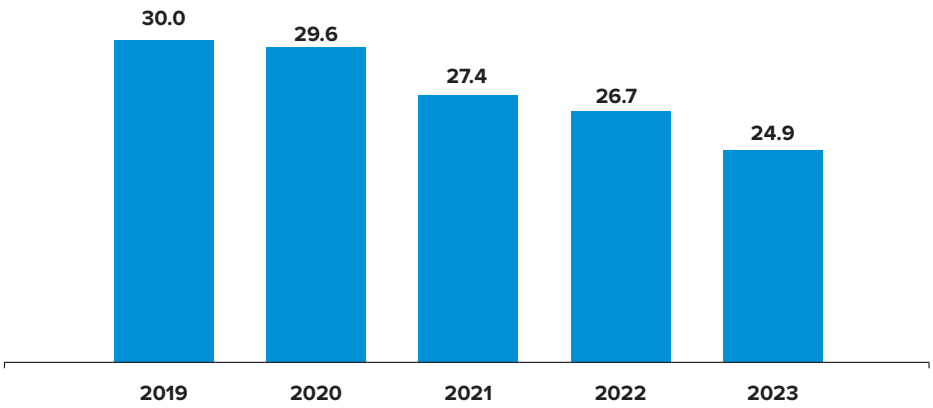


Source: RATEL

The rates for the international calls have not been significantly modified compared with the year before.

The information on the rates is available on the official websites of the operators.
The revenues from fixed telecommunication networks provided by all operators registered for this service in the territory of the Republic of Serbia in 2023 were lower compared to the year before, amounting to 24.9 billion dinars, including the revenues made from VoIP services in the amount of 3.7 billion dinars. The investments made in the fixed telephony services in 2023 amounted to approximately 24 billion dinars, which is an increase in respect to 2022.

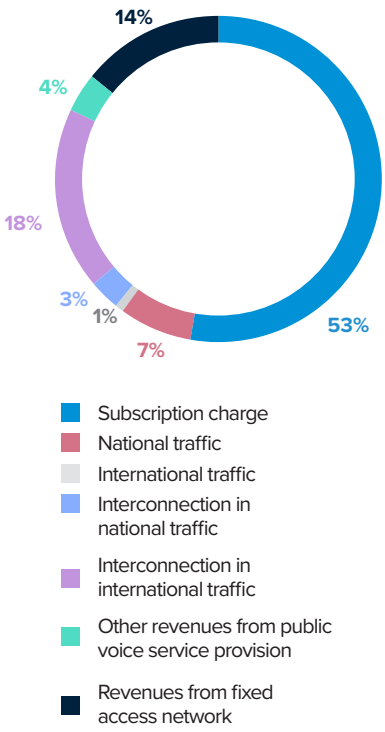
Figure 4.10. Revenues from fixed telecom networks and services (billion dinars)



Source: RATEL

Despite being lower than the year before, the subscription charges, in the amount of 11 billion dinars, still have the largest share in the total revenues, accounting for almost one half of total fixed network service revenues in 2023, without revenues from VoIP. The revenues made from national traffic, amounting to 1.6 billion dinars and the revenues made from international traffic, amounting to 0.3 billion, are lower compared with the year before and have a smaller share in the total revenues. The decrease in the number of minutes of both national and international traffic is the result of the decline in the number of subscribers and minutes of traffic made. The revenues from national interconnection are dropping, whilethe revenues from international interconnection are modestly growing.

Figure 4.11. Structure of revenues from fixed telecom networks and services in 2023

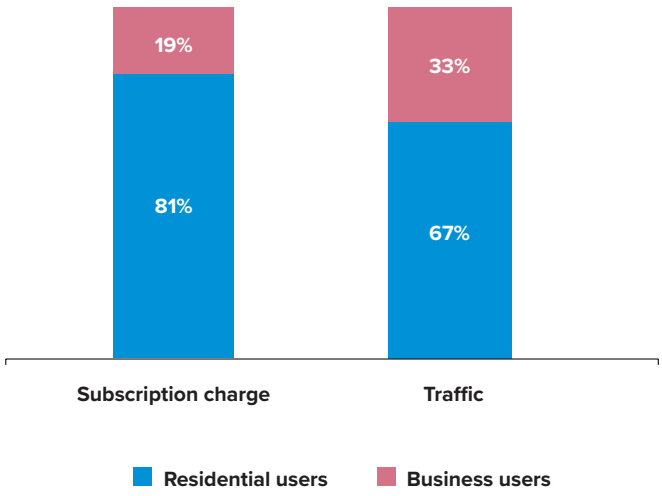


Source: RATEL

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, etc.

As shown in Figure 4.12, there are no significant changes in the share of residential and business users in the revenues from subscription charge and traffic made, compared to the year before.

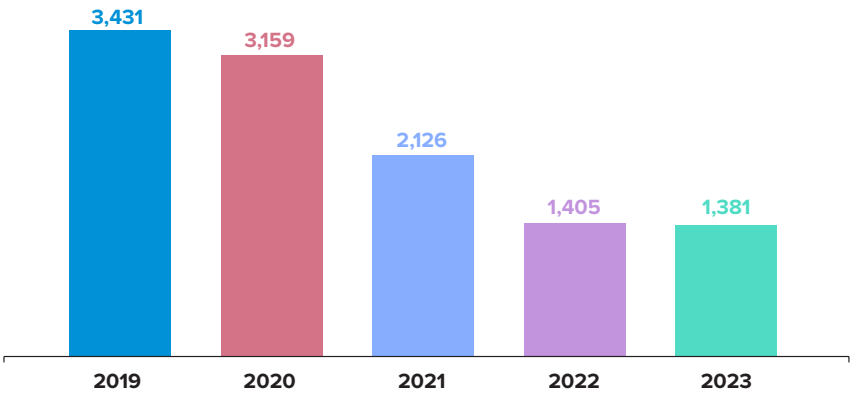
Figure 4.12. Share of residential and business users in the revenues made from subscription



Source: RATEL

The use of the number portability service on public fixed telephone networks has decreased compared to the year before. The monthly average of ported numbers in 2023 was 1,381.

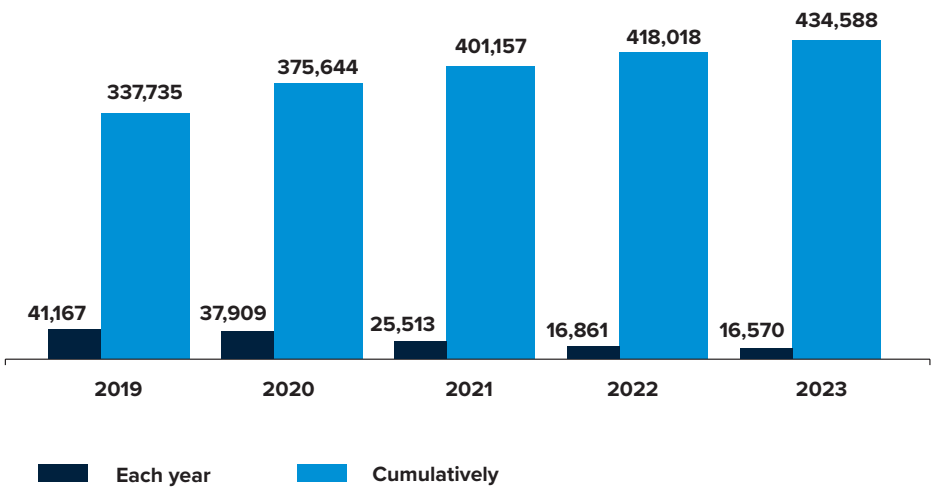
Figure 4.13. Monthly average of ported numbers each year



Source: RATEL

During 2023, there were 16,570 fixed line subscribers who changed the operator while keeping the same number, with the total of ported numbers amounting to 434,588 at the end of the year (Figure 4.14).

Figure 4.14. Portings made each year and in total



Source: RATEL

Leased Lines

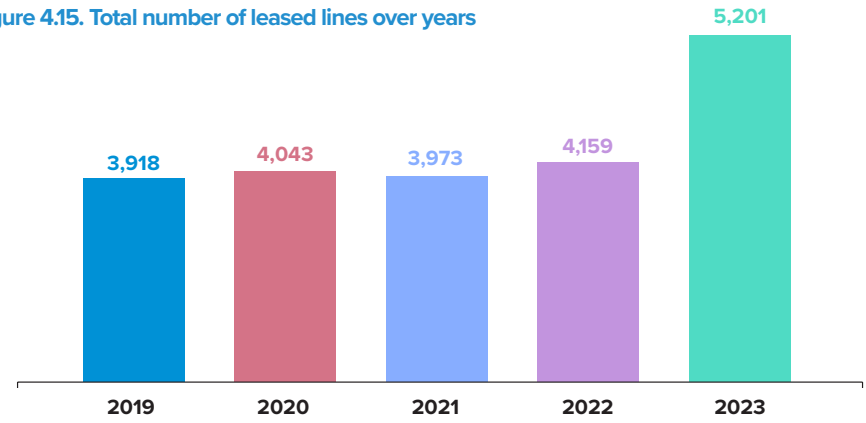
Leased lines are a significant part of the market of electronic communications, being the essential means for service provision for some operators, as transport infrastructure. Also, big business users (as end-users) use leased lines to connect remote branches and to enable various data transmission.

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

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

According to available data, leased lines service was provided by 42 operators in Serbia in 2023 and the total number of national and international leased lines was 5,201, while national lines accounted for 97.5% of the total in 2023.

Figure 4.15. Total number of leased lines over years

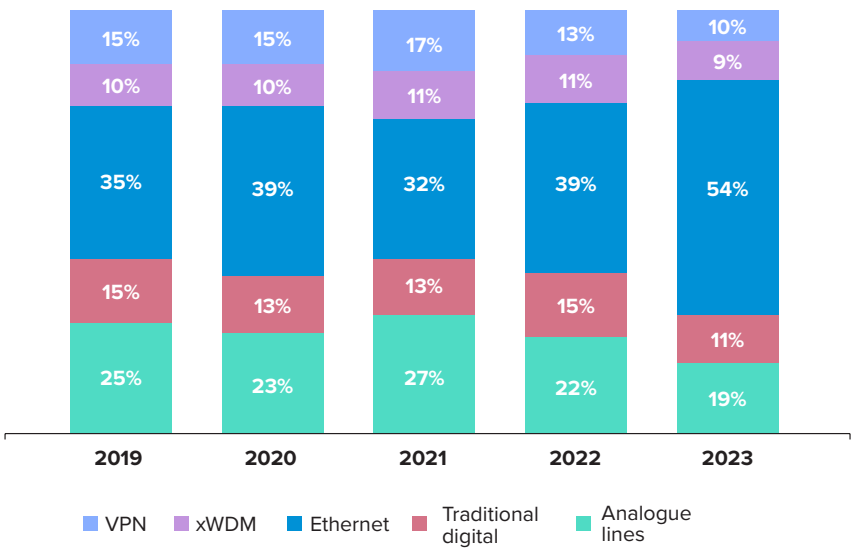


Source: RATEL

As for technologies, most national leased lines are Ethernet based, 47% in 2023. The shares of traditional digital lines, analogue lines, lines based on xWDM and those based on VPN have decreased compared to the year before. Since 2018 data are being collected on VPN end-user service, which is an equivalent of the traditional leased lines service in terms of high-quality access provision, and which has a 10% share in the total number of lines.

Analogue leased lines account for 19% of leased national lines. This service is no longer available to new users on the market and its presence is a result of valid contracts on lease closed for a period of 5 to 10 years.

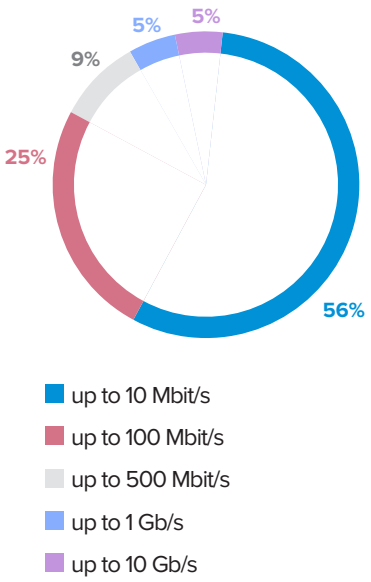
Figure 4.16. Distribution of national leased lines according to access type



Source: RATEL

In terms of speed, the most common national line transmission technologies in 2023 are Ethernet 10 Mbit/s lines with 56%, an increase from 52% which was the 2022 share, followed by Ethernet 100 Mbit/s lines with a 25% share. The least common are Ethernet 500 Mbit/s with a 9% share and 1 Gb/s lines with a 5% share, while 10 Gb/s lines also have a 5% share.

Figure 4.17. Distribution of Ethernet national leased lines according to speed in 2023

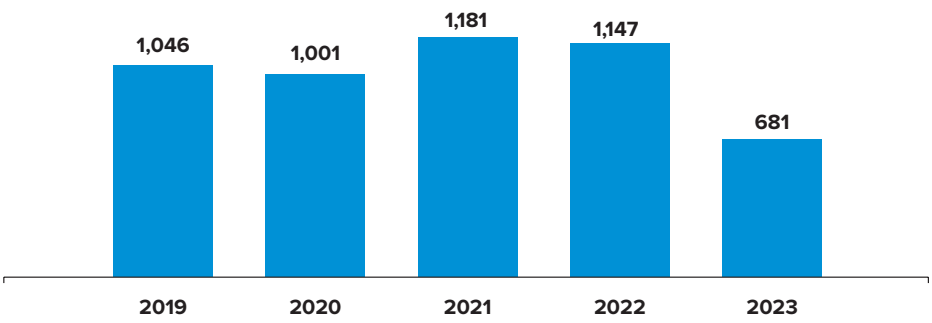


Source: RATEL

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

The total revenues made from national and international leased lines in 2023 were approximately 0.68 billion dinars. Since 2023, the revenues made from dark fiber and antenna masts have been excluded from the total leased lines revenues, having become part of infrastructure revenues (Figure 1.2). The share of revenues made from international lines in the total revenues is 33%.

Figure 4.18. Revenues made from leased lines in 2023 (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 2023:

- Telecommunications Company Telekom Srbija JSC, 58,11% owned by 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 JSC and its predecessor;[1]
- Yettel LLC, owned by Emirates Telecommunication Group - 50% plus one and PPF TMT Bidco 1 B.V. of the Netherlands;
- A1 Srbija LLC, 100% owned by Mobilkom CEE Beteiligungsverwaltungs GmbH of Austria.

The three above mentioned network operators are using parts of the following RF bands on technologically neutral basis, based on the individual licences (hereinafter: the licenses) for RF usage issued upon public bidding procedure:

- 791-821/832-862 MHz;
- 890-915/935-960 MHz;
- 1710-1780/1805-1875 MHz;
- 1900-1915 MHz (not used by the operators yet);
- 1920-1965/2110-2165 MHz.

The operators are using GSM (2G), UMTS (3G) and LTE (4G) technologies.
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 the network operators, until 30.11.2023, virtual mobile operator Globaltel LLC also operated in the market. As of 01.12.2023, the company was acquired by Telekom Srbija JSC.

As of 2015, the development of 4G network in the Republic of Serbia began. In early 2015, the public bidding procedure for the issuance of individual licences for the usage of radio frequencies in the 1710-1785/1805-1880 MHz frequency bands, in which all three operators had participated, was completed. In March 2015, individual decisions were issued to all three operators, granting the usage of two 5 MHz radio frequency blocks, which enabled the introduction of new mobile technology generation 4G, which provides better coverage and faster Internet on the terriotory 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

[1] www.mts.rs

frequency bands in the territory of the Republic of Serbia, in which all three operators had participated, was successfully carried out. Upon the completed procedure, in January 2016, individual decisions were issued to all three operators, granting the usage of two 10 MHz-radio frequency blocks, each.
Telekom Srbija JSC 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 daughter companies.

Yettel LLC has been in the Serbian telecoms market since 2018, when the ownership structure changed and Telenor group sold all its business operations in Central and Easterne Europe, consisting of subsidiaries in Bulgaria, Hungary, Serbia and Montenegro, and a provider of technological services Telenor Common Operation from Serbia to PPF group. As part of a regional transaction, PPF group acquired 100% of shares of Telenor LLC. As of August 2023, Yettel's control stock is owned by Emirates Telecommunication Group.

A1 Srbija LLC 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. A1 Srbija has been present in the Serbian market since 2006 (as Vip mobile LLC). Based on the set of entry data on active base stations within the network received from operators Telekom Srbija JSC, Yettel LLC and A1 Srbija LLC, 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 31.12.2023

I		Telekom Srbija	Yettel	A1
1.	Total number of active sites with mobile telephony base stations	3,186	2,489	2,597
2.	Raw land sites (RL) (freestanding land polls) with base stations	1,871	1,401	1,470
3.	Rooftop sites (RT) (antenna systems on buildings and masts on buildings) with base stations	1,241	1,016	1,063
4.	Indoor sites with base stations	64	47	44
5.	RT + indoor sites	10	25	20
II				
6.	ADAS indoor systems	6	5	7
7.	DAS indoor systems	63	66	56
8.	ADAS + DAS indoor system combinations	5	1	1
III				
9.	2G base station sites (all RF bands and their combinations)	2,890	2,427	2,520
10.	2G 1800 sites only (no 2G 900 sites, however with possibly other technologies and RF bands)	1	4	26
11.	2G 900 sites only (no 2G 1800 sites, however with possibly other technologies and RF bands)	2,741	2,393	2,487
12.	2G 900 + 2G 1800 sites (with possibly other technologies and RF bands)	148	30	7
IV				
13.	3G sites (all RF bands and their combinations)	3,002	2,464	2,462
14.	3G 2100 sites only (no 3G 900 sites, however with possibly other technologies and RF bands)	2,984	1	2,448
15.	3G 900 sites only (no 3G 2100 sites, however with possibly other technologies and RF bands)	10	2,438	14
16.	3G 900 + 3G 2100 sites (with possibly other technologies and RF bands)	8	25	0
V				

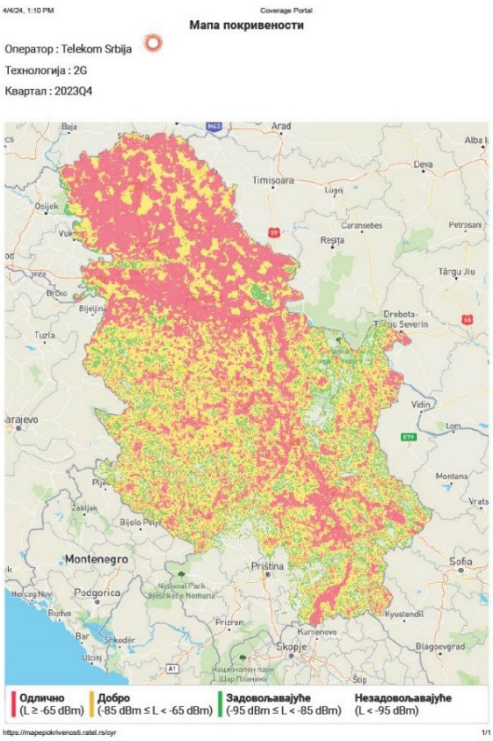
17.	4G sites (all RF bands and their combinations)	**3,130**	**2,463**	**2,597**
18.	4G 800 sites only (no 4G 1800 and 4G 2100 sites, however with possibly other technologies and RF bands)	**314**	**548**	**72**
19.	4G 1800 sites only (no 4G 800 and 4G 2100 sites, however with possibly other technologies and RF bands)	**48**	**45**	**27**
20.	4G 2100 sites only (no 4G 800 and 4G 1800 sites, however with possibly other technologies and RF bands)	**1**	**3**	**0**
21.	4G 800 + 4G 1800 sites (no 4G 2100 sites, however with possibly other technologies and RF bands)	**264**	**683**	**477**
22.	4G 800 + 4G 2100 sites (no 4G 1800 sites, however with possibly other technologies and RF bands)	**2**	**1**	**9**
23.	4G 1800 + 4G 2100 sites (no 4G 800 sites, however with possibly other technologies and RF bands)	**33**	**26**	**60**
24.	4G 800 + 4G 1800 + 4G 2100 sites (with possibly other technologies and RF bands)	**2,468**	**1,157**	**1,952**
VI				
25.	Indoor all technology repeater sites	**925**	**521**	**600**
26.	Indoor 2G repeater sites	**93**	**2**	**63**
27.	Indoor 3G repeater sites	**264**	**24**	**100**
28.	Indoor dual repeater sites (2G + 3G)	**217**	**207**	**7**
29.	Indoor 4G repeater sites	**20**	**4**	**0**
30.	Indoor dual/triple repeater sites (4G + 2G/3G)	**331**	**284**	**430**
VII				
31.	Outdoor repeater sites (only remote if different from donor)	**12**	**25**	**0**
VIII				
32.	WiFi sites	**1,286**	**14**	**0**

33.	Indoor WiFi sites	**476**	**0**	**0**
34.	Outdoor WiFi sites	**557**	**13**	**0**
35.	Indoor + outdoor WiFi sites	**253**	**1**	**0**
IX				
36.	2G 900 base radio stations	**2,889**	**2,442**	**2,494**
37.	2G 1800 base radio stations	**149**	**33**	**33**
38.	3G900 base radio stations	**18**	**2,479**	**14**
39.	3G2100 base radio stations	**2,991**	**26**	**2,448**
40.	4G800 base radio stations	**3,047**	**2,392**	**2,510**
41.	4G1800 base radio stations	**2,812**	**1,933**	**2,516**
42.	4G2100 base radio stations	**2,503**	**1,199**	**2,021**
43.	WiFi AP	**3,019**	**14**	**0**
44.	Indoor WiFi AP	**2,010**	**1**	**0**
45.	Outdoor WiFi AP	**1,009**	**13**	**0**
46.	Indoor repeaters	**1,473**	**733**	**600**
47.	Outdoor repeaters	**12**	**39**	**0**
X				
48.	Optic to the Base-stations	**1,827**	**985**	**1,030**
49.	Single microwave connection to optical transmission point	**1,011**	**791**	**770**
50.	Multiple microwave connection to optical transmission point	**348**	**713**	**797**

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

Name	Telekom Srbija JSC, Belgrade	YETTEL LLC Belgrade	A1 LLC Belgrade (New Belgrade)
2G network territory coverage	92.72%	88.05%	90.02%
2G network population coverage	99.38%	98.91%	99.17%
3G network territory coverage	79.40%	89.69%	78.11%
3G network population coverage	97.25%	99.13%	97.15%
4G network territory coverage	85.21%	76.73%	75.50%
4G network population coverage	98.35%	96.85%	96.35%

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



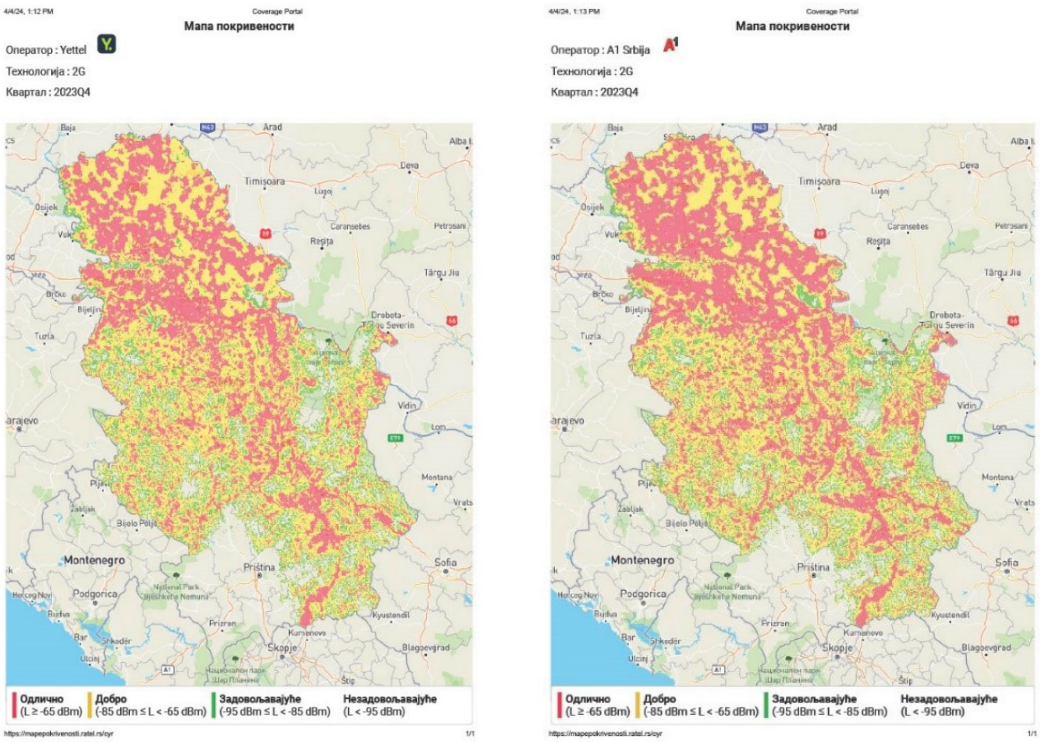
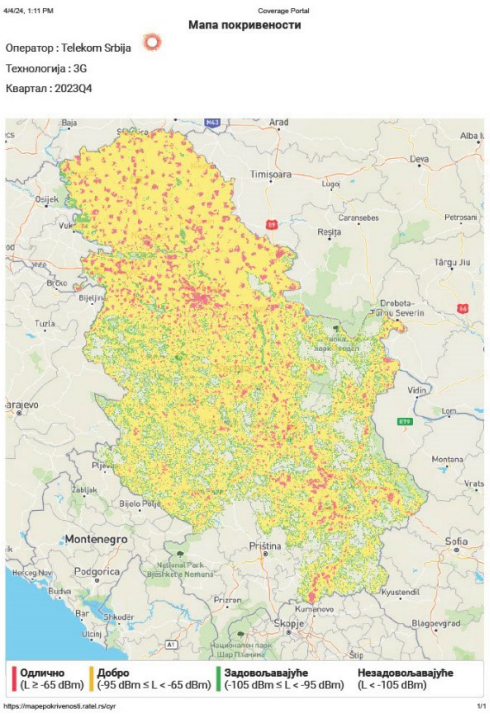


Figure 5.2. Graphic presentation of mobile telephony signal coverage for UMTS technology



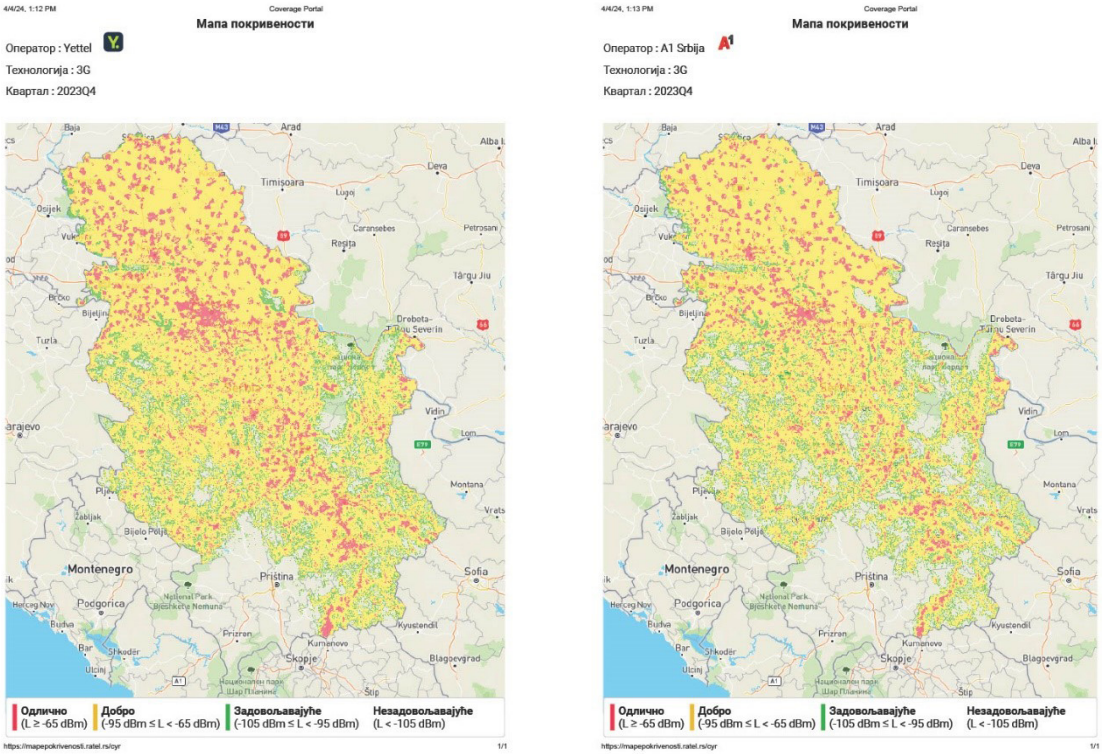
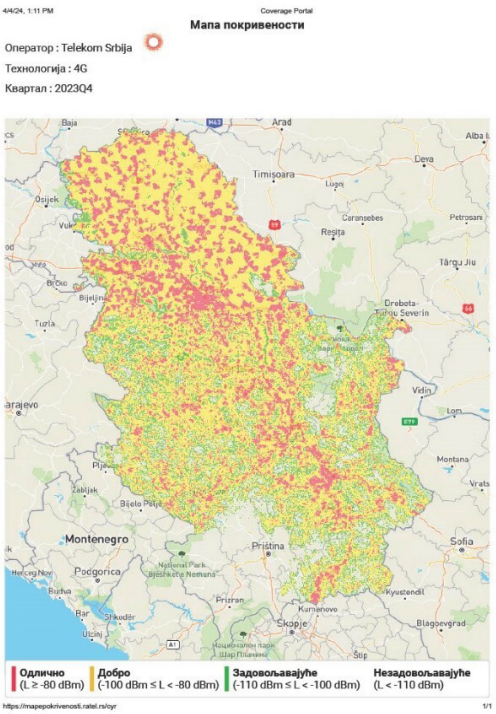
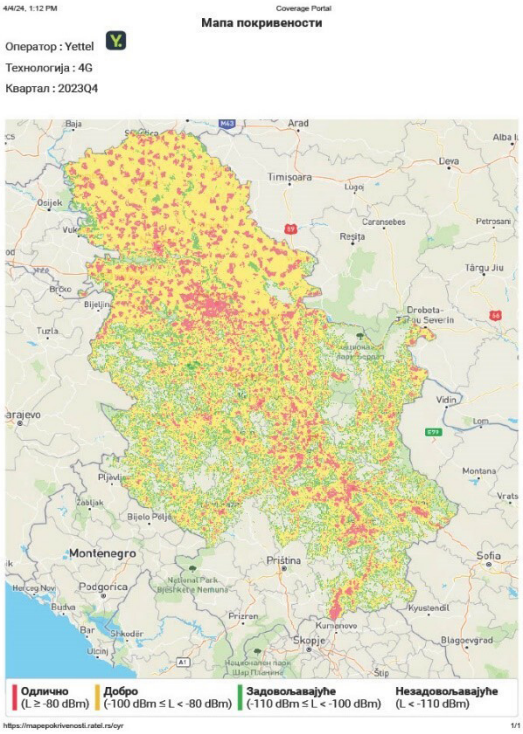
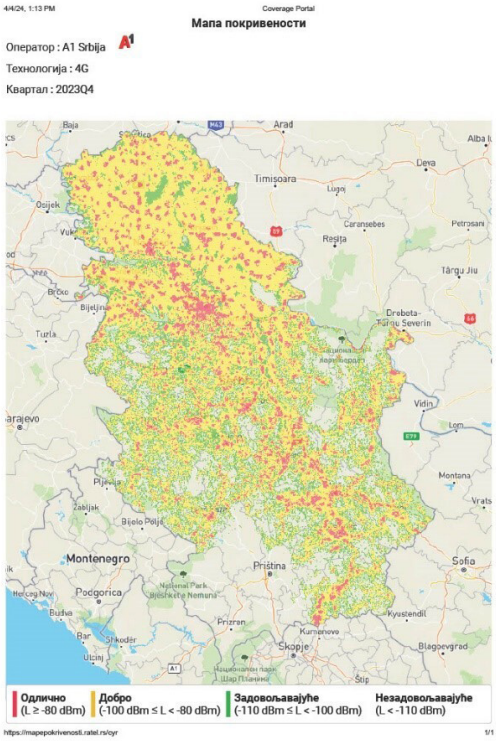


Figure 5.3. Graphic presentation of mobile telephony signal coverage for LTE technology

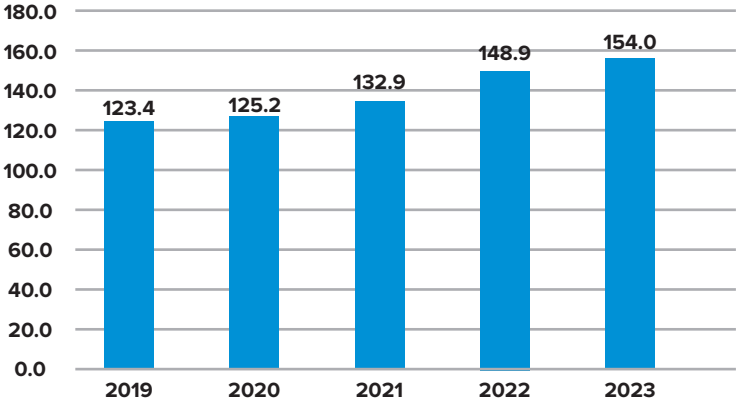






In 2023, mobile operators earned 154 billion dinars in revenues, which is about 1.31 billion euros. The 2023 revenues in dinars grew by 3.4% in comparison to the year before.

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

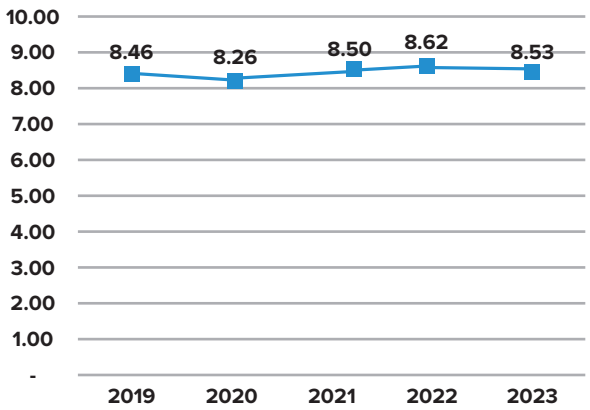


Source: RATEL

Investments in this electronic communications market segment have increased by 11% compared to the year before, amounting to 19.3 billion dinars.
At the end of 2023, the total number of mobile telephony users was 8,532,022, which is a 1% decrease compared to 2022.

Figure 5.4. shows the trend in the total number of users over the previous period.

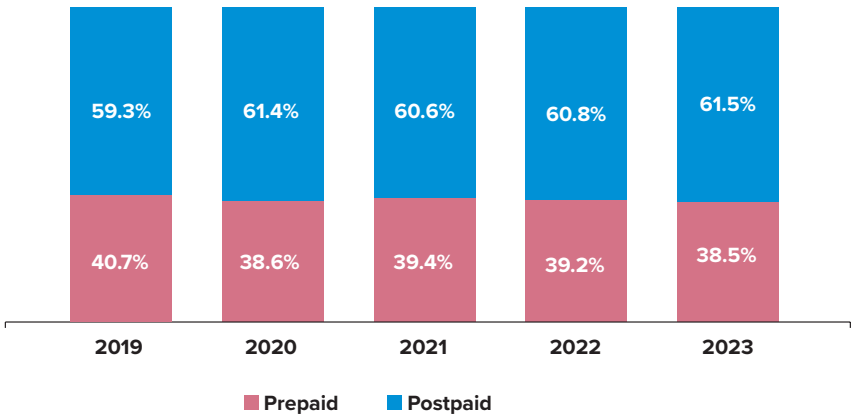
Figure 5.4. Total number of active mobile telephony users (in million)



Source: RATEL

The total number of users are postpaid and prepaid subscribers that were active in the last three months of particular year. Distribution between prepaid and postpaid users is given in Figure 5.5. The postpaid user take-up in 2023 amounts to 61.5%.

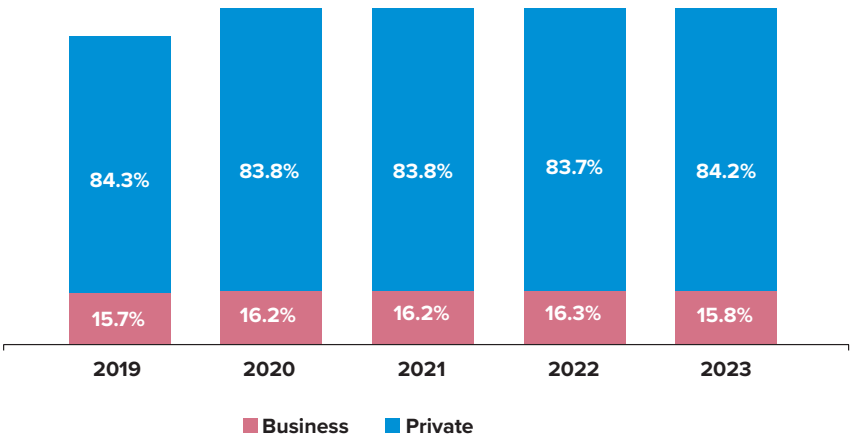
Figure 5.5. Prepaid/postpaid user ratio



Source: RATEL

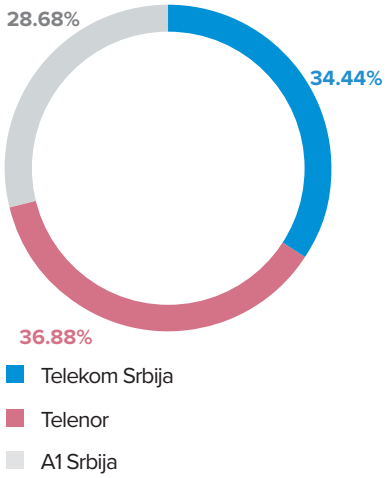
The following figure shows the distribution between private and business users. In the user structure, during all observed years, natural persons are dominant. The number of private users in 2023 accounts for 84.2% of the total number of users and is similar as in previous years.

Figure 5.6. Private/business user ratio



Source: RATEL

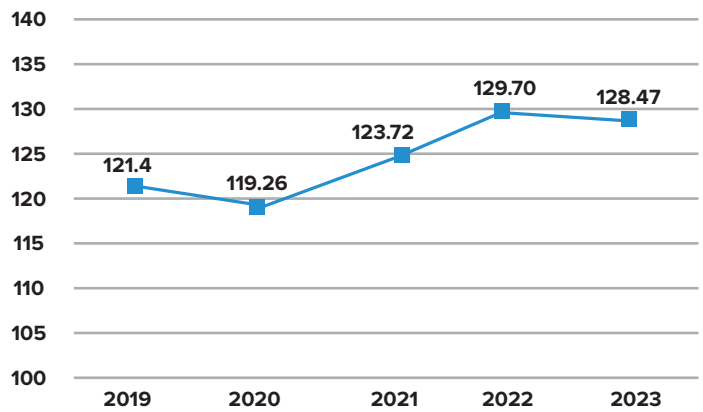
Figure 5.8. Operators' share in the total revenues made from mobile telephony (%)



Source: RATEL

The total number of mobile network users in 2023 continues to surpass the total number of inhabitants. The penetration in the observed year is 128.47%, indicationg that a number of subscribers use more than one SIM card .

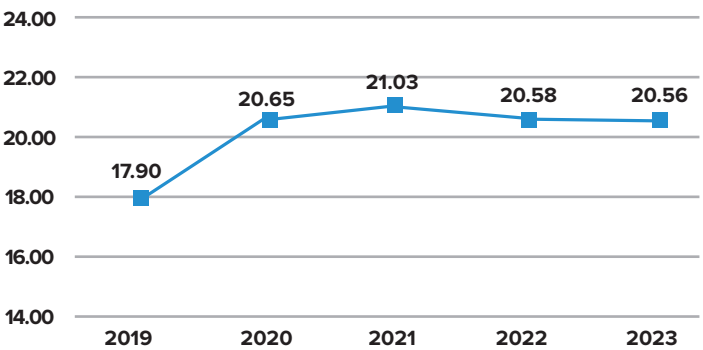
Figure 5.7. Mobile telephony subscribers per 100 inhabitants



Source: RATEL

Data on the number of minutes of calls from mobile networks show that this parameter has remained slightly decreased after several years of growth. Total outgoing traffic in 2023 amounted to 20.56 billion minutes, which is slightly less than in 2022, when the amount of outgoing traffic was 20.58 billion minutes. During 2023, each user talked on a mobile phone for an average of about 2,380 minutes, or about 6 minutes and 30 seconds per day.

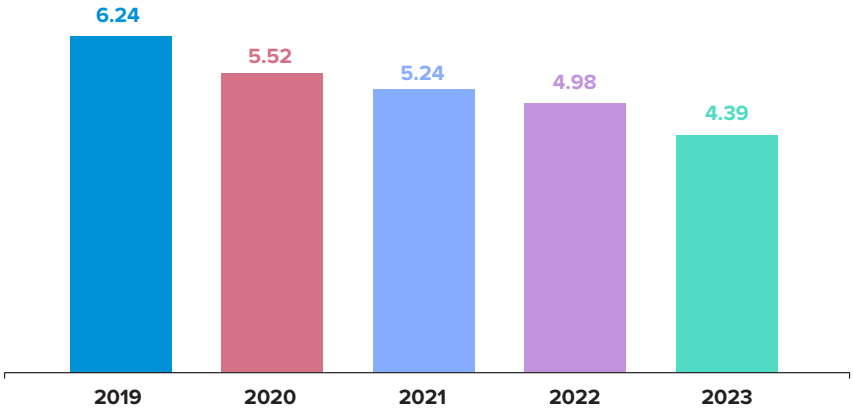
Figure 5.8. Total outgoing traffic (in billion minutes)



Source: RATEL

The downward trend in the number of SMS messages sent continues. During 2023, 4.39 billion SMS messages were sent, which is 12% less than in 2022, during which 4.98 billion SMS messages were sent. In 2023, each user sent an average of about 509 SMS messages, or an average of 1.4 messages per day. Observed by user group, 85% of SMS messages in 2023 were sent by private users.

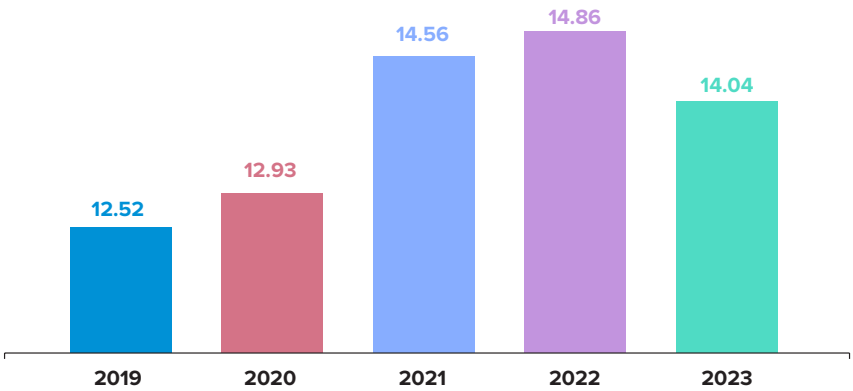
Figure 5.9. Number of sent text (SMS) messages (in billion)



Source: RATEL

The number of MMS messages has decreased after several years of growth. Namely, 14.04 million MMS messages were sent in 2023, which is 5.5% less than in 2022. Observed by user group, 82% of MMS messages in 2023 were sent by private users.

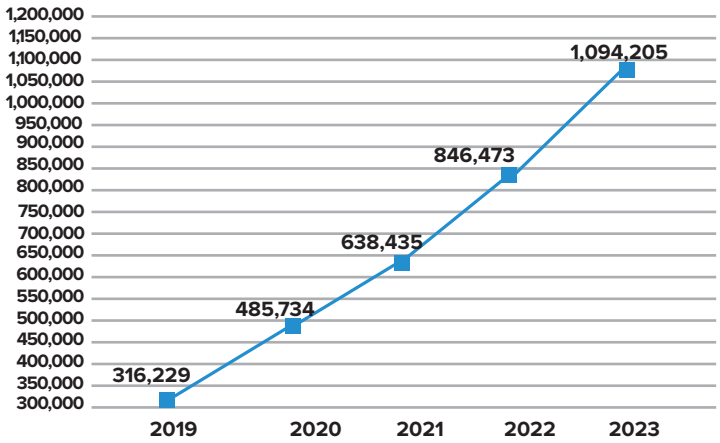
Figure 5.10. Number of sent MMS messages (in million)



Source: RATEL

The amount of data transferred during the previous period has been constantly growing (Figure 5.11). In 2023, the amount of transferred data increased by approximately 29.3%.

Figure 5.11. Data traffic in TB (GPRS+UMTS +LTE)

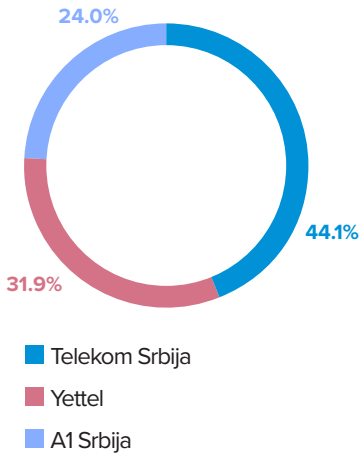


* As of 2016 data traffic over LTE network is also included.

Source: RATEL

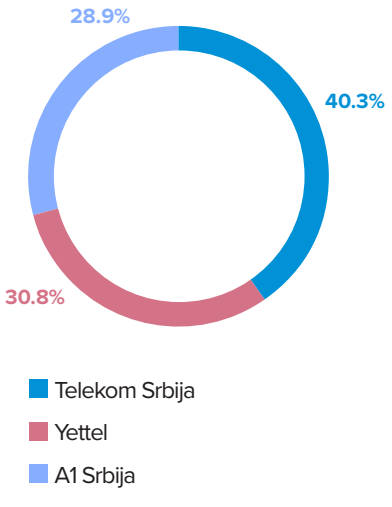
Based on available data, Figures 5.12 to 5.16 show the market share of mobile operators in terms of the total number of users, outgoing traffic, number of SMS and MMS messages sent and amount of data transferred.

Figure 5.12. Operators' share in terms of users (%)



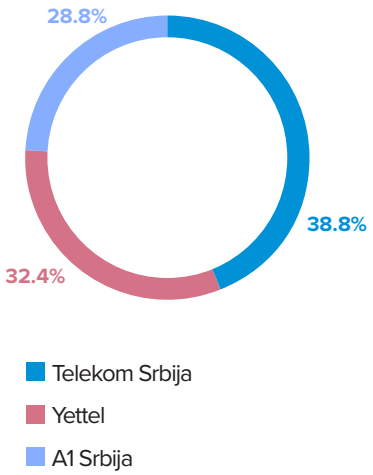
Source: RATEL

Figure 5.13. Operators' share in the total outgoing voice traffic (%)



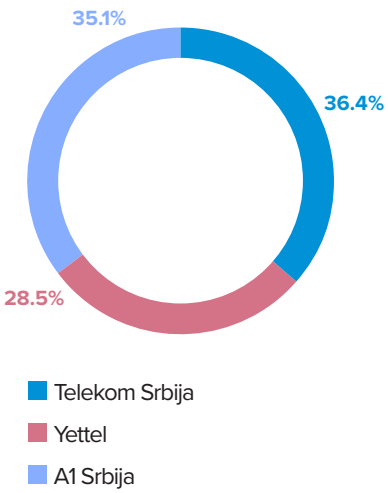
Source: RATEL

Figure 5.14. Operators' share in the total number of sent SMS (%)



Source: RATEL

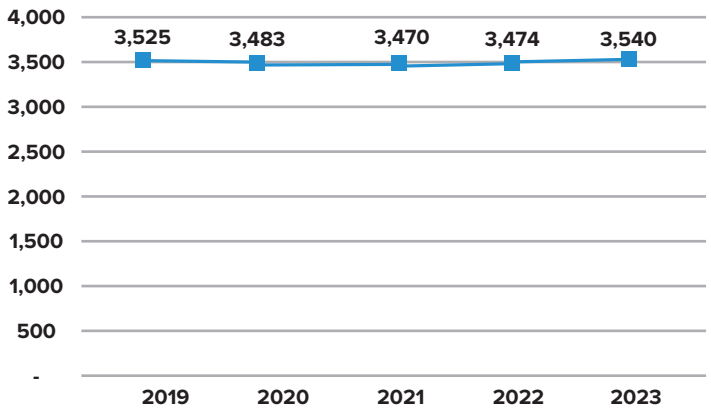
Figure 5.15. Operators' share in the total number of sent MMS (%)



Source: RATEL

The competition in the mobile market is 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 HHI value is determined based on market shares in terms of the number of users and is shown in Figure 5.17.

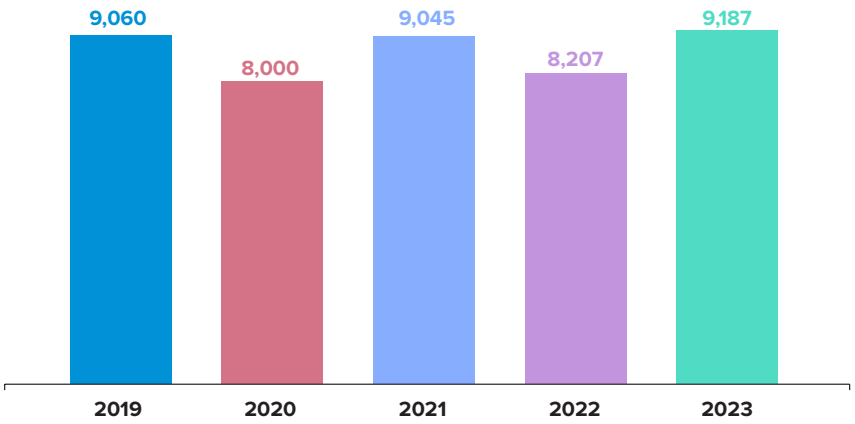
Figure 5.17. HHI values



Source: RATEL

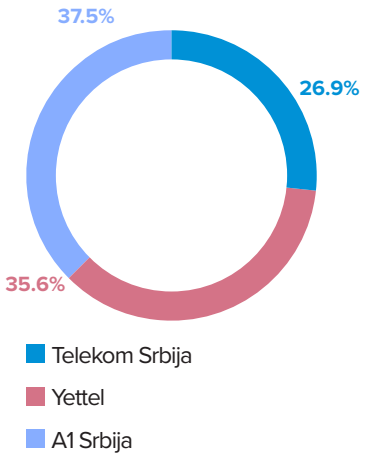
The average number of ported mobile numbers has increased by 12% compare dto the year before, resulting in a monthly average of 9,187 portings in 2023.

Figure 5.18. Average monthly number of portings by year



Source: RATEL

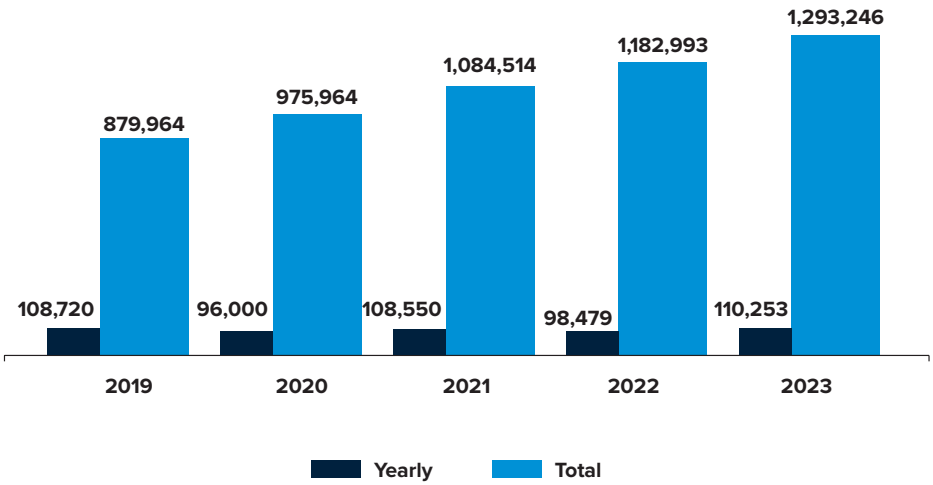
Figure 5.16. Operators' share in total data transfer (GPRS+UMTS+ LTE)(%)



Source: RATEL

In 2023, there were 110,253 number portings, so that a total of 1,293,246 numbers have been ported between mobile telephony operators since the introduction of mobile number portability.

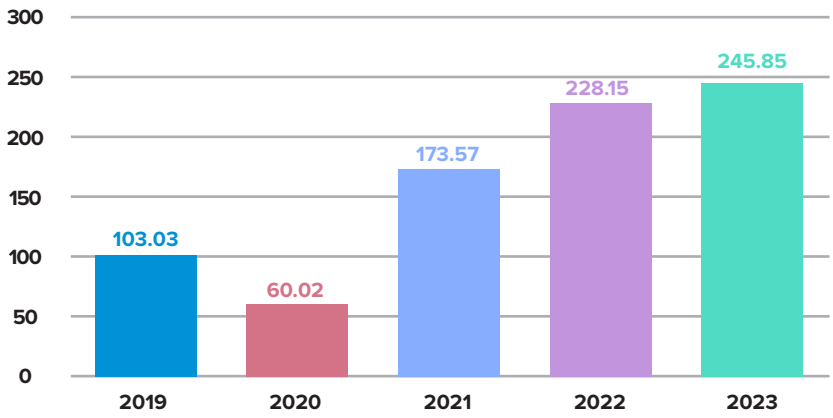
Figure 5.19. Average yearly and total number of portings



Source: RATEL

In addition to the traffic generated while in the country, users of domestic mobile operators also generate traffic while roaming. In the observed period, the volume of voice traffic in roaming decreased in the first two years, primarily as a result of the use of voice applications over the Internet. An additional cause of the drastic drop in traffic in 2020 is the COVID-19 epidemic, which led to a reduced volume of roaming services. In the last three observed years, roaming traffic has continued to grow, which is largely a result of the abolition of additional fees and charges for regulated call services, SMS messages and data transfer in roaming at domestic retail prices, which has brought the price of roaming in the Western Balkans region in line with the "roaming like at home" rule in force in the European Union.

Figure 5.20. Number of roaming minutes used by domestic subscribers (in million)

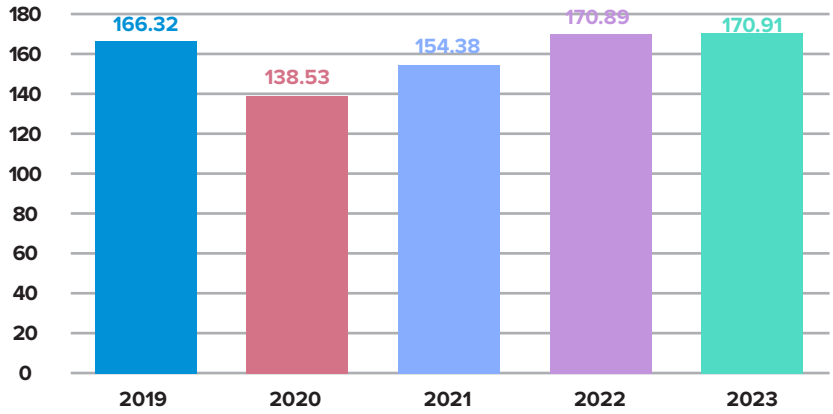


Source: RATEL

In addition to voice traffic, subscribers also use mobile Internet abroad and according to the available data for 2023 the volume of mobile Internet traffic outside the country was around 6,182 TB. On top of that, 45 million SMS messages were sent.

In Serbia, in addition to users of domestic mobile operators, traffic is also generated by foreign users who made a variable volume of voice traffic during the observed period, however with a noticeable growth trend.

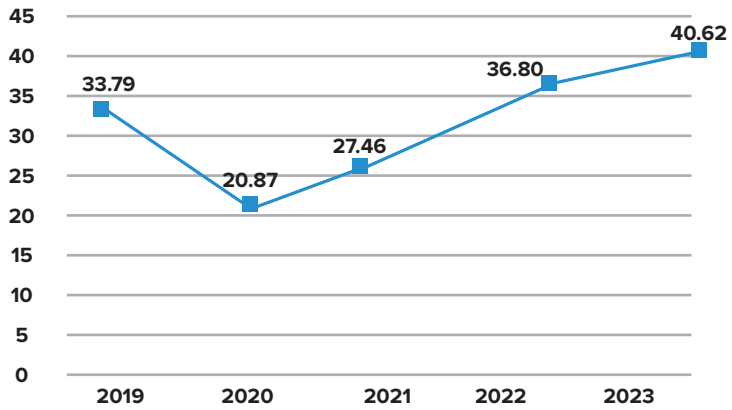
Figure 5.21. Number of roaming minutes used by foreign subscribers (in million)



Source: RATEL

The revenues made from roaming include revenues made from outbound roaming and revenues made from inbound roaming. In 2023, there was an increase by 10.4% compared to the year before.

Figure 5.22. Roaming (in million EUR)



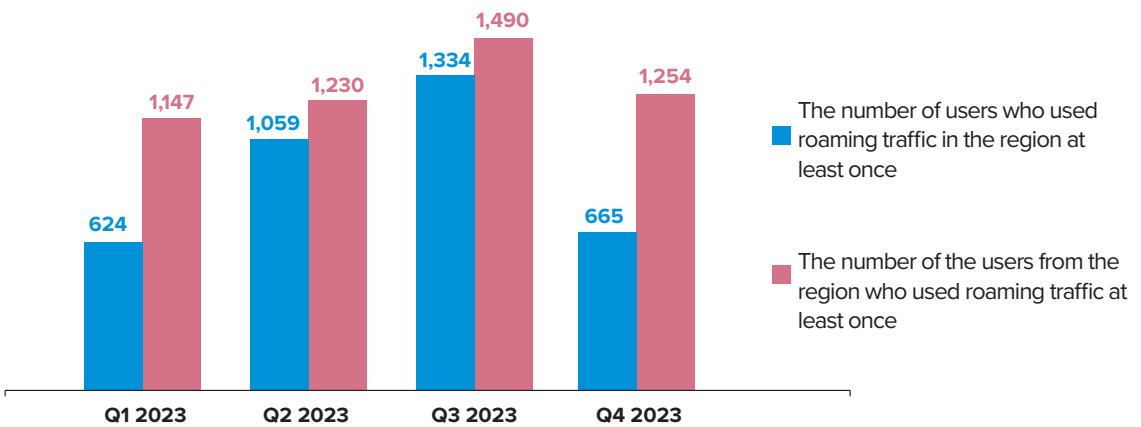
Source: RATEL

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 lasted until 30 June 2021, as of 1 July 2021 all surcharges were abolished and regulated calls, SMS and data transfer in roaming are charged in accordance with the domestic retail pricelists bringing the roaming prices in the Western Balkans region to the price level in line with the "roam like at home" rule applied in the European Union.

The data on the number of users show a significant increase in the visitors from the region using roaming, which outnumbers the national network subscribers using roaming in the region.

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 2023 are given below.

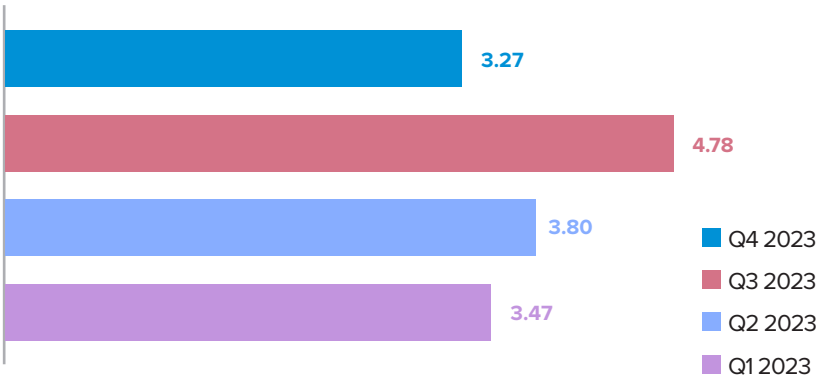
The overview shows the trend of the traffic made from the regulated retail roaming services by mobile users while travelling to the region.

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

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

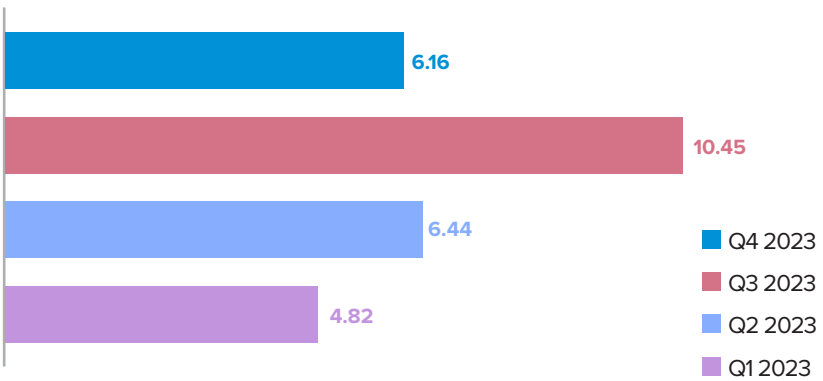
The data on voice service show that prepaid users generate more incoming call minutes compared to outgoing calls in 2023 (Figures 6.2. and 6.3).

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



Outgoing prepaid calls

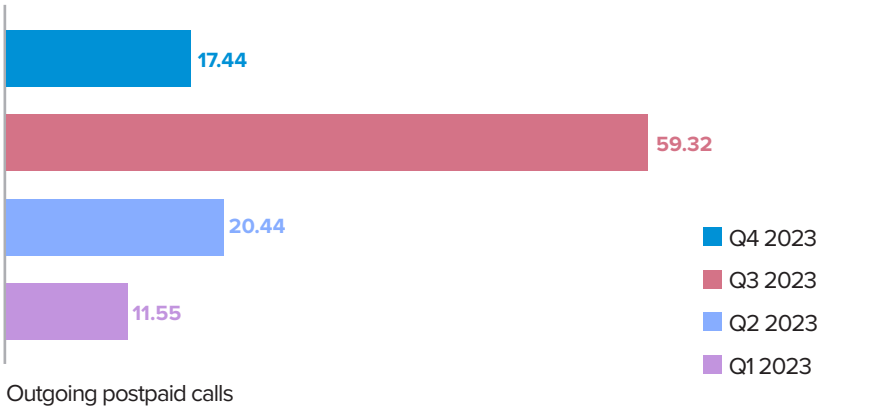
Figure 6.3. Roaming incoming calls made by prepaid users in the region (million minutes)



Incoming prepaid calls

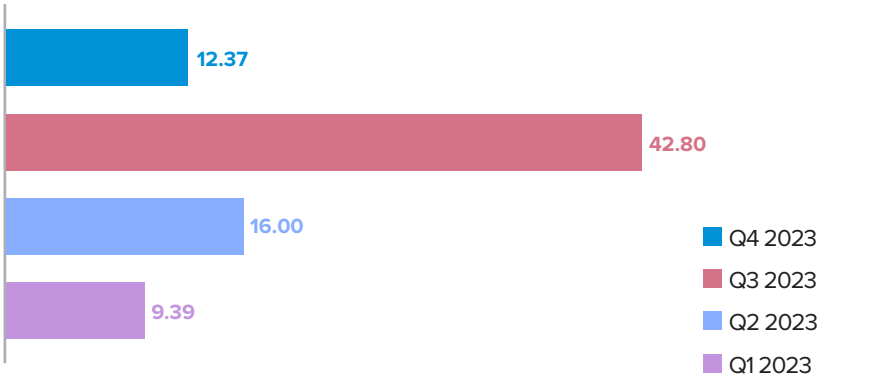
Comparable quarterly data show that postpaid subscribers are actively using roaming voice services, meaning that they generate more outgoing calls minutes compared to incoming calls during all four quarters of 2023 (Figures 6.4. and 6.5).

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



Outgoing postpaid calls

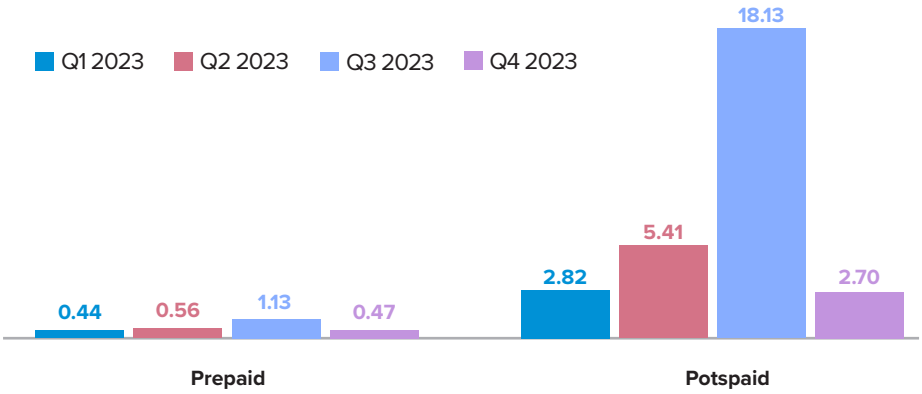
Figure 6.5. Roaming incoming calls made by postpaid users in the region (million minutes)



Incoming postpaid calls

As for the text messages, the data show that postpaid users send more SMS messages in roaming than the prepaid users, since there is more postpaid than prepaid users using roaming (Figure 6.6).

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



Both prepaid and postpaid users used roaming data transmission the most during the third quarter of 2023 (Figures 6.7. and 6.8).

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

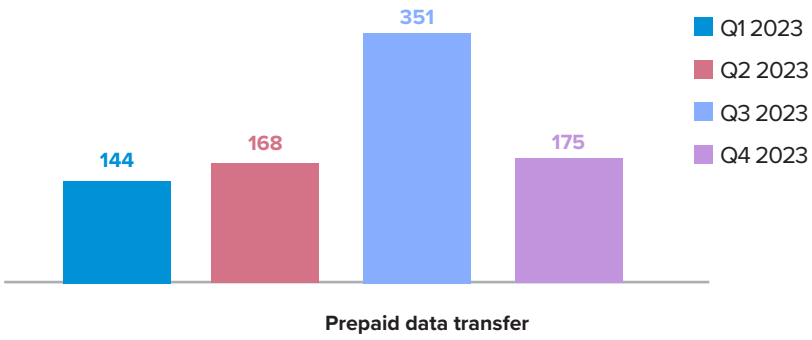
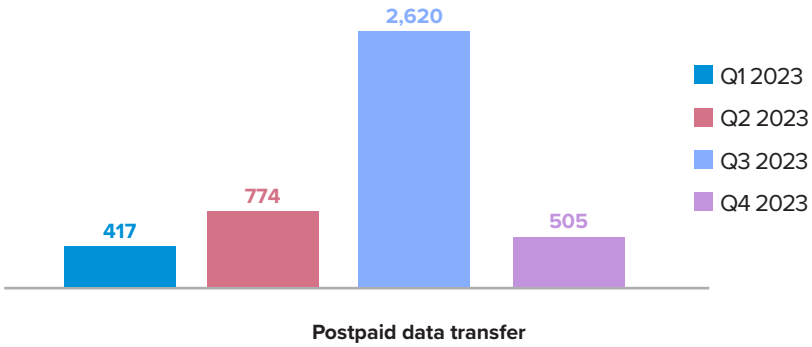


Figure 6.8. Roaming data traffic made in the region – postpaid (TB)



Below are the data showing the trend of revenues made from roaming without the revenues made from tariff add-ons.

The revenues made from outgoing roaming calls provided to prepaid users in the region are higher than the revenues made from incoming roaming calls, as given in Figures 6.9. and 6.10. The lowest total revenues from both incoming and outgoing calls were made in Q1 2023, while the highest revenues from both categories of calls were made in Q3 2023, during the summer holiday season.

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

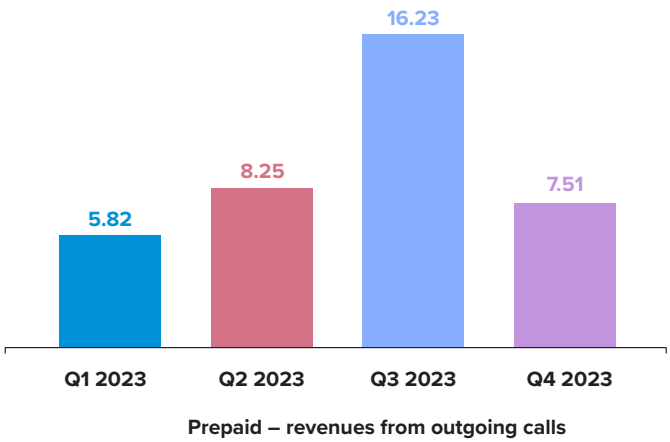
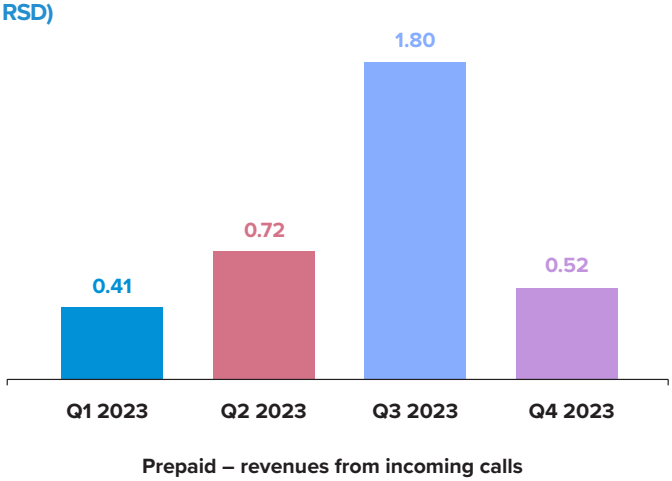


Figure 6.10. Revenues made from incoming roaming calls provided to prepaid users in the region (mil. RSD)



The revenues made from outgoing roaming calls provided to postpaid users in the region during 2023 are given in Figure 6.11, whereas the revenues made from the incoming roaming calls remain rather negligible (Figure 6.12).

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

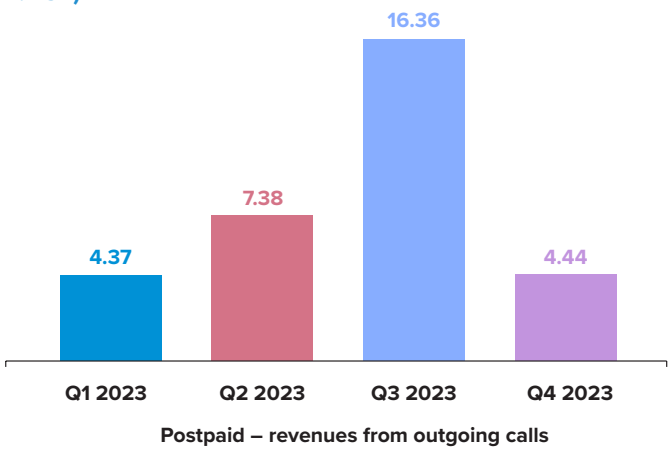
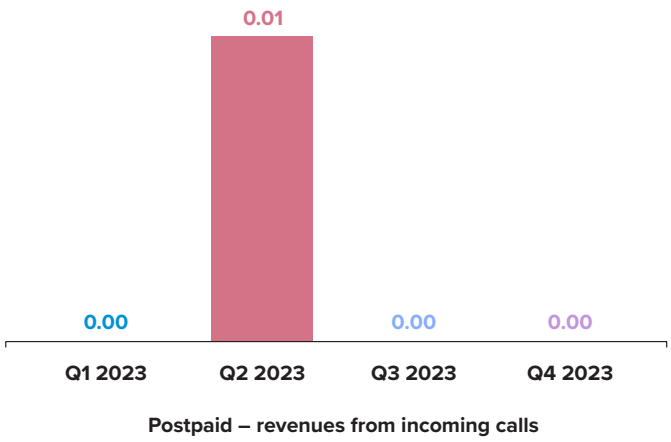
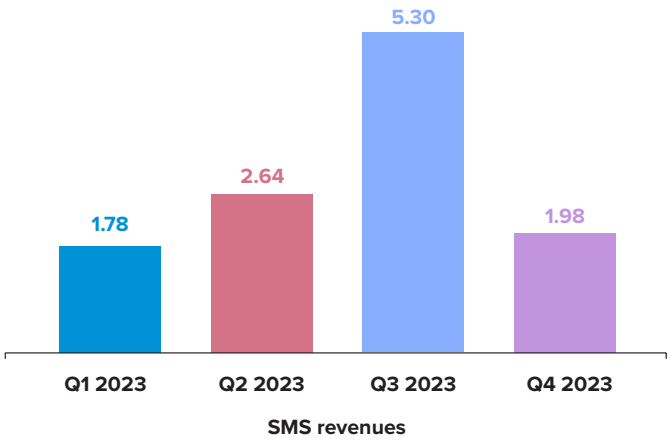


Figure 6.12. Revenues made from incoming roaming calls provided to postpaid users in the region (mil. RSD)



The revenues made from SMS roaming were highest in Q3 2023, during the holiday season when people travel more to the region (Figure 6.13).

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



The revenues made from data roaming made by postpaid users in the region are significantly higher in all four quarters of 2023, compared to the revenues made from data roaming provided to prepaid users. Data roaming was most used during Q3 2023 and the revenues made from providing the service to postpaid users were significantly higher than the revenues made from prepaid users (Figures 6.14. and 6.15).

Figure 6.14. Revenues made from the roaming data in the region – prepaid (mil. RSD)

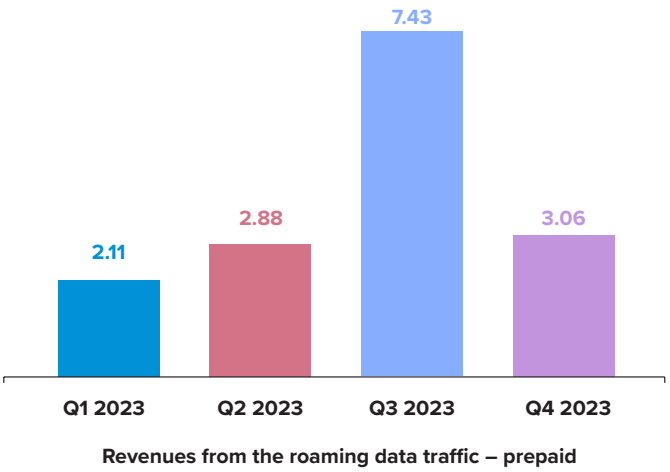
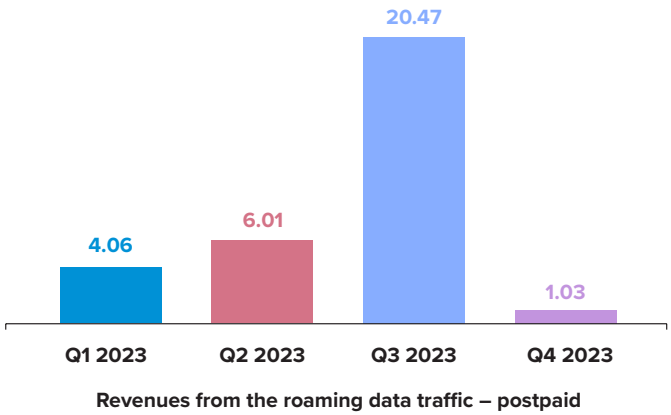


Figure 6.15. Revenues made from the roaming data in the region – postpaid (mil. RSD)



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 over the past years, which continued in 2023. In addition to the rise in the total number of users, a continuous uptrend is seen in the demand for the high-rate Internet packages. We have witnessed the rise and expansion of the Internet of Things (IoT) in the past decade. Our world is highly digitized and connected, from smartphones and tablets to home devices. Average global Internet speed is increasing, the demand for capacity is on the rise and new application requiring higher speeds keep on appearing. Video streaming has become one of the services requiring the biggest throughput and is likely to continue growing, as the quality of video is constantly being improved and video content is displayed on large screen TV sets. As the usage of OTT video streaming services is expanding and the number of connected devices at home is growing, users need higher speeds to upgrade their digital experience. The Internet is becoming increasingly important as an access to information and a crucial link in the promotion and development of science, technology and innovation, as well as in the enhancement of regional and international cooperation.

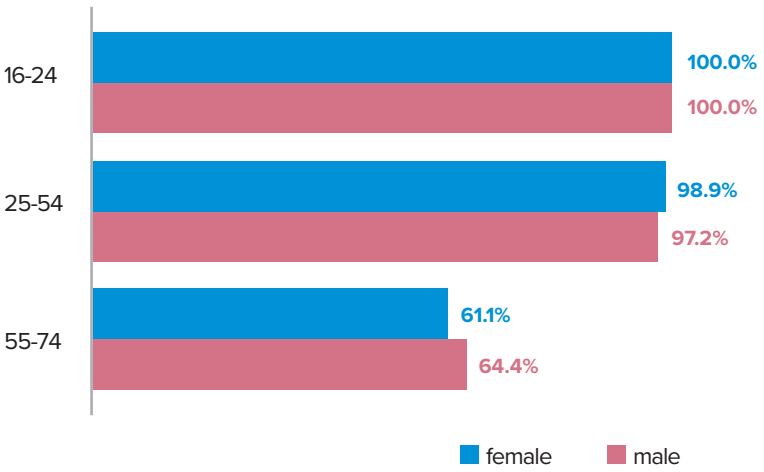
According to a survey on ICT usage by individuals, households and business, carried out in 2023 by the Statistical Office of the Republic of Serbia on the sample of 2,800 households and 2,800 individuals, as well as 1,839 businesses, the number of Internet users remained on an approximately same level as in 2022, as **eight out of ten persons in Serbia used the Internet i**n the first quarter of 2023.

The Internet was most used by the youngest population (16 – 24 years) and equally by male and female population. In 2023, the share of respondents from younger population who had an account on the social networks, such as Facebook and Twitter, was 96.8%.

The survey showed that the older age group (25-54 years) used the Internet somewhat 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, however this disparity is decreasing year after year.

[1] Data sourced from the publication 'Usage of Information and Communication Technologies in the Republic of Serbia, 2023,' published by the Statistical Office of the Republic of Serbia. The survey was conducted in February and March 2023.

Figure 7.1. Internet users by gender and age

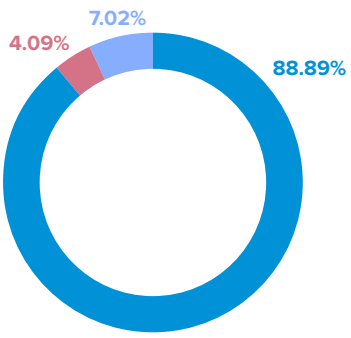


Source: Statistical Office of the Republic of Serbia

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

Internet of Things (IoT) is a new area, developing fast. IoT technology enables connecting many users, devices, services and applications to the Internet. End users can access data via Internet and mobile apps, manage device configurations and maintain IoT systems. The analysis accordingly showed that 26.4% of the respondents used the Internet via devices such as smart TV, smart speakers, game consoles, e-book readers and smart watches. This is particularly common for the younger population (16-24) where 41.4% of the respondents used this access mode. Internet access via mobile devices and smarphones remains to be the most frquent type of Internet access, used by 94.5% of the respondents (Figure 7.2).

Figure 7.3. Mobile broadband user structure



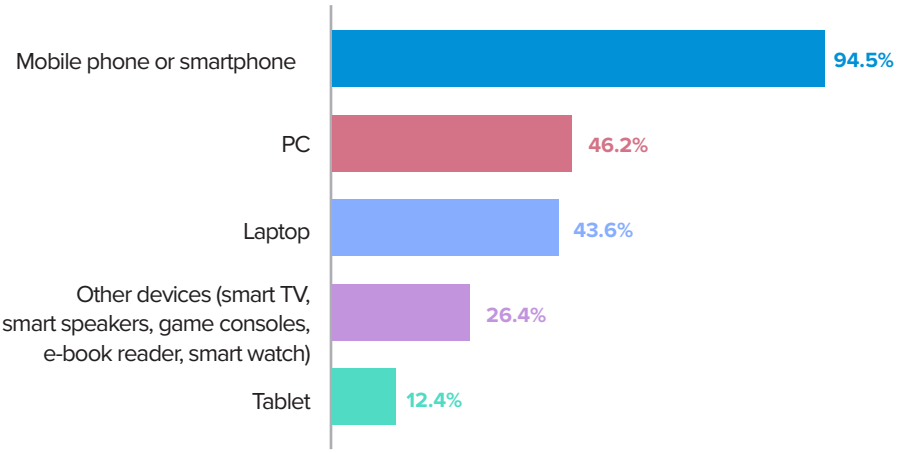
Subscribers of mobile broadband access for data and voice transmission

Subscribers of mobile broadband access for data transmission only (without USB wireless modem subscribers)

USB modem subscribers

Source: RATEL

Figure 7.2. Mobile devices used for Internet access



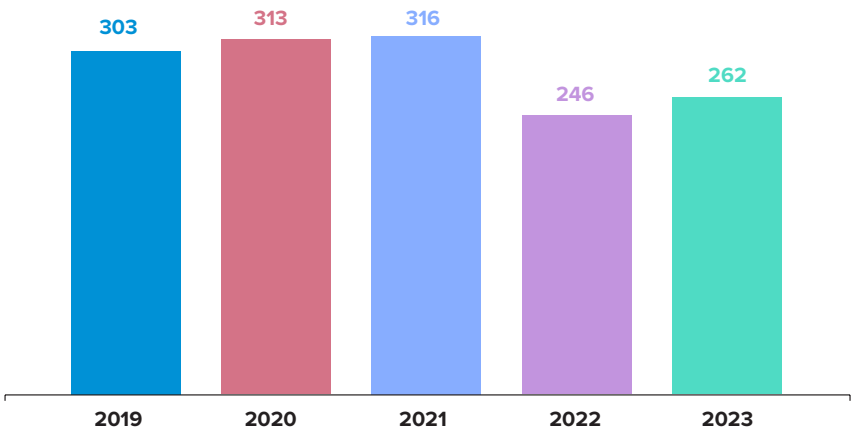
Source: Statistical Office of the Republic of Serbia

The ever growing usage of mobile phones for the purpose of Internet access is reflected in the constant rise in the number of users of mobile Internet services provided in 2023 by three mobile operators: Telekom Srbija JSC, Telenor LLC, now Yettel LLC and A1 Srbija LLC, and one virtual mobile network provider Globaltel LLC, operating in the market until November 30, 2023. As of December 1, 2023, Globaltel LLC is part of Telekom Srbija JSC.

The total number of active mobile broadband users in 2023 was 7.4 million, including the subscribers of mobile broadband data and voice service, data service only and subscribers using USB wireless modem for the Internet access. This is a 1.4% increase compared to 2022, when the total number of active broadband users was around 7.3 million. Data show that the number of subscribers who purchased mobile broadband internet services independently of voice services increased by 16.3% compared to the year before.

The number of M2M subscriptions rose significantly, amounting to 262 thousand in 2023, which is an increase by approximately 6.5% compared to the year before.

Figure 7.4. Number of M2M subscriptions (in thousand)

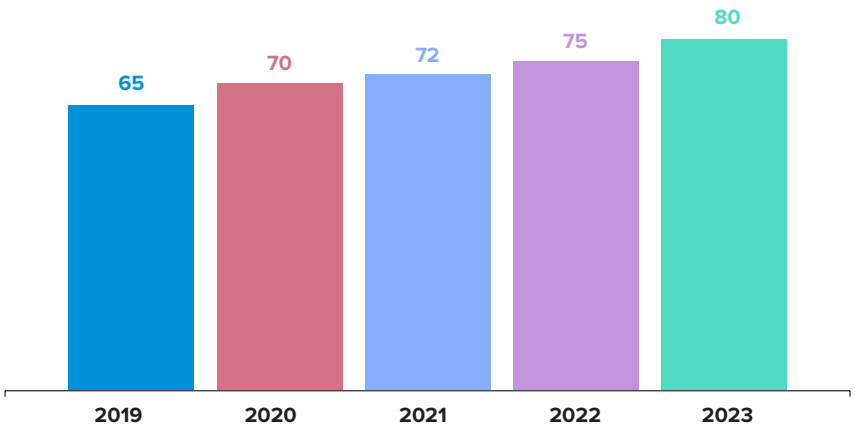


Source: RATEL

The increase in the number of users resulted in the increase in the traffic volume, which is around 1.3 times bigger compared with the year before, amounting to 1.06 billion GB on an annual level for entire UMTS and LTE traffic (the traffic includes mobile Internet users, via cell phones and modems). LTE traffic had a 96% share in the total traffic in 2023. As expected, the increase in the total traffic is the result of an augmented LTE traffic, whereas UMTS traffic dropped by 15.6%.

The bestselling mobile Internet package for private postpaid users included 150 GB data transmission traffic at the price of 1,249 dinars.

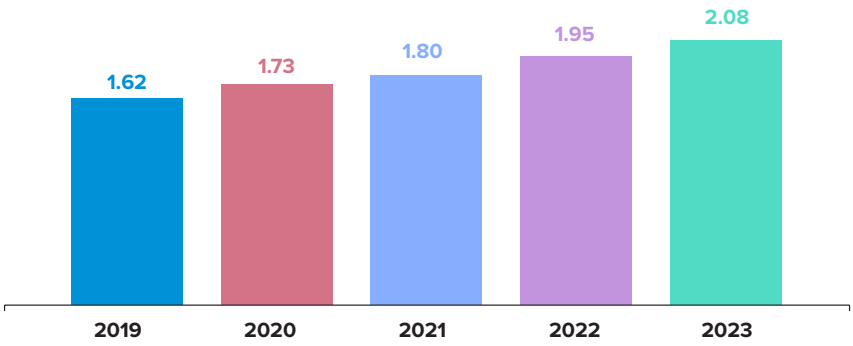
Figure 7.5. Number of fixed broadband Internet subscribers per 100 households



Source: RATEL

In 2023, eighty of one hundred households (80.2%) had fixed broadband access. The total number of fixed broadband subscribers in 2023 was 2.08 million, which is an 6.67% increase compared with the year before (Figure 7.6).

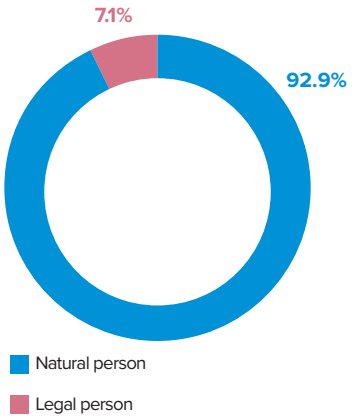
Figure 7.6. Total number of subscribers of fixed broadband Internet access (in million)



Source: RATEL

The shares of natural and legal persons in the total number of broadband Internet subscribers in 2023 are shown in Figure 7.7.

Figure 7.7. Shares of natural and legal persons in the total number of broadband Internet subscribers

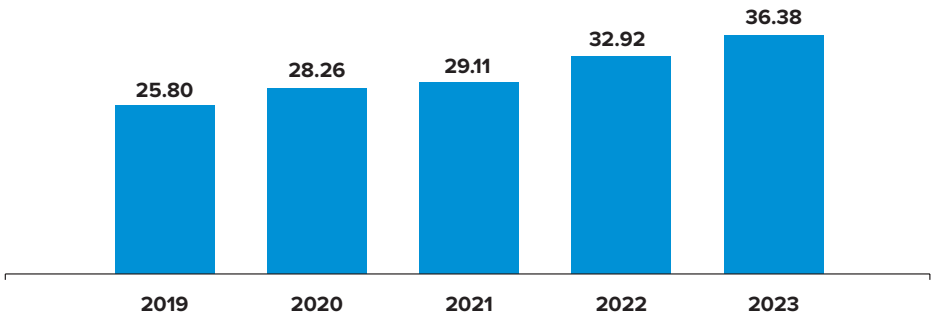


Source: RATEL

Due to an ever growing demand for broadband Internet access, the need for faster and more reliable networks grows as well. This requires a change in the infrastructure through which the services are delivered, as the number of subscribers using the service of broadband Internet access via optical fibers increases. Based on the available data, on the basis of the type of access, the biggest growth, by almost 25%, was recorded in the number of broadband users with FTTH (Fiber to the Home) or FTTB (Fiber to the Building) fibre-optics Internet access. Thanks to the fast development of cable networks, which are usually composed of both fiber and coaxial networks, and an upgrade of these networks to DOCSIS 3.1 standard, high-speed Internet packages are provided to end users via coaxial cable networks as well. The number of users accessing the Internet over coaxial cable network has changed the least in comparison to the year before, decreasing by a mere 0.1%. The number of xDSL users in 2023 increased by 0.6%. The xDSL subscriber structure continues to change in favor of the VDSL technology users that account for 64% of the total number of xDSL users. Also, in 2023, the number of VDSL users grew by 4.1% compared to the year before.

The increase in the number of users created the increase in the revenues from fixed broadband Internet access, which, compared to 2022, rose by around 11% (Figure 7.8).

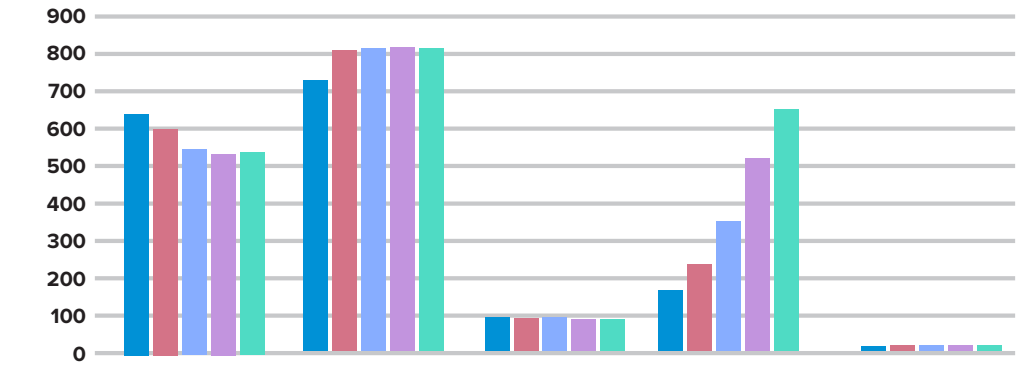
Figure 7.8. Trend of revenues from fixed broadband Internet access (in billion)



Source: RATEL

In 2023, coaxial cable infrastructure remains, for the sixth year in a row, the most widely used access technology, with 39% of the total number subscribers. It is noteworthy that FTTH/FTTB access became the second most frequent type of Internet access in 2023, accounting for approximately 31% of the total number of broadband Internet access users, unlike in previous years, when that was xDSL (Figure 7.9).

Figure 7.9. Share of broadband subscribers by type of access (in thousand)



	xDSL	KDS	Bežični	FTTH/B	Ostalo*
2019	630.51	719.88	98.01	166.63	8,76
2020	590.80	800.14	92.05	237.61	9,90
2021	537.92	803.67	96.62	351.21	10,24
2022	526.53	805.29	91.21	515.21	10,62
2023	529.90	804.69	88.29	642.12	11,64

* Eternet, LAN

Source: RATEL

The availability of high-speed Internet is important to ensure a high-quality access to Internet content, including the content generated by end users (various services and information). The Internet was most used for voice/video calls (94%) and online messaging using Skype, Messenger, Whats App and Viber (93.2%), as well as for online newspaper and magazine reading (86.4%).

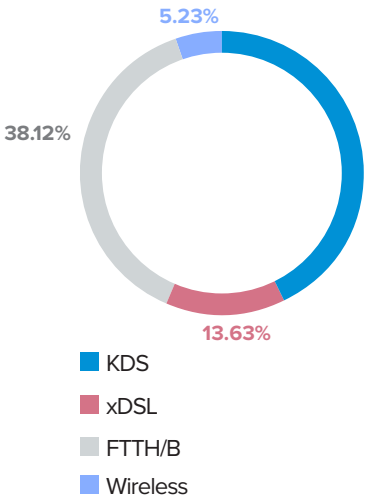
In 2023, the revenue made via coaxial cable infrastructure equalled 43.02% of the total revenue made from broadband access, showing a decrease compared with the year before.

A significant drop in the revenue share is seen in the services provided via xDSL as well. This type of access remians widely present, however, the drop in the revenues results from the fact that, despite the decrease in the number of xDSL access technology users, this type of access only enables services with lower access rate and are less expensive. The share in the revenues from services provided via xDSL technology in 2023 was 13.63%.

In line with the subscriber structure, where preference is given to technologies enabling higher speeds, revenue structure reveals a growth trend in services

provided over FTTH/FTTB infrastructure. In terms of the number of subscribers, this type of Internet access ranks right below the coaxial cable infrastructure access, with the 2023 revenue share of 38.12% (Figure 7.10).

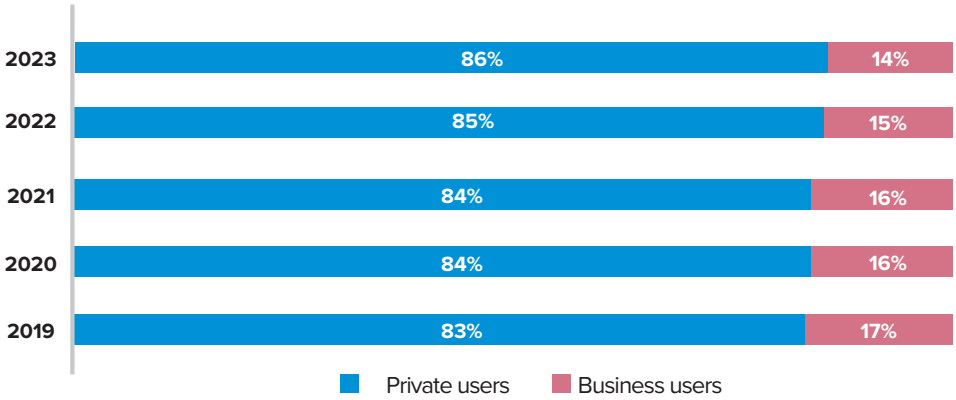
Figure 7.10. Structure of revenues made from fixed broadband, by type of access



Source: RATEL

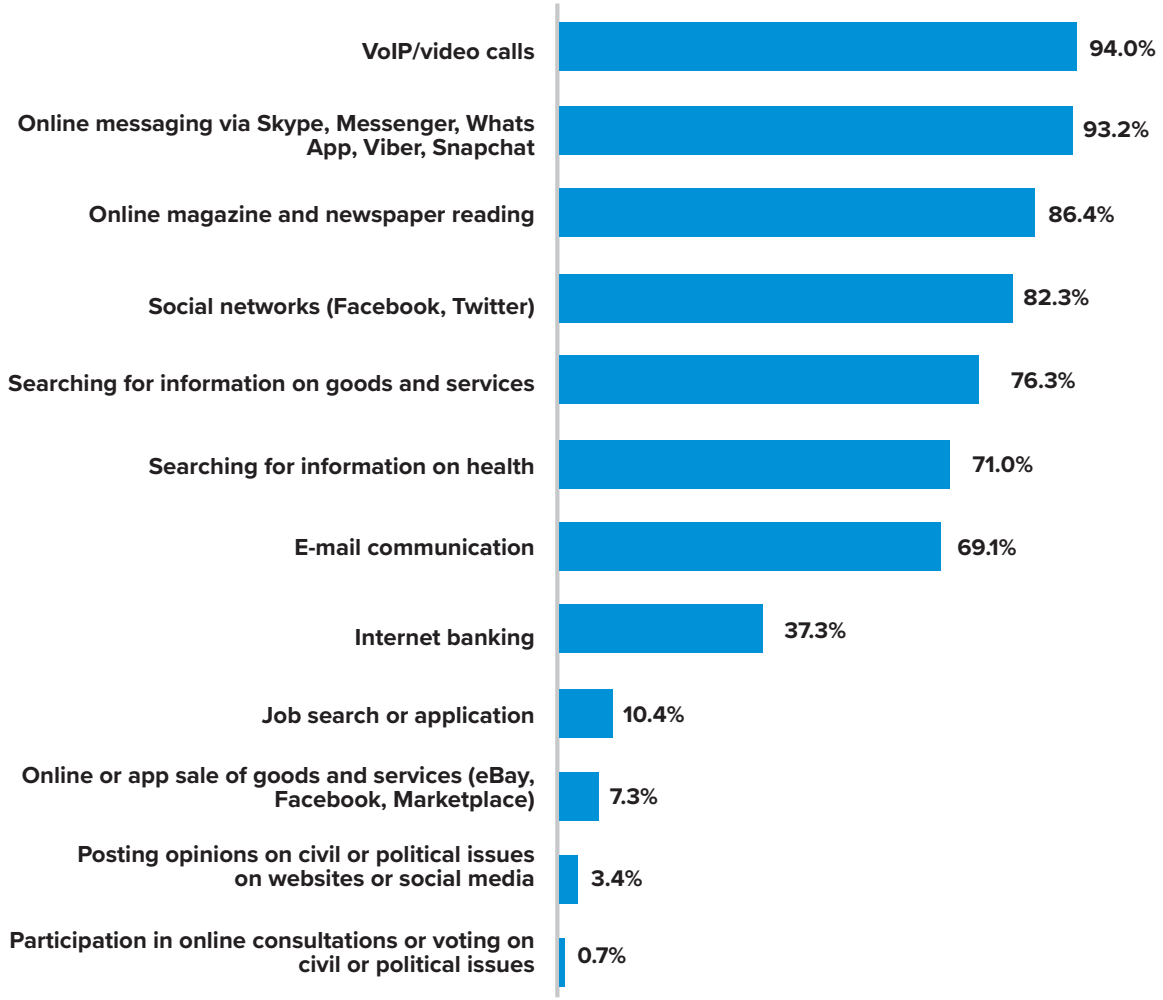
The revenues from fixed broadband access provision to business users had a similar distribution as in the previous years, corresponding to 14% of the total revenues in 2023. The share of private and business users in the total revenues made in the past 5 years is illustrated in Figure 7.11.

Figure 7.11. Share of private and business users in the total revenues made from fixed broadband Internet service



Source: RATEL

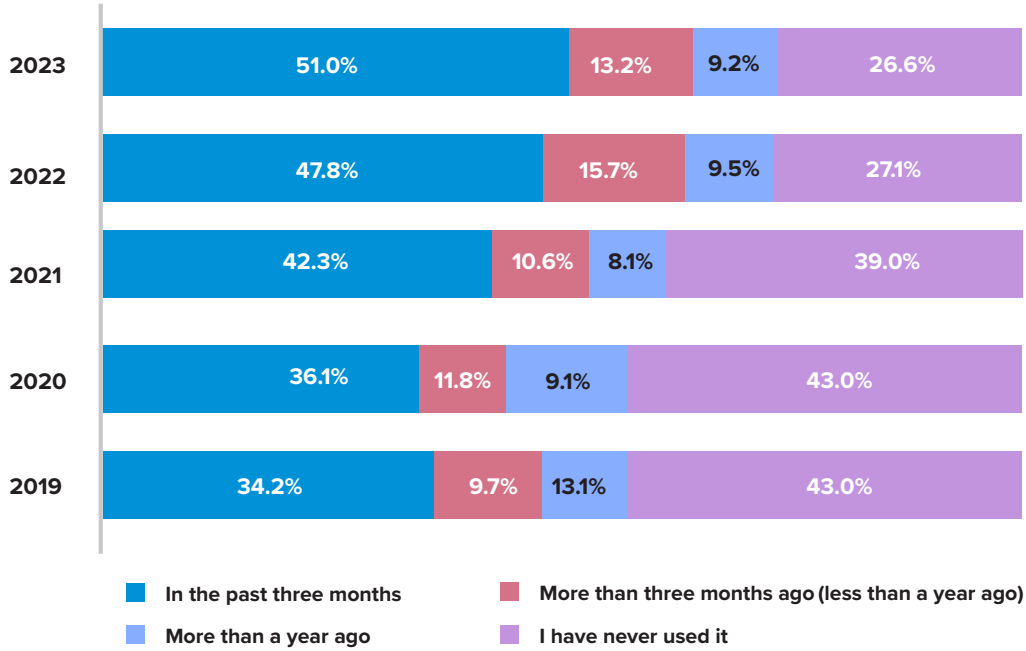
Figure 7.9. Types of Internet Use for Personal Purposes



Source: Statistical Office of the Republic of Serbia

The technological developments are changing user habits. Online purchase of goods and/or services has been steadily growing over the past years. The growth trend continued in 2023 and the changes in the habits of individuals regarding online purchases over the last 5 years can be seen in Figure 7.13.

Figure 7.13. Ordering/purchasing goods or services online



Source: Statistical Office of the Republic of Serbia

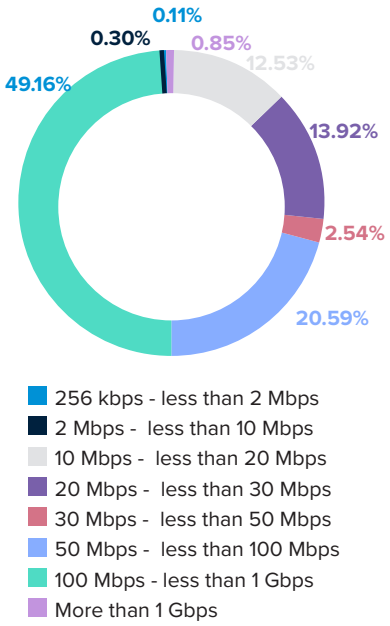
Due to the fact that the number of fixed broadband users has significantly increased over the past years and that fixed broadband can considerably differ in terms of speed, the quality and the functionality if the Internet access can also differ. Changes in user habits, increased number of users accessing video streaming services, along with the increase in the number of devices used to simultaneously access the Internet have resulted in the change of the package structure and the increase in the traffic volume.

As for fixed broadband access, Internet packages offering 20 Mbps speed were the most sold in 2023, at the price ranging between 800 RSD and 2,849 RSD.

The average monthly bill amount for fixed broadband Internet access in 2023 was 1,407 RSD for private users and 3,931 RSD for business users. For the sake of comparison, in 2022 the monthly bill amounted to 1,372 RSD for private users and 3,931 RSD for business users.

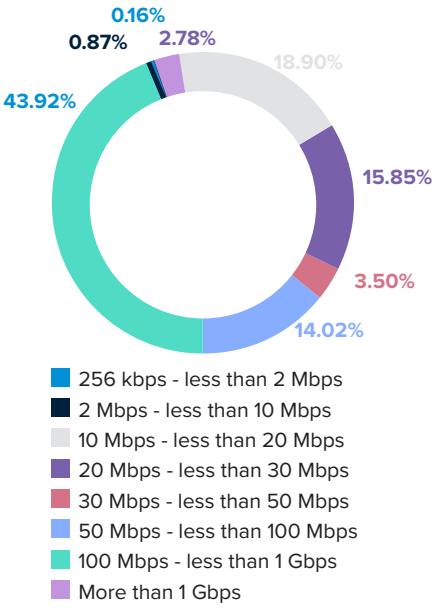
The distinction between fixed broadband Internet access rates and the display of this indicator help understand the digital divide, so that the data on the number of subscribers and the speeds they use help create and introduce regulatory measures

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



Source: RATEL

Figure 7.15. Share of fixed broadband business subscribers, according to access rate



Source: RATEL

targeted at bridging the digital divide. According to the available data, there is an increasing demand for high-speed packages on fixed broadband market, with the fastest growing trend being the need for access rates over 100 Mbps. Out of the total number of fixed broadband subscribers in 2023, the share of those using Internet packages with speeds over 100 Mbps was approximately 49%. This trend can be explained both by the operators' desire to use their VHCN (Very High Capacity Network) networks as well as by an ever growing demand trend for various services (such as OTT, online video games and similar) requiring for their operation higher access speeds and better quality parameters provided by VHCN networks (latency, jitter, packet loss).

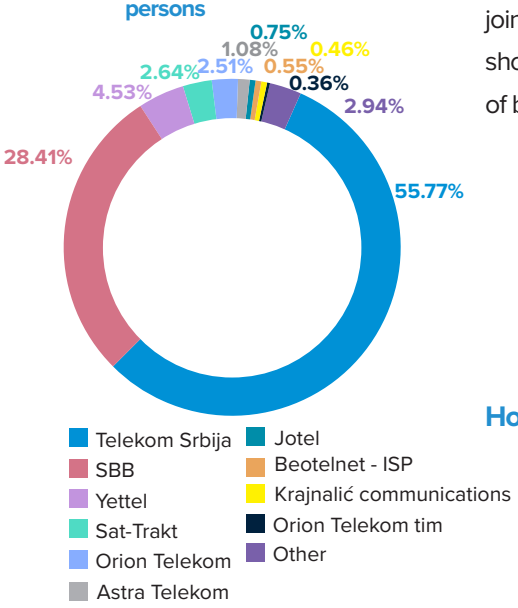
As for business users, the Internet connection speed defined under the contract closed between a company and an ISP is given in Figure Figure 7.15.

Out of the total number of companies with Internet connection, 85.1% have their own website, most usually offering the description of goods or services and featuring the price list (86.2%), providing customized content to regular visitors (63%) and enabling the visitors to personalize or design products and services (56%). Social networks are increasingly present in businesses' operations as well. In 2023, more than 53% of the companies used social networks for their business operations (such as Facebook, LinkedIn, Xing, Yammer). The share of companies that pay for cloud services in order to use software, data storage and similar, was 37%. Cloud services are located on the provider's servers and can be used at the subscriber's request, and are paid for based on the used space capacity, i.e. 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 or company, resulted in the increased traffic volume. Based on the available data, the assessed total traffic made by fixed broadband in 2023 was around 4.26 EB. The average international link capacity usage was approximately 1.75 million Mb/s, while the leased international link capacity (lit/equipped) was assessed to be around 7 million Mb/s.

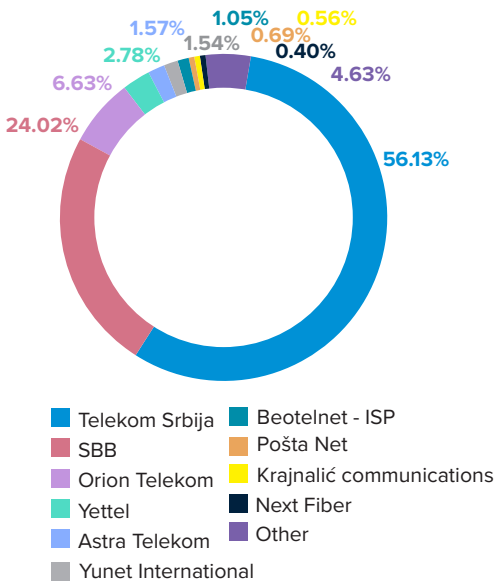
The biggest fixed broadband Internet provider in the Republic of Serbia in 2023 is still Telekom Srbija JSC, with a 55.79% market share, followed by SBB LLC, with market share of 28.1%, followed by Yettel LLC, Orion telekom LLC, Sat-Trakt LLC, Astra telekom LLC, Jotel LLC, BeotelNet-ISP LLC, Krajnalić Communications LLC and Yunet

Figure 7.16. Market share of leading operators of fixed broadband Internet access in 2023 – natural persons



Source: RATEL

Figure 7.17. Market share of leading operators of fixed broadband Internet access in 2023 – legal persons

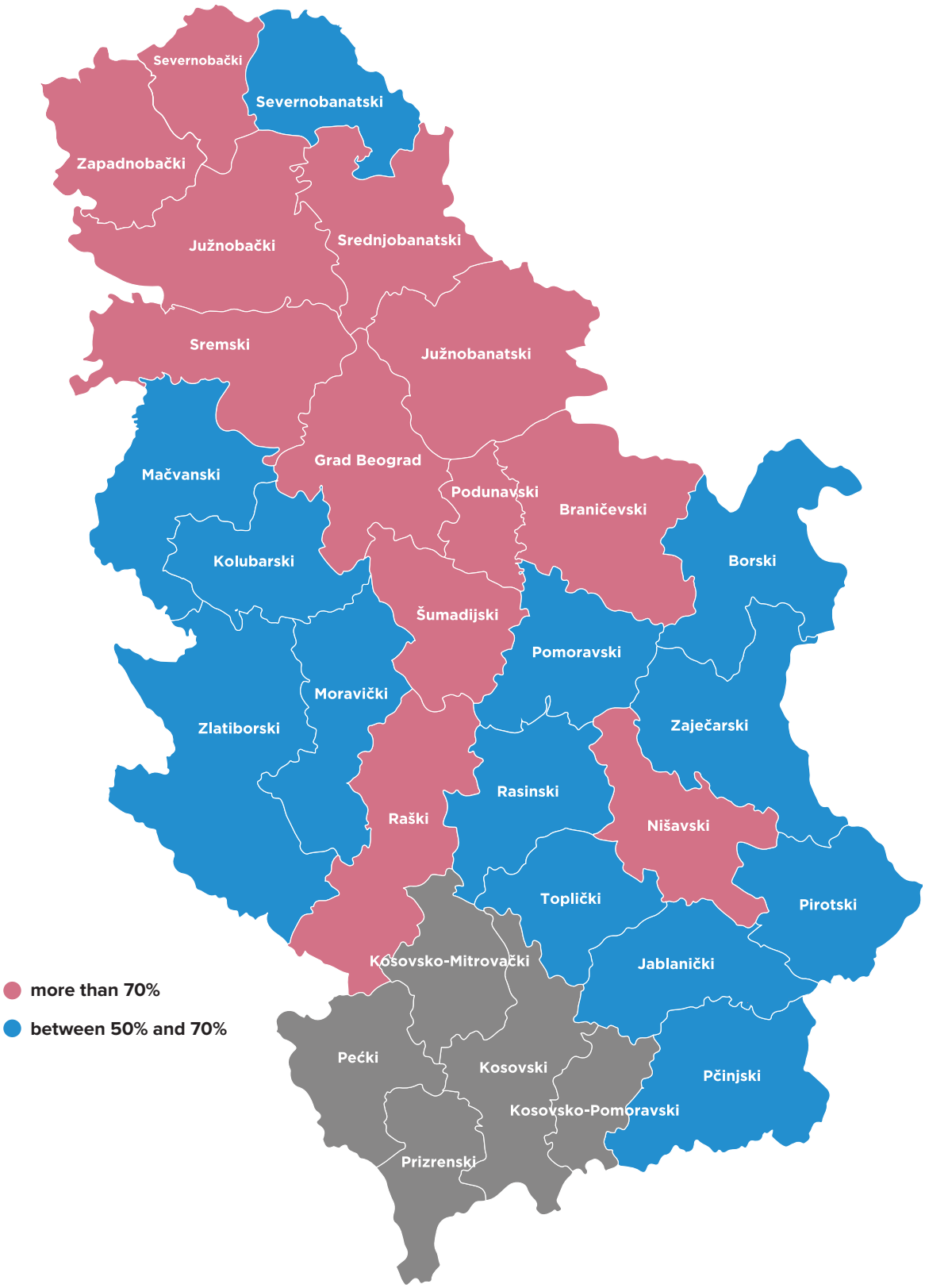


Source: RATEL

International LLC, each of them holding a significantly smaller share than Telekom Srbija JSC and SBB LLC. In terms of the number of subscribers, these 10 operators jointly account for 96.8% of Serbian broadband Internet market. Figures 7.16. and 7.17. show market shares of leading fixed broadband Internet providers in 2023, in terms of both natural and legal persons.

Household Internet penetration rate by districts

DISTRICT	PENETRATION (%)
City of Beograd	109.77
Južnobački district	99.67
Sremski district	80.30
Južnobanatski district	79.01
Srednjobanatski district	74.84
Šumadijski district	74.62
Raški district	73.82
Severnobački district	73.76
Nišavski district	72.54
Podunavski district	71.16
Braničevski district	70.11
Pomoravski district	69.65
Mačvanski district	69.18
Kolubarski district	66.71
Rasinski district	65.71
Zapadnobački district	65.05
Moravički district	63.71
Pčinjski district	61.89
Zlatiborski district	59.49
Borski district	58.02
Severnobanatski district	56.04
Pirotski district	53.42
Jablanički district	52.38
Zaječarski district	50.76
Toplički district	50.43


Severnobački
Severnobanatski
Zapadnobački
Južnobački
Srednjobanatski
Sremski
Južnobanatski
Mačvanski
Grad Beograd
Podunavski
Braničevski
Borski
Kolubarski
Šumadijski
Pomoravski
Moravički
Zaječarski
Zlatiborski
Rasinski
Raški
Nišavski
Toplički
Pirotski
Kosovsko-Mitrovački
Jablanički
Pećki
Kosovski
Pčinjski
Kosovsko-Pomoravski
Prizrenski
more than 70%
between 50% and 70%

List of 10 municipalities/cities with the largest Internet penetration rate

MUNICIPALITY	PENETRATION (%)
Čajetina	178.91
Novi Sad	126.35
Beograd	109.77
Pančevo	100.62
Požarevac	92.16
Šabac	87.79
Stara Pazova	87.35
Niš	86.90
Kragujevac	86.47
Zrenjanin	85.97

Municipalities with Internet penetration rate below 20%

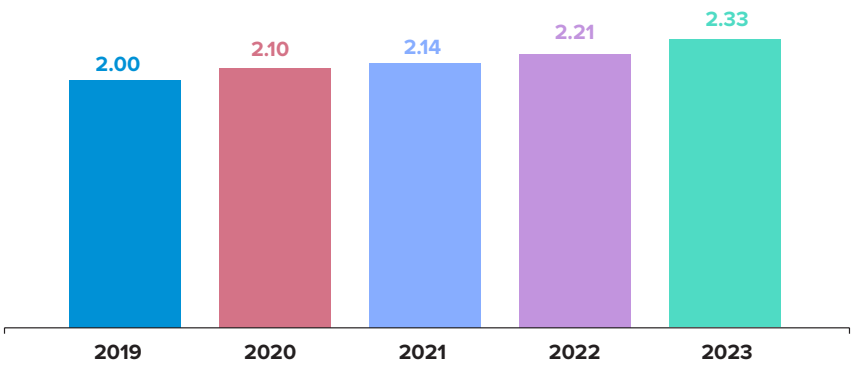
MUNICIPALITY	PENETRATION (%)
Kučevo	13.05
Bosilegrad	12.06
Trgovište	11.60
Crna Trava	10.33

8 MEDIA CONTENT DISTRIBUTION

In 2023, there were 41 registered media content distribution (MCD) operators providing the service via cable distribution network (coaxial, hybrid and optical), copper pair network, satellite distribution network and wireless network. Since 2016, another media content distribution service has been available on the market – paid terrestrial television, broadcast via the network of terrestrial transmitters in the DVB-T2 standard, which requires an indoor antenna and a set-top box. In 2023, the provision of this service in the Serbian market was carried out by Telekom Srbija j.s.c.

The total number of subscribers of the media content distribution service in 2023 was 2.33 million, which is an increase by 5.2% compared to the previous year, mostly due to the surge of the IPTV and Internet media content distribution number of subscribers. Approximately 1.72 million subscribers used the service of media content distribution within a package (bundled service), usually combined with broadband access and/or fixed telephony.

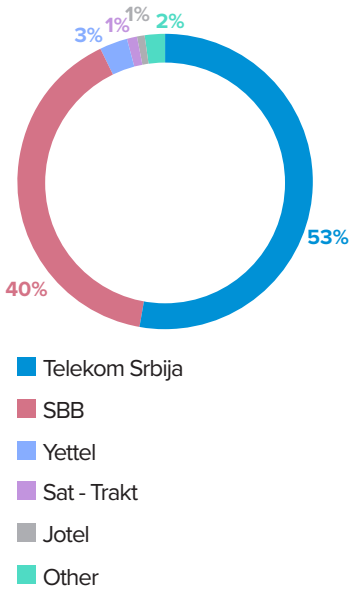
Figure 8.1. Total number of subscribers (in million)



Source: RATEL

The penetration was 35.10% in terms of population and 90.02% in terms of the total number of households.

Figure 8.3. Market share of leading operators in 2023



Source: RATEL

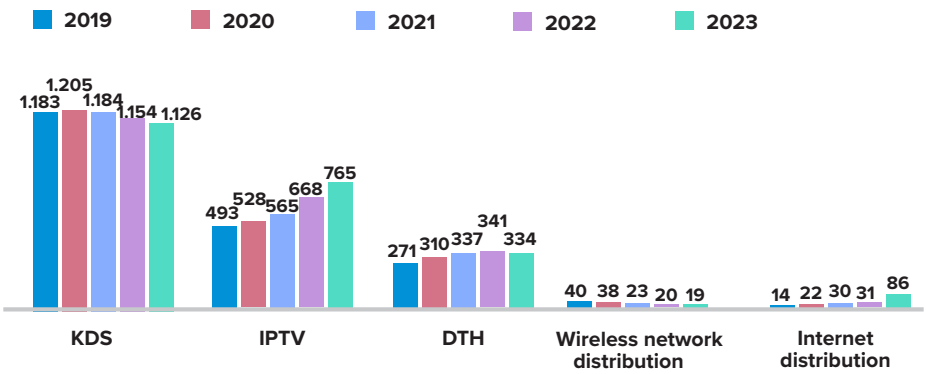
Figure 8.2. Household penetration (in %)

Source: RATEL

The largest MCD operator in the Republic of Serbia in 2023 was Telekom Srbija, Joint Stock Company, with a market share of 53%, in terms of the number of subscribers. Serbia Broadband – Srpske kablovske mreže Ltd. (SBB Ltd.), accounted for around 40% of the market share in 2023. Together with Yettel LLC and Sat-Trakt LLC, they accounted for a market share of 97% pertaining to media content distribution, in terms of the number of subscribers.

Media content distribution via cable distribution systems (CATV) remains dominant in 2023, with around 1.12 million subscribers, which is a decrease by approximately 2.5% compared to the year before. The number of IPTV subscribers rose by approximately 14% compared to the previous year, whereas the number of DTH subscribers via satellite network dropped by 2%. The number of media content distribution subscribers via wireless network continues to drop in 2023, amounting to approximately 19 thousand, whereas the number of MCD subscribers via Internet marks a significant increase, amounting to approximately 86 thousand.

Figure 8.4. Subscribers of dominant media content ditribution types (in thousand)

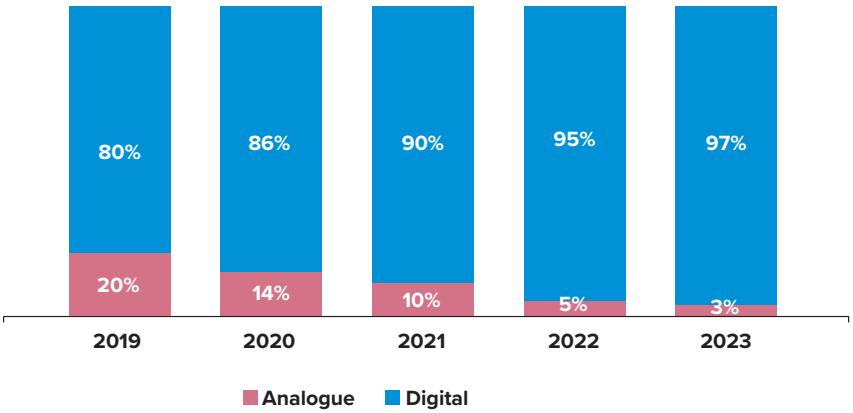


Source: RATEL

The share of subscribers by dominant media content ditribution types has not changed substantively during 2023 for the most widely used technologies, while the shares of other types of distribution increased slightly, from 2.3% to 4.5%. In particular, these are the subscribers using the distribution via Internet, and they have more than doubled their share compared to the year before, amounting to 3.7%, whereas wireless network subscribers slightly decreased from 0.9% to 0.8%. Pay TV, present on the market since 2016, had around 9 thousand subscribers in 2023.

In 2023, as much as 97% of the total number of CATV subscribers followed the media content in digital format, which means that the users' preferences have changed, and that the digitalization of cable networks is in its full development. Digital cable distribution enables users to watch the content in high resolution (HD), and to have many additional services available. In addition, analogue to digital distribution switchover is encouraged by diverse promotional activities offered by the operators.

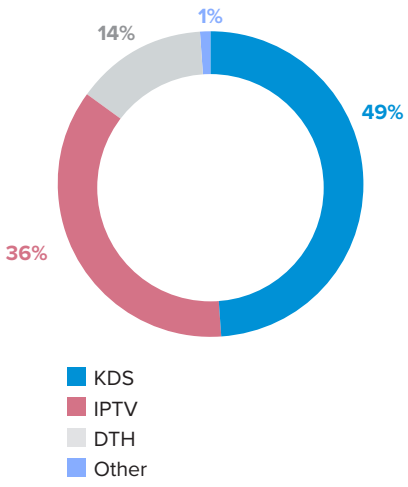
Figure 8.5. Distribution of CATV subscribers



Source: RATEL

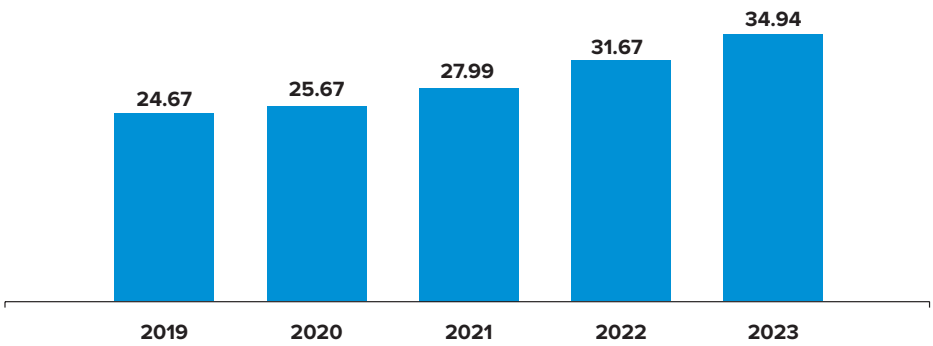
The total income of media content distribution operators in 2023 amounted to 34.94 billion dinars, which is by around 10% more compared to the previous year.

Figure 8.7. Structure of revenues from media content distribution in 2023



Source: RATEL

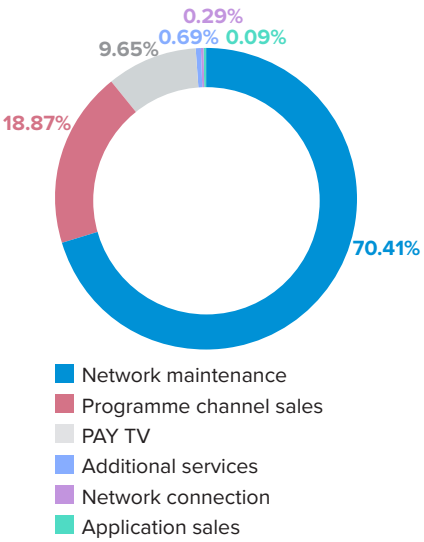
Figure 8.6. Revenue trends on media content distribution market (in billion dinars)



Source: RATEL

CATV accounts for the biggest share in the revenues from the media content distribution in 2023 (around 49%), followed by IPTV (36%) which grew compared to the year before, with DTH (14%) approximately at the same level as in the previous year. Other revenues in the observed market (revenues from distribution via Internet and from distribution via wireless network including revenues from paid terrestrial television) participate with a little over 1%.

Figure 8.8. Share of revenues from media content distribution in 2023

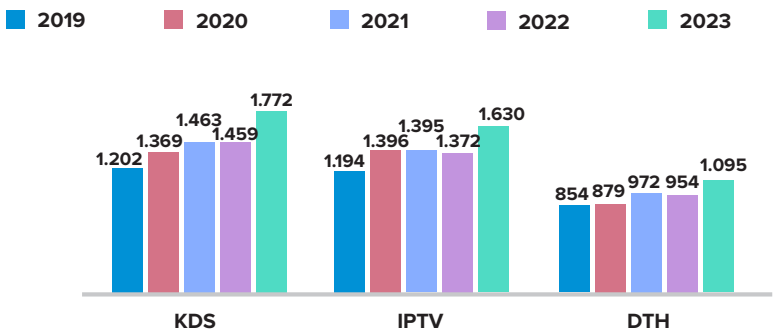


Source: RATEL

The revenues from the network maintenance and revenues from programme channels sales, which is the income made by selling own programme channels to other operators, account for approximately 90% of the total income, as shown in Figure 8.8. Revenues made from additional PAY TV service make up around 9% of the total revenues. Network connection charges account for 0.29% of the total revenues in 2023, resulting from the trend where most operators do not charge this service to new users during promotional offers or in case of a 12-month/24-month contract. Additional service income includes revenues from services such as video on demand, rewind service, programme recordings service etc, which have altogether accounted for 0.69% of the total revenues in 2023. Revenues pertaining to the sale of TV watching app refer to the application that is sold independently from the distribution service without a user agreement, account for 0.09%, a rather negligible portion of the total income.

In 2023, the average monthly subscription was 961 dinars for basic analogue CATV package, and it 1794 dinars for digital CATV. The average subscription for basic IPTV package has increased compared to the previous year, amounting to 1630 dinars, whereas the average monthly subscription for DTH is 1095 dinars, marking a growth compared to the year before.

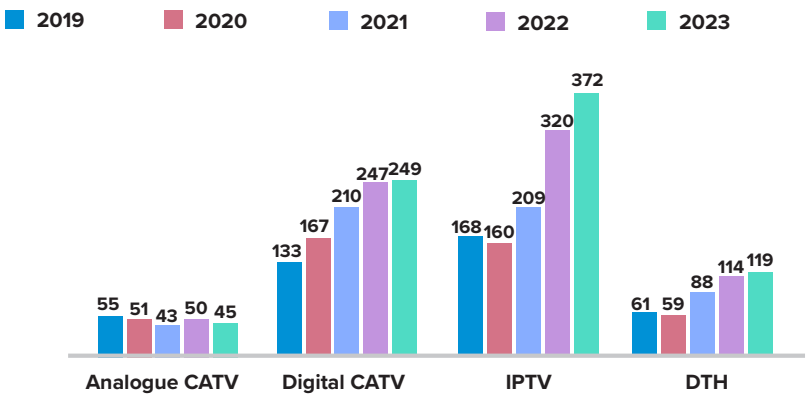
Figure 8.9. Average monthly subscription for basic package of dominant types of distribution (in dinars)



Source: RATEL

The average number of TV programmes in the basic package in 2023, for different types of distribution, ranged from 45 in case of analogue CATV to 372 in case of IPTV. A big disproportion remains between the number of basic package programmes for the analogue and those for the digital CATV, which is one of the means operators use to encourage subscribers to switch to the digital distribution of media content.

Figure 8.10. Average number of TV programs in basic package of dominant types of distribution



Source: RATEL

In addition to basic package programs included in monthly subscriptions, users can opt for extra, usually thematic, channels subject to additional subscription. These programme packages, in addition to the standard programme plan included in the subscription, contain additional educational, sports, film and other additional HD programmes. According to the available data, in 2023, these programmes were followed by more than 654 thousand subscribers.

Beside the extra channels, additional services available to the subscribers of digital CATV and IPTV include VoD (video on demand), rewind service, recording of the content, interactive TV guide, parental control, watching content on mobile devices and other. According to the available data, in 2023, 1.8 million subscribers used additional services and with more than 1.7 billion requests for an additional service (almost 1000 requests annually per subscriber), where more than 46 million requests involved Video on Demand (VoD), which is around 25 requests per subscriber annually.

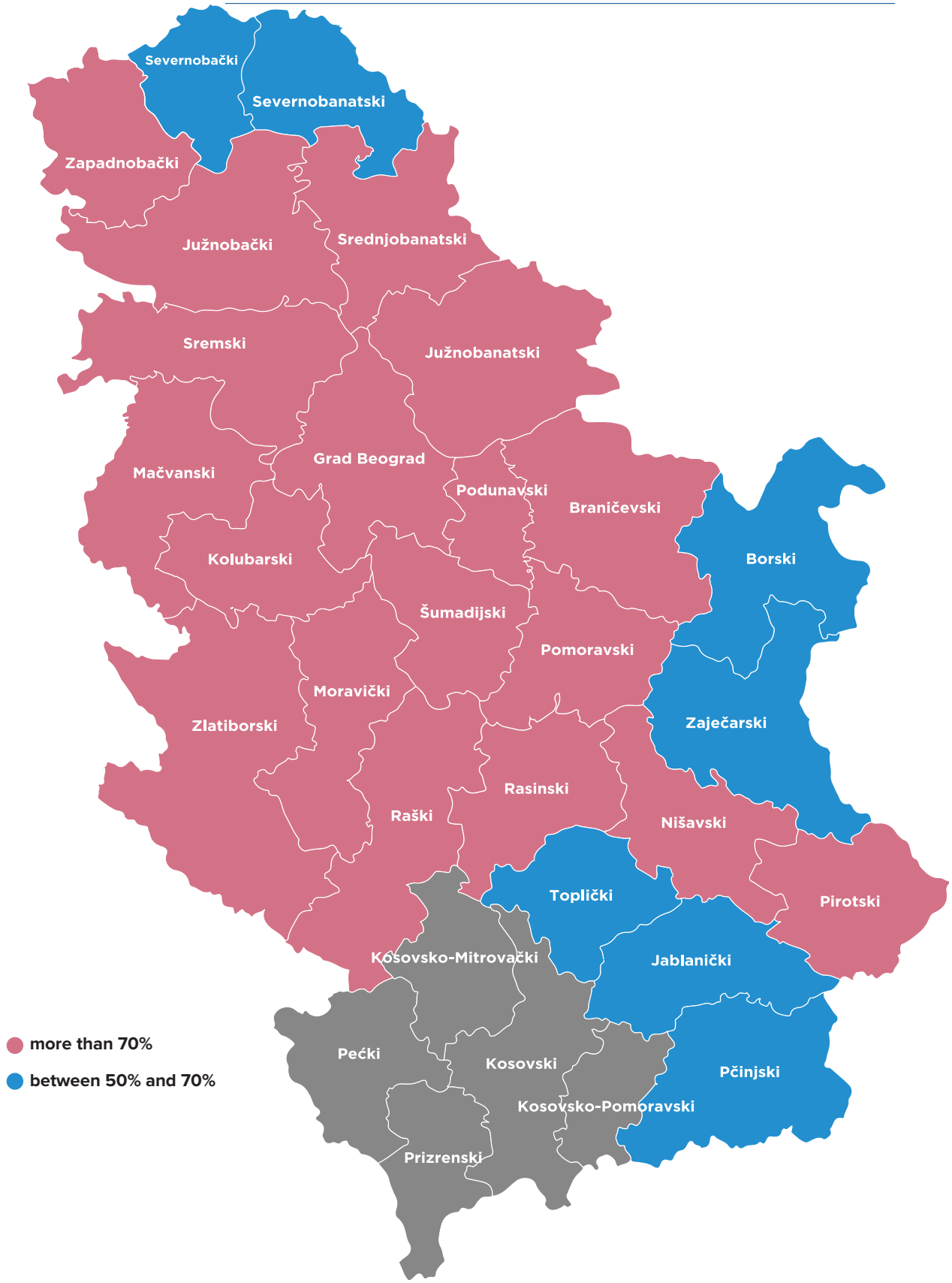
In order for the MCD subscriber to be able to follow media content in digital format (regardless of the type of distribution service network, such as cable, telephony, wireless) on more TV devices, an additional set-top box is required for each device, which is charged separately. During 2023, around 604 thousand subscribers rented additional receivers.

In addition to the distribution service, some TV content is available on mobile devices through different apps, without having to connect to the distribution network or to

close a subscriber contract with an operator. The user of the app does not pay for a monthly subscription, instead, the app is usually activated by an SMS charged at a predefined rate. This rate is, in fact, the fee for the usage of the application during a specific, usually shorter, period.

Penetration of media content distribution service per household by districts

DISTRICT	PENETRATION (%)
City of Belgrade	120.27
Južnobački district	105.89
Sremski district	93.35
Braničevski district	87.20
Šumadijski district	89.58
Kolubarski district	87.57
Južnobanatski district	84.25
Srednjobanatski district	82.11
Podunavski district	82.00
Raški district	86.08
Nišavski district	79.18
Pomoravski district	78.76
Mačvanski district	81.46
Rasinski district	79.32
Zlatiborski district	79.73
Moravički district	80.08
Zapadnobački district	72.63
Pčinjski district	69.39
Pirotski district	73.00
Zaječarski district	68.68
Borski district	67.59
Severnobački district	69.86
Jablanički district	63.36
Toplički district	57.98
Severnobanatski district	53.99


Severnobački
Severnobanatski
Zapadnobački
Južnobački
Srednjobanatski
Sremski
Južnobanatski
Mačvanski
Grad Beograd
Podunavski
Braničevski
Borski
Kolubarski
Šumadijski
Pomoravski
Moravički
Zaječarski
Zlatiborski
Rasinski
Raški
Nišavski
Toplički
Pirotski
Kosovsko-Mitrovački
Jablanički
Pećki
Kosovski
Pčinjski
Kosovsko-Pomoravski
Prizrenski
more than 70%
between 50% and 70%

10 municipalities/cities with the highest MCD service penetration rate

MUNICIPALITY	PENETRATION (%)
Čajetina	226.75
Novi Sad city	130.76
Beograd city	120.27
Veliko Gradište	107.38
Vrnjačka Banja	105.93
Stara Pazova	103.17
Dimitrovgrad	102.94
Požarevac city	101.95
Raška	101.08
Kragujevac	100.19

Municipalities with penetration of MCD service under 20%

MUNICIPALITY	PENETRATION (%)
Bosilegrad	17.17

9 BUNDLED SERVICES

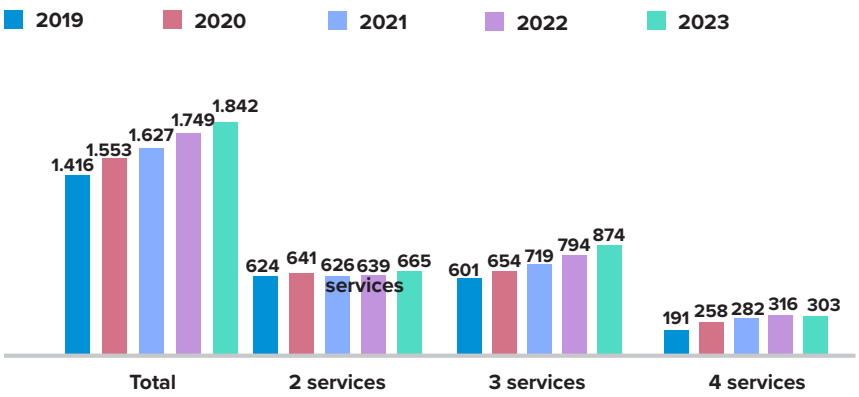
Bundled services are commercial offers of two or more services at a flat rate, which is lower than the sum of individual prices for each of the services. In the electronic communications market, service packages (bundled services) are the result of the horizontal integration, enabling the operators to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

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

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

Based on the available data, in the market of the Republic of Serbia, bundled services are offered by 31 operators, out of which 12 operators offer 3-service packages, whereas 4-service packages are offered by one operator. The total number of bundled service subscribers in 2023 was around 1.84 million, which is an increase of 5% compared to the year before. The triple-play package subscribers account for the growth by 10%, and those of of double-play service packages by 4% compared to 2022. The number of 4-service subscribers dropped by 4% in 2023.

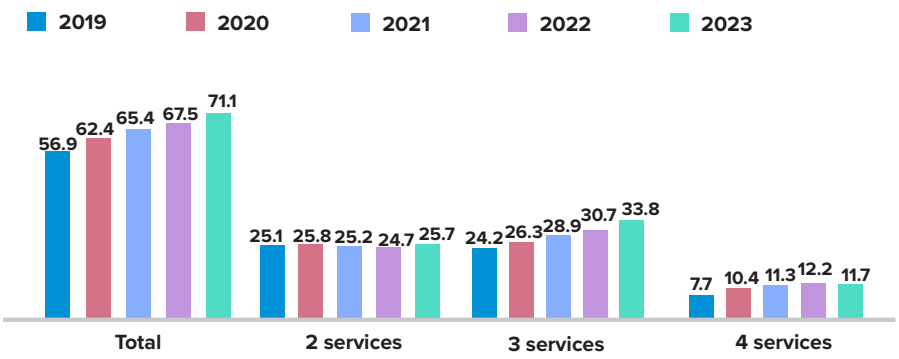
Figure 9.1. Number of bundled service subscribers (in thousand)



Source: RATEL

In 2023, the penetration of bundled services by the number of households was around 71%.

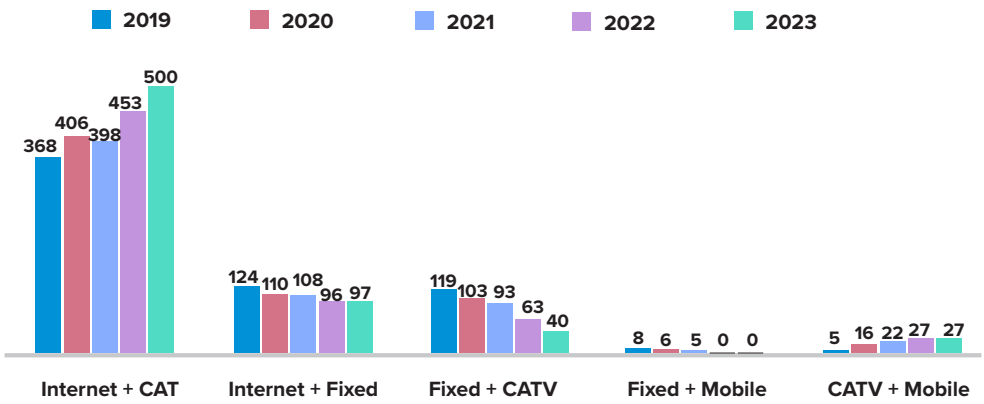
Figure 9.2. Bundled service penetration by the number of households (%)



Source: RATEL

The majority of 2-service package subscribers used bundled services 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 2023 the number of subscribers of broadband Internet access and media content distribution increased (by 10%), while the number of subscribers of packages including fixed telephony and media content distribution decreased (by 36%). The number of subscribers of the broadband Internet and fixed telephony package slightly augmented (by 1%). The number of subscribers of packages with mobile telephony remains low.

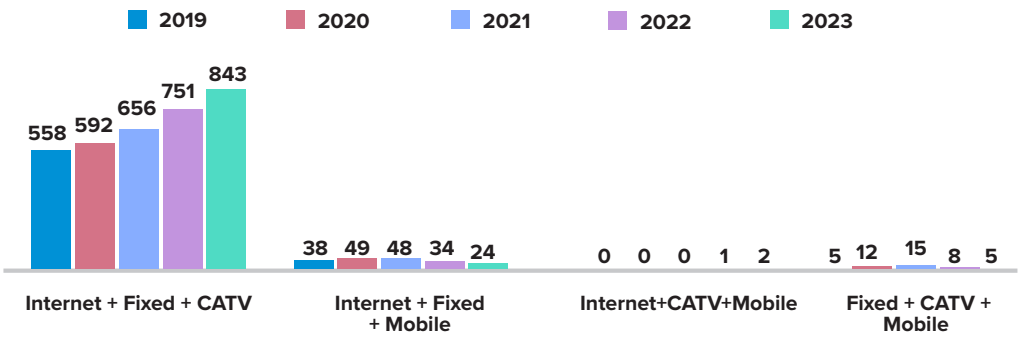
Figure 9.3. Number of 2-service package subscribers (in thousand)



Source: RATEL

The best selling 3-service package is a bundled service including broadband Internet access, fixed telephony and media content distribution, with a 12% increase in the number of subscribers. The package containing broadband Internet access, fixed and mobile telephony has seen a drop by 30%, as well as the 3-service package offering fixed telephony, media content distribution and mobile telephony, present on the market since 2016, which continued to drop in 2023, amounting to aproximately 4,000. A bundle consisting of broadband Internet, media content distribution and mobile telephony has been available since 2022.

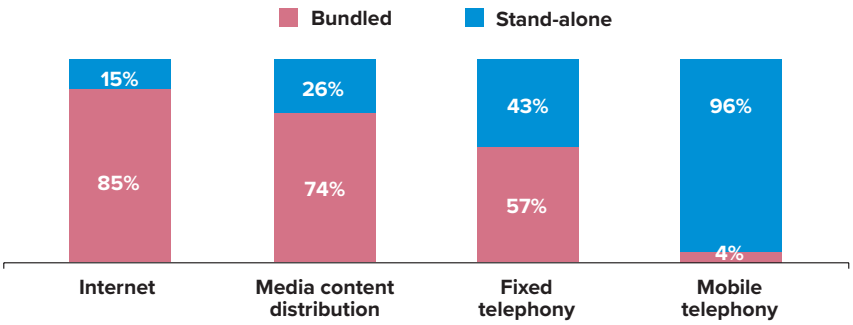
Figure 9.4. Number of 3-service package subscribers (in thousand)



Source: RATEL

Compared with the previous year, the number of subscribers purchasing broadband Internet access, media content distribution and fixed telephony as bundled service, has marked a remarkable increase, while the situation regarding the mobile telephony service has not changed significantly. The best-selling service within the package is still that of broadband Internet access, used in bundled mode by over 1.76 million subscribers in 2023. It is followed by the service of media content distribution, used in package by more than half of its subscribers (around 1.72 million), while the least purchased bundled service is mobile telephony.

Slika 9.5. Share of stand-alone and bundled services subscribers in 2023

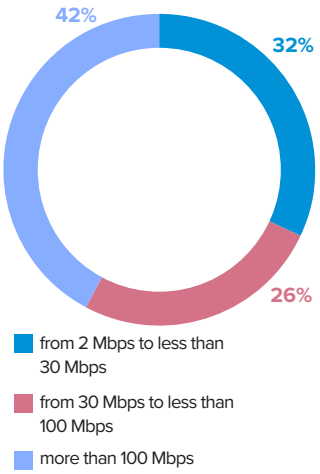


Source: RATEL

In the majority of cases, subscribers purchase the service of broadband Internet access from the same operator providing media content distribution or fixed telephony. For that reason, broadband Internet is usually purchased within a package, since the subscribers benefit from the opportunity to pay less and have easier registration and billing procedures (for example, instead of several subscriber agreements for each individual service they purchase, only one package contract is signed with the operator, and instead of various separate bills for each individual service, only one bill for the bundle is received , etc.).

Within the best selling 2-service and 3-service packages in 2023, containing broadband Internet access service, as much as 42% of the subscribers opted for the Internet speed over 100 Mbps. Within the package containing broadband Internet access and media content distribution services, around 80% of the subscribers opted for the above rate, whereas 47% 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, almost 43% of the subscribers used the Internet rate from 2 Mbps to less than 30 Mbps.

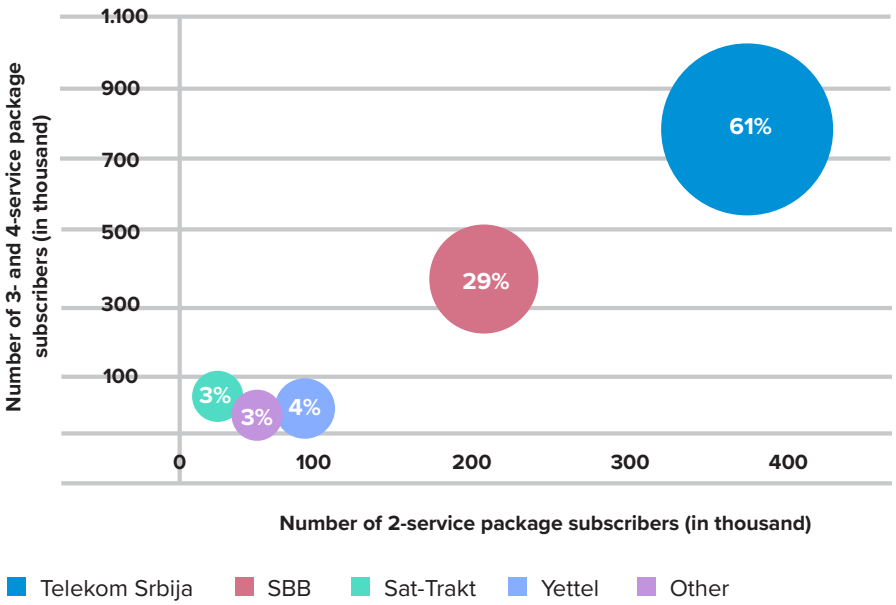
Figure 9.6. Subscribers of best-selling service packages by Internet speed in 2023



Source: RATEL

The majority of the operators on the market act individually, offering in their packages the services they already provide to their subscribers. There are certain forms of joint offers on the market of the Republic of Serbia, designed to offer services otherwise absent from regular operators' offers, but those include separate subscriber agreements and separate bills for end-users, so they cannot be considered bundled services. The share of operators measured by the number of bundled service subscribers is shown in Figure 9.7.

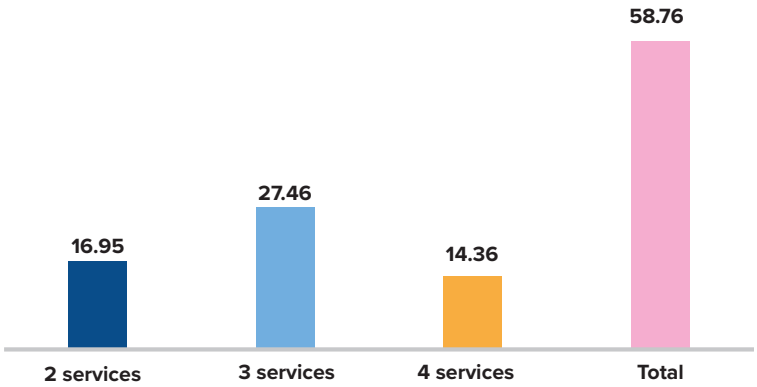
Figure 9.7. Share of operators by the number of bundled service subscribers in 2023



Source: RATEL

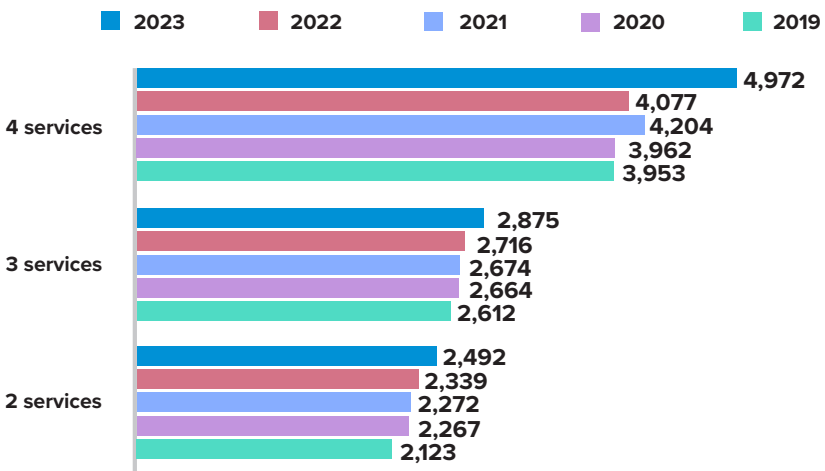
From the sale of bundled services in 2023, the operators earned more than 58.8 billion dinars, the most of which (around 27.5 billion dinars) was generated from the sale of triple-play bundles, while the sale of quad-play packages accounted for the smallest income share (around 14.4 billion dinars).

Figure 9.8. Earned income from bundled service sales in 2023 (in billion dinars)



Monthly subscriptions for the bestselling packages in 2023 range between 1.690 dinars for the cheapest package up to 5,499 dinars for the most expensive one, depending on the operator and the package content, and are on the rise compared to those of the year before. Operators often offer bundled services at promotional prices, which are considerably lower than the regular ones, for a limited period, with a 12 or 24-month contract. Monthly subscriptions differ depending on the program package (basic channel package, additional services, additional media content), Internet speed, free minutes in fixed telephony and a mobile telephony package included in the bundled service. The average bestselling bundled services subscription amounts in the Republic of Serbia are shown in Figure 9.9.

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



Source: RATEL

10

VALUE ADDED SERVICES AND MESSAGING SERVICES

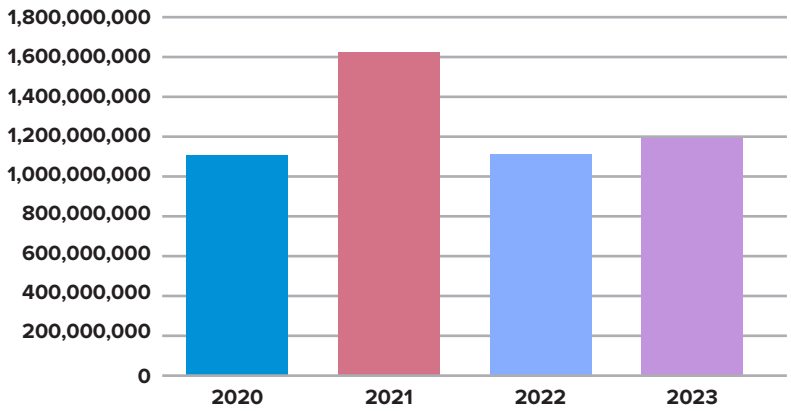
The Law on Electronic Communications and Rulebook on general terms and conditions for electronic communication activity ("Official Gazette of RS", No. 38/11) have created administrative possibility for messaging and value-added service (VAS) providers to be registered in the register of operators managed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

In 2023, there were 40 operators in the register of public communication networks and services registered for value added service provision, most of them also being registered for message transmission service. These operators provide services through fixed and mobile network operators, the users of these networks being able to access value added services by means of public numbering (090Xabcdef and 0780abcdef) for value added voice transmission and internal numbering of mobile operators for value added messaging (SMS, MMS).

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

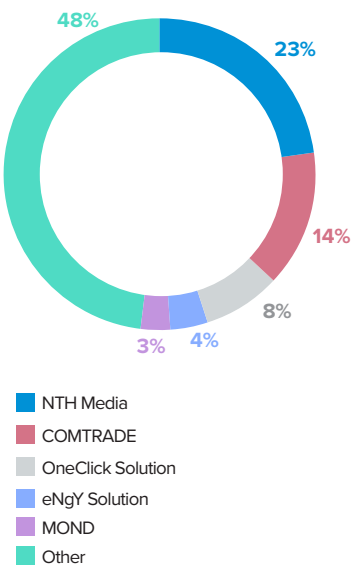
Annual revenues for the period 2020-2023 pertaining to the above services are given in Figure 10.1. The service provision accounts for the total income of 1.111 to 1.619 billion dinars annually. In 2023, the revenues in this market, according to the data collected by RATEL, amounted to approximately 1.191 billion dinars, which means that the operators' income has increased by approximately 7% compared to the year before. It should be noted that part of the revenues from network usage, traffic billing and collecting is generated by network operators, based on commercial contracts between network operators and messaging and value-added service providers.

Figure 10.1. Annual revenues 2020-2023



According to the available data provided by the operators to RATEL, there were three providers with the largest revenues from the messaging and value-added service provision in 2023: NTH Media, COMTRADE and OneClick Solutions, taking up totally 44% of the VAS market share.

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



Source: RATEL

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

Around 93% of the total revenues made by the operators in 2023 are revenues from messaging service (SMS, MMS) and VAS messaging, and the rest of the income comes from voice VAS. The technology that enables easier and better data processing for SMS and MMS, the expansion of direct electronic marketing and electronic and mobile payment have in the recent period led to a significant increase in the revenues made from messaging and value-added services and to a simultaneous drop in the revenues from VAS voice transmission services, with the income share steadily setting in during the recent years. In addition, the large-scale usage of smart phone devices made the users lose interest in VAS by voice transmission or SMS messaging, which particularly affects voice VAS.

Figure 10.3. Market share by type of VAS and revenues made in 2020, 2021, 2022 and 2023

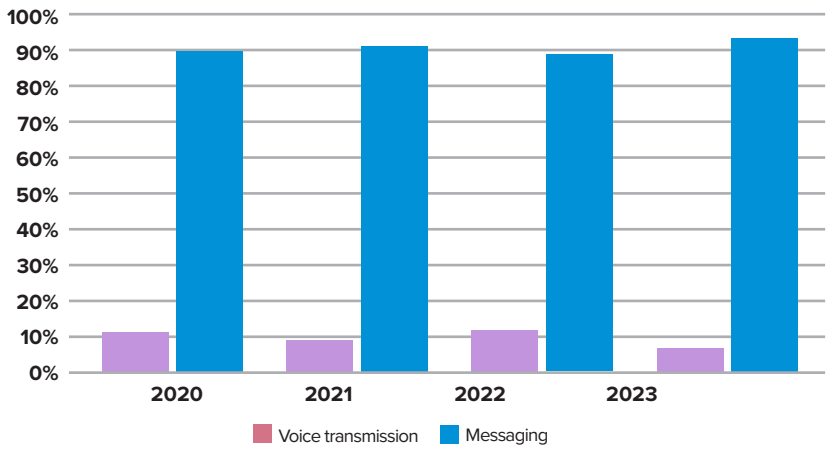
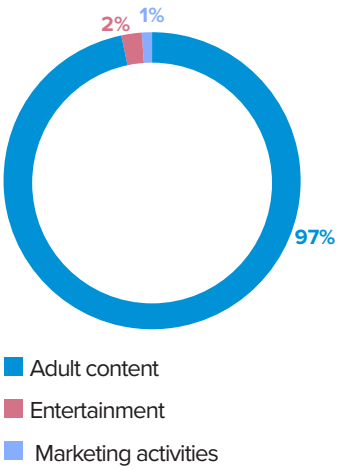


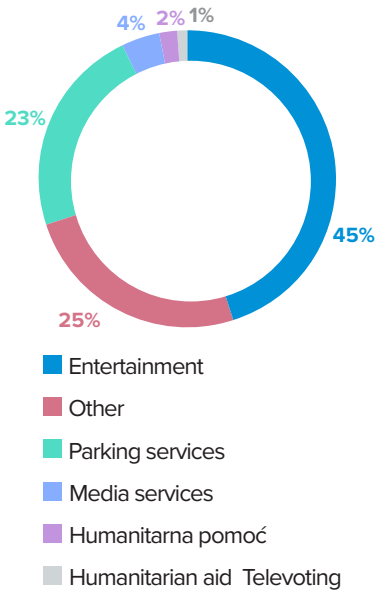
Figure 10.4. Share of realized minutes by type of voice VAS in 2023



For the purpose of VAS voice transmission, the operators were assigned 340 numbers, which is 40 numbers less than the previous year.

In 2023, the voice value added service provision accounted for approximately 32.768 million minutes of traffic, and the share by type of voice VAS is given in Figure 10.4

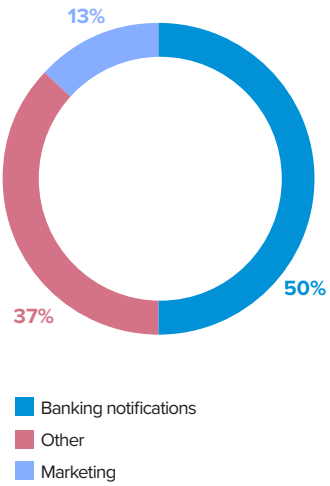
Figure 10.5. Share of realized VAS messages by purpose in 2023



In 2023, the volume of bulk message transmission and VAS message transmission was 1.060 billion messages, 91% of which account for bulk messages, and 9% for VAS messages.

The share of realized VAS messages by purpose is shown in Figure 10.5, with 45% of the messages belonging to the category “Entertainment“, which is a continuation of the trend of the year before, resulting from the fact that messages from the “Other” category are more and more transferred via smartphone applications, rather than via SMS and MMS messages.

Figure 10.6. Share of realized messages by purpose for message transmission in 2023



The share of realized bulk messages by purpose is shown in Figure 10.6. Their number grew by 46% in comparison to the year before, mostly in the category „Other“ (by 36%).

Revenues from voice VAS transmission amount to approximately 81 million dinars, with the shares by purpose being shown in Figure 10.7.

Revenues from message service transmission (bulk messages) and VAS messages amount to approximately 1.1 billion dinars, 55% of which account for the income from bulk message transmission and the rest from VAS message transmission. This change in the ratio of realized revenues compared to the year before is due to a drastic surge of bulk messages in the category „Other“.

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 10.7. Share of voice VAS revenues by purpose in 2023

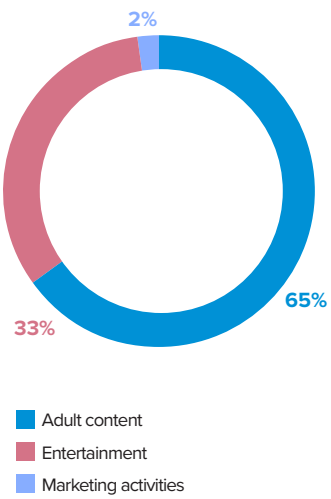


Figure 10.8. Share of VAS transmission revenues by purpose in 2023

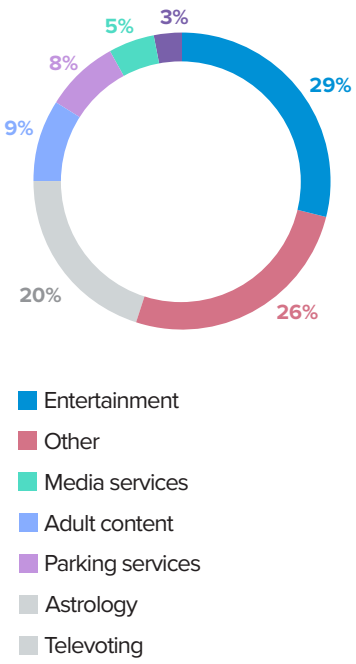
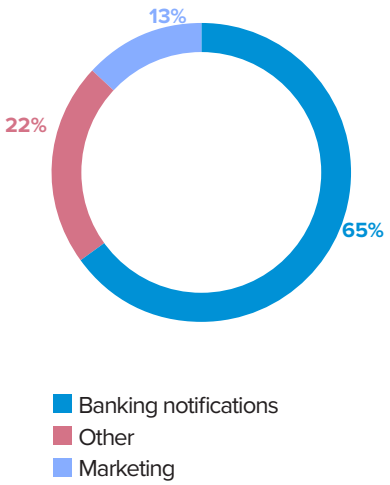


Figure 10.9. Share of message transmission revenues by purpose in 2023



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 communications services, measurements and testing, and on the assessment of the practices of electronic communication operators ("Official Gazette" of RS, No. 23/23).

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

- public voice service on the fixed network,
- public voice service on the public mobile communications network at a fixed location,
- public voice service and transmission of data on the public mobile communications network,
- Internet access and Internet services on the fixed communications network at a fixed location,
- media content distribution on the fixed network;

The electronic communication operators are required to provide, at least once a year, a report on the values of the quality parameters of electronic communication services, on appropriate forms for each service. The Regulator also monitors the operators' provision of electronic communication services and performs measurements and probes of the activity of public electronic communication networks and services, 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.

The Regulator maintains an up-to-date database on the quality of the public communication services. In addition, the providers of publicly available electronic communication services are required, pursuant to Article 126 of the Law on electronic communications, to provide the end-users with information which specifically includes the minimum quality of service provision, to the extent of the offer.

The reports on the values of quality parameters for electronic communication services and networks for the previous year were submitted to the Regulator by the operators within the prescribed delay, before March 15, 2024.

11.1 Average values of quality parameters for electronic communication services for the period January – December 2023

A total of 8 requested and legally obliged operators submitted their reports for 2023. Those are the providers that, pursuant to the Rulebook, have more than a 2% subscriber share of the particular service on the market of the Republic of Serbia, as well as those requested by the Regulator: Telekom Srbija, A1 Srbija, Orion Telekom, YETTEL, SAT-TRAKT, Astra Telekom, SBB, JOTEL. Further below is shown the value statistics of the selected electronic communication service quality parameters.

Average supply time for electronic communications services

For all electronic communications services, the average time from the moment of a valid service order being received to the moment a working service is activated, was less than 4.12 days, which is within prescribed limits, for 95% new connections during the year.

Table 11.1. Average supply time for service

	Prescribed value	2023
Public voice service on the fixed network	≤10 days for 95% of new connections a year	4.12
Internet access and Internet services on the fixed communications network at a fixed location	8 days for more than 95% requests	3.17
Media content distribution on the fixed network	8 days for more than 95% requests	3.18

Customer complaints about quality of electronic communications services

During 2023, the highest percentage of users' complaints about quality of electronic communications services was 11.94% and it referred to media content distribution on the fixed network, with the lowest percentage of complaints being 0.4% for public voice service and transmission of data on the public mobile communications network. The time needed for the resolution of users' complaints (applicable for 80% of the complaints) was around 1 day for all services, except for Internet access and Internet services, amounting to 4.24 days and needs to be shortened.

Table 11.2. Users' complaints and complaint resolution

		Prescribed value	2023
Public voice service on the fixed network	Precentage of users' complaints	0.5%	1.92%
	Resolution time for user complaints for 80% of complaints (days)	10.0	0.83
	Percentage of corrected bills	≤1%	0.83%
Public voice service and transmission of data on the public mobile communications network	Precentage of users' complaints	-	0.4%
	Percentage of corrected bills	≤1%	0.11%
Internet access and Internet services on the fixed communications network at a fixed location	Precentage of users' complaints	-	7.97%
	Resolution time for user complaints (days)	>80% a day	4.24
	Percentage of corrected bills	≤1%	0.54%
Media content distribution on the fixed network	Precentage of users' complaints	-	11.94%
	Resolution time for user complaints (days)	5 days for 95% of complaints	1
	Percentage of corrected bills	≤1%	1.04%

Parameters of operator's contact services

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

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

	2023
Public voice service on the fixed network	33s
Public voice service on the public mobile communications network at a fixed location	80s
Public voice service and transmission of data on the public mobile communications network	54s
Internet access and Internet services on the fixed communications network at a fixed location	67s
Media content distribution on the fixed network	67s

Quality parameters for public voice service on the fixed network

The ratio of all unsuccessful calls comprising the percentage of unsuccessful national calls in fixed network within and outside of the local exchange, percentage of unsuccessful national calls from fixed network to mobile operators and other fixed operators, as well as percentage of unsuccessful international calls was 0.8%, the value being in prescribed limits, as was average supply time for calls.

Table 11.4. Quality parameters for public voice service on the fixed network

	Parameter definition	Prescribed value	2023
Unsuccessful call ratio (all calls)	**Percentage of call attempts to an existing user which failed due to system failure or incorrectly dimensioned bundles. The case where the called party (B-Number) is busy or not responding is not regarded as a failed call**	**≤1%**	**0.8%**
Supply time for call (average time for national calls)	**Time between selecting the last digit of the subscriber's number and call verification signal**	**<3s**	**2.5s**

Quality parameters for services on the public mobile communications network

Three operators have provided reports including quality parameters for public services on the public mobile communications network:

- Telekom Srbija,
- YETTEL,
- A1 Srbija,

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 2023, in the period 11-15 December, 2023.

Table 11.5. Quality parameters for public voice service and transmission of data on the public mobile communications network

	Parameter definition	Prescribed value	2023
Call Setup Success Rate for mobile network	CSSR=(successful call attempts/all call attempts)*100	> 98% na nivou mreže	99.81%
Call Drop Rate for mobile network	CDR=(irregularly dropped calls/successful call attempts)*100	<2%	0.2%
Telephony Setup Time	Time for connection setup from the moment user activates sending function	E.771	2.93s
Data transfer rate from network toward user (DL)	Average application throughput toward user (DL)	> 4 Mb/s	43.88 Mb/s
Data transfer rate from user toward network (UL)	Average application throughput from user (UL)	1Mb/s	8.56 Mb/s

11.2 Benchmarking of mobile communications networks

(Comparative measurement and analysis of quality parameters of mobile communications network services)

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

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

The manner of the commercial benchmarking measurement performance is dependent on the specific contractor and methodology. Unlike mobile operators which perform internal benchmarking campaigns based on their own criteria, RATEL measurements are carried out in accordance with technical recommendation (ETSI) TR 103 559 Annex A of ETSI (European Telecommunications Standards Institute).

The use of this methodology has enabled standardized measurement and scoring of the achieved results. The crucial KPIs pertaining to the most important mobile telephony services are measured, weighted and finally added into the result which realistically reflects how the end-user experiences the network performance. Additionally, the measurements are mutually comparable and the results not to depend on the contractor performing the testing.
RATEL, in 2023, carried out the benchmarking measurements in a drivetest form, using two vehicles moving on the pre-defined routes, and in a walktest form, at ten hot-spot locations in Belgrade, Novi Sad and Niš, as well as along main rail corridors X and XI.

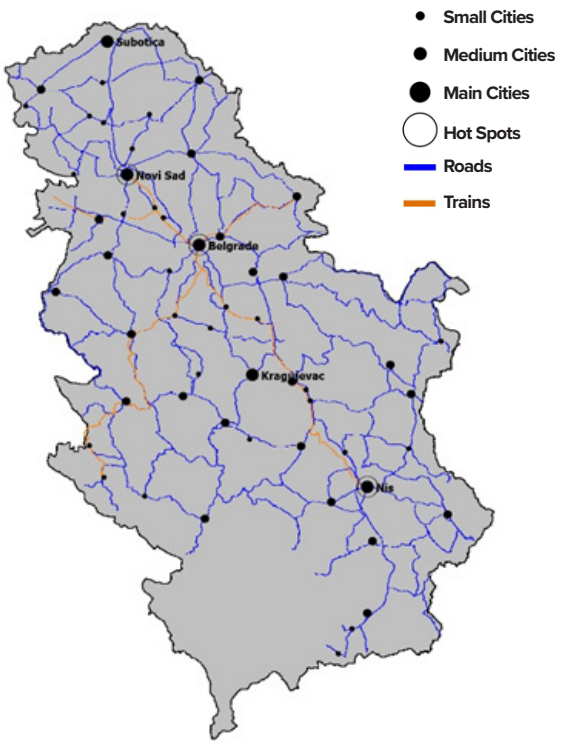
Benchmarking measurements were carried out in 55 cities, along 17,000 km of roads and 1600 km of railroads in the Republic of Serbia. During the campaign, more than 9,000 calls and 7,000 sessions for each data transfer service on all mobile networks and using all available technologies (2G, 3G, 4G) were performed.

The measurements included:
• radio parameter measurements for 2G/3G/4G technologies,
• testing of KPIs for voice service and data transfer service.

In 2023, the measurements were extended compared to the year before. The benchmark comprised measurements in the form of drive tests, at hot-spot locations (such as squares, promenades, shopping malls, airport) and the railway, which made this campaign in the Republic of Serbia (without AP Kosovo and Metohija), strictly categorized, in line with recommendation ETSI 103 559 (Annex A). The map of routes used for measurements is shown in Figure 11.1.

Since the benchmarking of mobile networks was carried out in October and November of 2023, the measured and calculated values of quality parameters, including final results, refer only to that period.

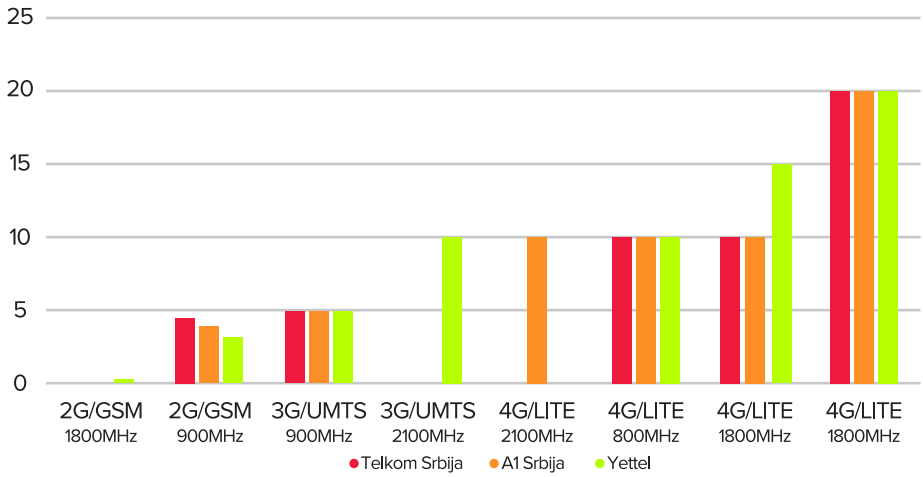
Figure 11.1. Map of measurement routes



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

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

Figure 11.2. Radio frequency bands used by operators during benchmarking campaign



2G/GSM: All three operators used radio frequency band 900 MHz. Additionally, Yettel used radio frequency band 1800 MHz to a lesser extent.
3G/UMTS: Radio frequency band 2100 MHz was used by A1 Srbija nad Telekom Srbija throughout the country, with Yettel using it only across some smaller areas. 900 MHz was used by Yettel on the whole territory and by Telekom Srbija and A1 Srbija only in some smaller areas.

4G/LTE: Radio frequency bands 800 MHz, 1800 MHz and 2100 MHz were used by all three operators. In cities and on roads, all three operators mostly used LTE-3/4CA, with A1 Srbija using up to 4CA, which allowed for a total of 50 MHz of the available bandwidth. Telekom Srbija and Yettel used LTE-3CA with an available throughput of 40 MHz and 45MHz, respectively. Also, Yettel used LTE 2100 MHz on one of two available throughputs, 10MHz or 15MHz, on channel 525.

The use of Carrier Aggregation (CA) depends on the network configuration and quantity of the data sent during the test. In cities, in 97% of cases, the operators used LTE CA. On highways, LTE CA was most used by Telekom Srbija with almost 99%, followed by A1 Srbija with 96% and lastly Yettel with 94%. Along main roads, Telekom Srbija, with 92%, used LTE CA most, A1 Srbija came in second with 90% and Yettel last with almost 58%. Along rural roads, the LTE CA usage was the least, with 76% for A1 Srbija, 75% for Telekom Srbija and 48% for Yettel.

Mobile network benchmarking results 2023

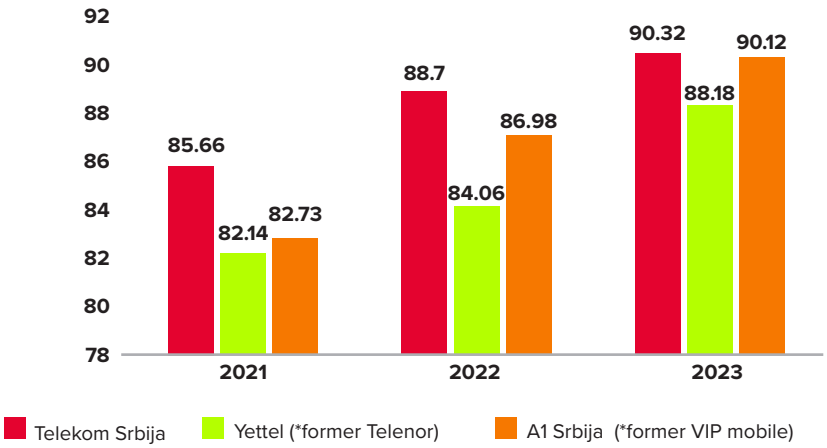
Telekom Srbija had the best total score of 90.32 points (out of possible 100), followed by A1 Srbija with 90.12 points (out of possible 100) and Yettel with 88.17 points (out of possible 100).The slight difference in the final score values between Telekom Srbija and A1 Srbija points to a similar level of the quality of services provided to users.

The achieved results of all three operators reflect an improved quality of service in mobile networks compared to 2022. The biggest progress was made by Yettel, by more than 4 points. A1 Srbija improved its result by more than 3 points, and Telekom Srbija by 1.61 points in the final scoring, compared to the year before.

Telekom Srbija achieved the best results along main and rural roads, as well as on rail corridors. A1 Srbija had the best results in cities.
All three mobile operators achieved satisfactory KPI (Key Performance Indicator) values on voice service tests in almost all aggregations. All mobile operators had lower voice service quality along railway corridors than in other aggregations, suggesting that the operators should work on the improvement of this aggregation's quality of service.

Telekom Srbija achieved the best results for the majority of data transmission services (transfer of WhatsApp messages, web browsing, YouTube). A1 Srbija had the best results for data transmission tests (small and large files). Both operators scored between 55% and 60% of the maximum number of points on these tests. Yettel underperformed, mostly due to undesirable results during data transmission testing.

Figure 11.3. Comparison of final results by year



For the assessment of the overall performance and mobile network ranking, 5 main types of services were tested, namely:

- Voice service, acounting for 40% of the total result
- Data transmission services, accounting for 60% of the total result, divided in the following subcategories:
  - Web browsing, accounting for 22.80% of the total result
  - Data transfer service, accounting for 15% of the total result
  - YouTube, accounting for 13.20% of the total result
  - WhatsApp messages, accounting for 9% of the total result.

The tests are carried out in various categories. According to ETSI TR 103 559 Anex A, there are three main categories, divided further into subcategories:

Cities:
- Main cities
- Medium cities
- Small cities

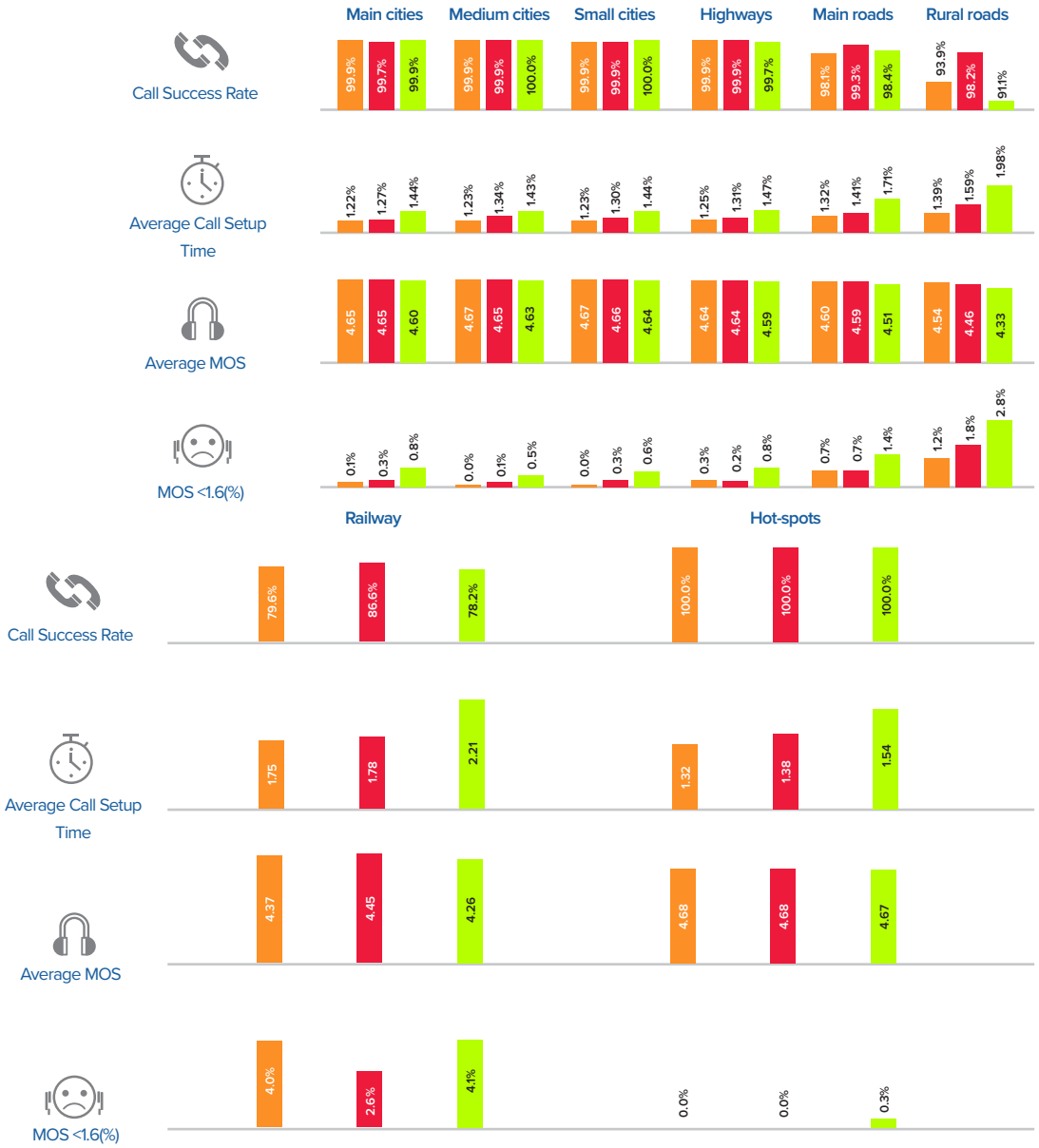
Roads:
- Highways
- Main roads
- Rural roads

Complementary areas:
- Rail corridors
- Hotspots

Voice service tests

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

Figure 11.4. Voice service testing results



In main cities, all operators achieved excellent successful call rates. Telekom Srbija and A1 Srbija had the shortest average call setup time, as well as almost maximum voice signal quality (MOS), with Yettel slightly lagging behing.

In medium cities, all operators achieved excellent successful call rates. A1 Srbija had the shortest average call setup time, as well as almost maximum voice signal quality (MOS). It is followed by Telekom Srbija and Yettel.

In small cities, all operators had excellent successful call rates. A1 Srbija achieved slightly better results for average call setup time and voice signal quality (MOS), compared to Telekom Srbija and Yettel.
On highways, successful call rate values were excellent for all three operators. A1 Srbija had the shortest average call setup time. The best voice signal quality (MOS) were achieved by A1 Srbija and Telekom Srbija, with Yettel slightly lagging behing.

On main roads, the biggest percentage of successful call rates was reached by Telekom Srbija. A1 Srbija had the shortest average call setup time, followed by Telekom Srbija and Yettel. Telekom Srbija and A1 Srbija had similar voice signal quality (MOS), somewhat higher than Yettel's.

On rural roads, the biggest percentage of successful call rates was achieved by Telekom Srbija. As expected, MOS parameter values were below other aggregations'. A1 Srbija had higher MOS parameter values and the shortest average call setup time compared to the competition.

Along rail corridors, Telekom Srbija had the biggest percentage of successful call rates, followed by A1 Srbija and Yettel. Overall, this parameter was lower than in other aggregations, moslty due to tunnels and mountain areas. All three operators achieved high percentage of dropped calls. This aggregation is the most challenging due to its poor service availability and reliability. Yettel had the highest call drop rate, more than 5%, A1 Srbija the lowest (3.7%), with Telekom Srbija in the middle (3.9%).

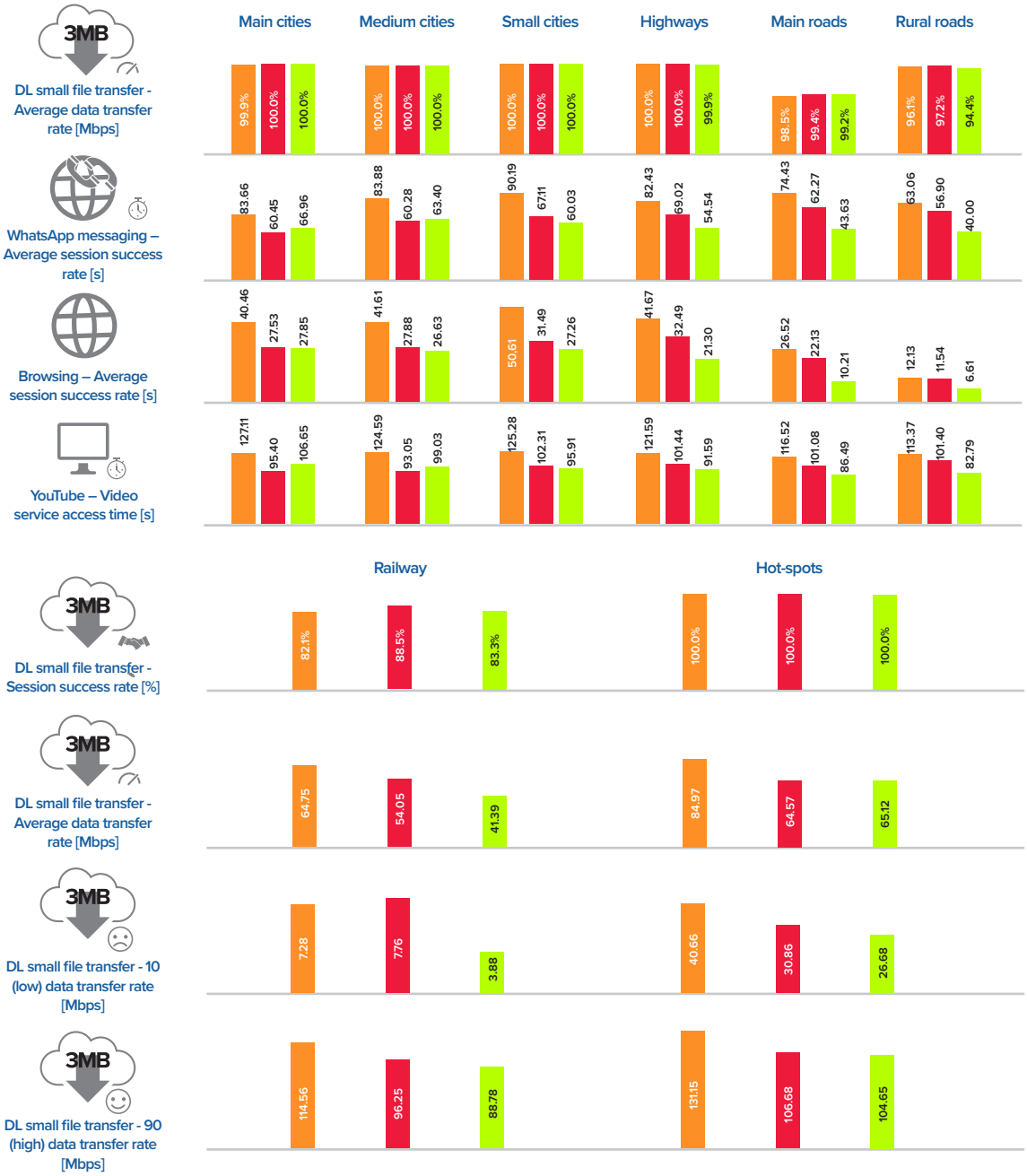
At hot-spot locations, all operators had excellent successful call rates. Overall, A1 Srbija achieved the shortest average call setup time, followed by Telekom Srbija, and then by Yettel. All operators reached similar voice signal quality (MOS). There were no dropped or interrupted calls.

Data transfer tests

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

• Small file transfer – Download

Figure 11.5. Data transfer service testing results – Download



In main cities, all operators achieved high session success rate. A1 Srbija had the highest average data transfer rate. Yettel had the second best result, both according to the average data transfer rate and according to 10/90 data transfer rate. Telekom Srbija was slightly behind its competition.

In medium cities, all operators achieved high session success rate. A1 Srbija had the highest average data transfer rate, with Yettel coming in second and Telekom Srbija third. Telekom Srbija had slightly better 10th percent data transfer rate than Yettel.

In small cities, all operators had high session success rate. A1 Srbija achieved the highest average data transfer rate, followed byTelekom Srbija. Yettel had lower average data transfer rate and lower 10/90 data transfer rate compared to the competition.

On highways, all operators had a very good score of successful sessions, reaching a high average data transfer rate. The highest average data transfer rate was achieved by A1 Srbija, followed by Telekom Srbija. Yettel had lower average data transfer rate, as well as 10/90 data transfer rate compared to the competition.

Along main roads, Telekom Srbija achieved the highest session success rate, followed by A1 Srbija and Yettel, with A1 Srbija having the advantage both according to the average data transfer rate and 10/90 data transfer rate. Telekom Srbija came in second and Yettel last.

Along rural roads, Telekom Srbija had the highest session success rate, unlike A1 Srbija and Yettel, who achieved lower parameters on rural roads compared to other aggregations. However, A1 Srbija managed to score the best results in data transfer rate, followed by Telekom Srbija and Yettel.
Along rail corridors, Telekom Srbija achieved high session success rate, followed by A1 Srbija and Yettel. Overall, the rate of sucessful sessions was much lower than in other aggregations, due to tunnels and mountain areas, which contributed to the poor coverage. As for the average data transfer rate, A1 Srbija scored the best results.
At hot-spot locations, all operators had high session success rate. A1 Srbija achieved the highest average data transfer rate, followed by Yettel and Telekom Srbija.

• Small file transfer – Upload

Figure 11.6. Small file transfer – Upload

In main cities, all operators had extremely high, almost maximum session sucess rates. A1 Srbija achieved the shortest average session time, slightly shorter compared to Telekom Srbija, with Yettel behind the competition.

In medium cities, similar to main cities, all operators had extremely high, almost maximum session sucess rates. A1 Srbija achieved the shortest average session time, followed by Telekom Srbija. Yettel had longer average session time compared to the competition.

In small cities, all operators had extremely high, almost maximum session sucess rates. A1 Srbija achieved the shortest average session time, followed by Yettel and Telekom Srbija the longest average session time.

On highways, operators achieved almost maximum session sucess rates. Telekom Srbija had the shortest average session time, slightly behind it is A1 Srbija, with Yettel having longer average session time than the competition.

Along main roads, Telekom Srbija had the best session sucess rate, followed by A1 Srbija and Yettel. Telekom Srbija and A1 Srbija had shorter average session time compared to Yettel.

Along rural roads, Telekom Srbija had the highest percentage of successful sessions. For A1 Srbija and Yettel, this parameter was lower in rural areas in comparison with other aggregations. For that reason, both operators achieved longer average session time than Telekom Srbija.

Along rail corridors, the rate of sucessful sessions was much lower than in other aggregations, mostly due to tunnels and mountain areas, which contributed to the poor coverage. Telekom Srbija had the best best session sucess rate, followed by Yettel and A1 Srbija. VMOS was on the approximately same level for all operators. Telekom Srbija achieved the shortest access time.
At hot-spot locations, operators achieved almost maximum session sucess rates. VMOS was on the same level for all operators. Telekom Srbija achieved slightly shorter access time compared to the competition.

• Browsing

Figure 11.7. Browsing service testing results

In almost all categories, all three operators achieved very high session success rates, except along rural roads and rail corridors. The average session time parameter is better when time interval is shorter. The above Figure describes in detail the values of this parameter for all categories.

• YouTube video service

Figure 11.8. YouTube video service testing results

In main, medium and small cities and along highways, the percentage of successful sessions was very high for all three operators.

Along main roads, Telekom Srbija had the best session sucess rate, Yettel came in second, with A1 Srbija slightly behind. VMOS was on the approximately same level for all operators. Telekom Srbija achieved slightly shorter access time.
Along rural roads, Telekom Srbija achieved the highest percentage of successful sessions. For A1 Srbija and Yettel, this parameter was lower in rural areas in comparison with other aggregations. For that reason, both operators had significantly longer access time than Telekom Srbija.

Along rail corridors, the overall rate of sucessful sessions was much lower than in other aggregations, mostly due to tunnels and mountain areas, which contributed to the poor coverage. Telekom Srbija had the best best session sucess rate, followed by Yettel and A1 Srbija. VMOS was on the approximately same level for all operators. Telekom Srbija achieved the shortest access time.
At hot-spot locations, all operators had maximum session sucess rates. VMOS was on the same level for all operators. Telekom Srbija achieved slightly shorter access time compared to the competition.

• WhatsApp messaging

Slika 11.9. Rezultati testiranja WhatsApp poruka

In main cities, all operators had extremely high, almost maximum session sucess rates. A1 Srbija achieved the shortest average session time, slightly shorter compared to Telekom Srbija, with Yettel behind the competition.

In medium cities, similar to main cities, all operators had extremely high, almost maximum session sucess rates. A1 Srbija achieved the shortest average session time, followed by Telekom Srbija. Yettel had longer average session time compared to the competition.

In small cities, all operators had extremely high, almost maximum session sucess rates. A1 Srbija achieved the shortest average session time, followed by Yettel and Telekom Srbija the longest average session time.

On highways, operators achieved almost maximum session sucess rates. Telekom Srbija had the shortest average session time, slightly behind it is A1 Srbija, with Yettel having longer average session time than the competition.

Along main roads, Telekom Srbija had the best session sucess rate, followed by A1 Srbija and Yettel. Telekom Srbija and A1 Srbija had shorter average session time compared to Yettel.

Along rural roads, Telekom Srbija had the highest percentage of successful sessions. For A1 Srbija and Yettel, this parameter was lower in rural areas in comparison with other aggregations. For that reason, both operators achieved longer average session time compared to Telekom Srbija.

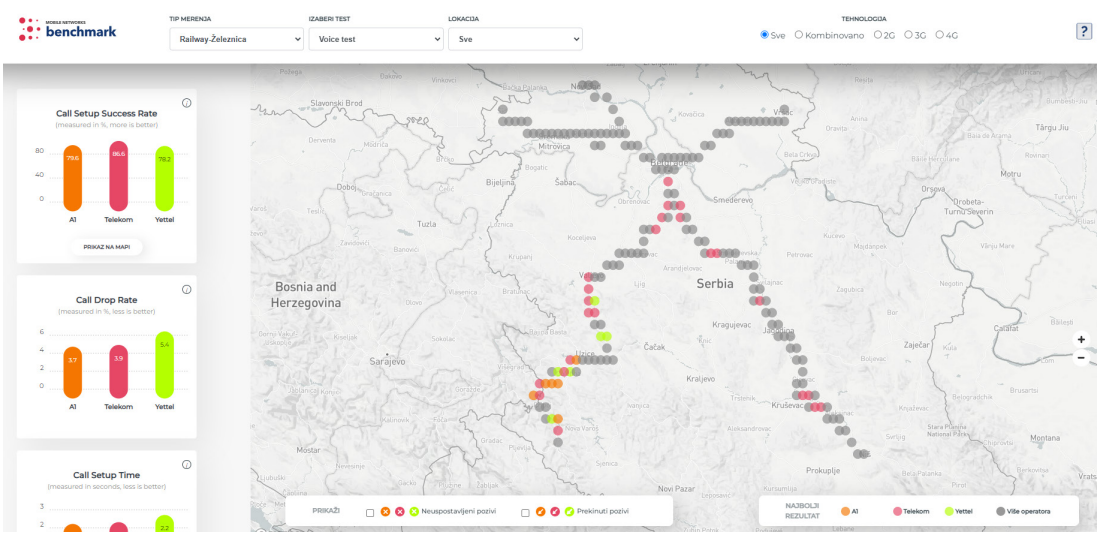
Along rail corridors, the overall rate of sucessful sessions was much lower than in other aggregations, mostly due to tunnels and mountain areas, which contributed to the poor coverage. Telekom Srbija had the best session sucess rate. A1 Srbija and Telekom Srbija achieved shorter average session time than Yettel.

At hot-spot locations, all operators achieved extremely high session sucess rates. Telekom Srbija and A1 Srbija achieved shorter average session time compared to the competition.

Results overview – Mobile Network Benchmark Portal

After the benchmarking measurements, data processing and analysis of the results regarding the quality of mobile operators' networks had been completed, the interactive portal for comparative mobile network quality in the Republic of Serbia was updated with the 2023 benchmark measurement and analysis results. The portal is available to end-users in Serbian and English, at the following address: http://benchmark.ratel.rs/en.

Figure 11.10. Benchmark interactive portal



11.3 RATEL NetTest: testing of the Internet connection quality

RATEL enables the users of Internet access services in public fixed and public mobile communications networks to measure QoS of broadband Internet access by means of its application RATEL NetTest.

The purpose of RATEL NetTest application is to provide transparent and comprehensive information. The application measures connection from the user's device (PC, tablet, mobile terminal) to a measuring server. The measuring server is located 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.

The Internet access quality monitoring is carried out via Regulatory Net Test Portal for Probe Measurement Management and Monitoring, to assess the quality of Internet access at the user's end. This portal is used by the employees involved in quality of service monitoring.

As a result of the above, the Ethernet throughput at the RATEL NetTest measurement server in SOX has been increased from 2Gb/s to10Gb/s since some of the single users' speeds rose, due to the use of optic Internet access.

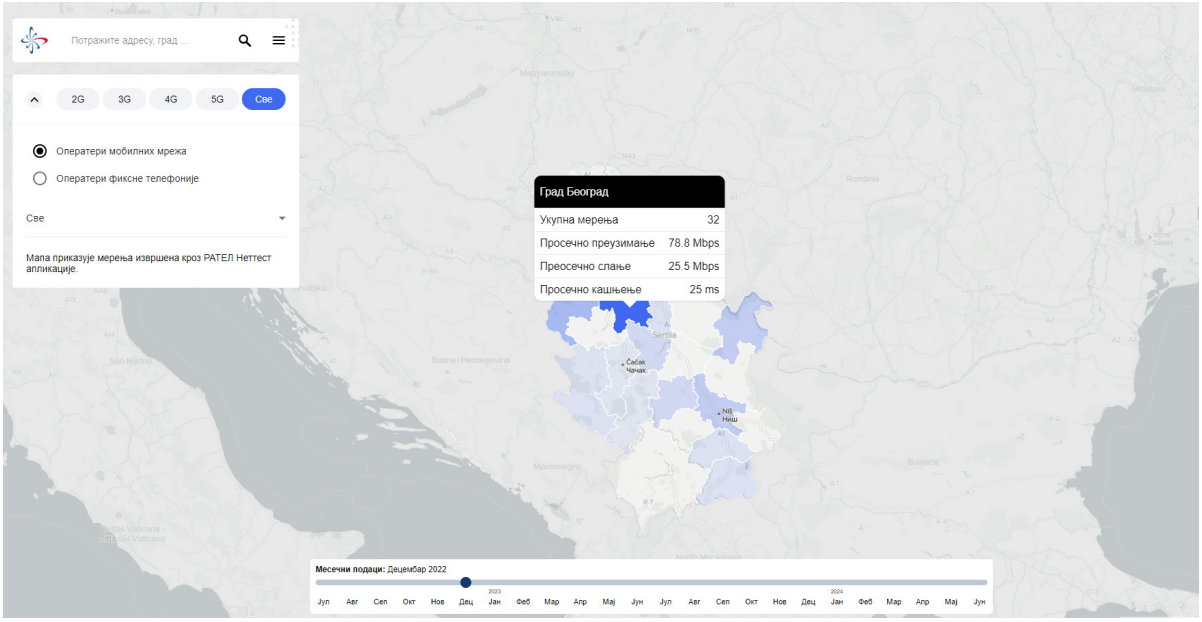
The testing of Internet connection in public fixed and WiFi communications networks can be done using RATEL's application available on its website: https://nettest.ratel.rs/en/test.

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

The app users are able to view NetTest measurement results on the map of the Republic of Serbia, including all measurement results performed by other app users over the last two years, expressed as average values pertaining to districts or municipalities, with a possibility to filter the results according to operator, type of service and time of reading. Users can also view their own measurement logs in the measurement history. A loop measurement regime has also become available to users, which is a feature allowing a continious quality check of Internet connection for a pre-selected interval and number of trials.

Figure 11.11. Mobile application home page

Figure 11.12. Map view of performed tests

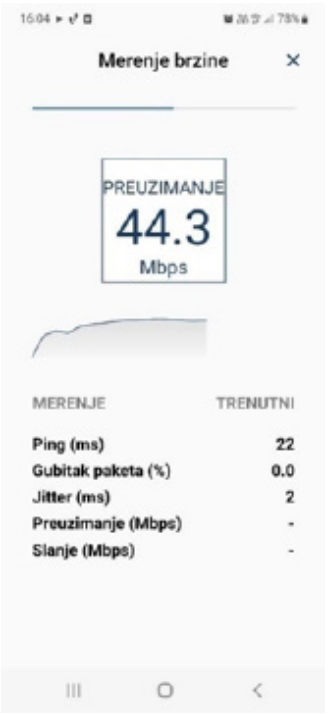


All measurement results obtained through RATEL NetTest application are, beside the NetTest map of the Republic of Serbia, available in a machine readable format (CSV, XML and JSON) at a dedicated Internet address: https://www.nettest.ratel.rs.

RATEL NetTest application offers its users the possibility to test the quality and speed of current Internet connection. This feature enables comparative analysis of Internet service providers, depending on the location or type of Internet access (fixed/mobile). Color scale red/yellow/green serves as a visual indicator of the connection quality level for the majority of Internet services. This scale does not refer to the technology used, however extremely high speeds in mobile networks can only be achieved by means of certain technologies, such as LTE.
By means of RATEL NetTest application, the following quality parameters of Internet connection can be tested:

- data download speed: measurement from measuring server to user (download),
- data upload speed: measurement from user to measuring server (upload),
- ping (latency),
- packet loss,
- signal quality (RxQual, Ec/Io, RSRQ) and signal strength (RSSI, RSCP, RSRP), if a mobile terminal is used.

Figure 11.13. Testing of the Internet connection measurement and results



Based on the „Instructions for the measurement of Internet data throughput using RATEL NetTest application“, can perform measurements in order to use their results in the complaint process regarding the quality of service of Internet data throughput. In the complaint filing process, it is necessary to carry out several measurements during different parts of the day, so as to provide necessary measurement statistics for the purpose of proper assessment of the provided throughput.

12 ELECTRONIC COMMUNICATIONS INFRASTRUCTURE INTENDED FOR SHARED USE

The Regulator 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). In July 2015, the Agency adopted the Rulebook. 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).

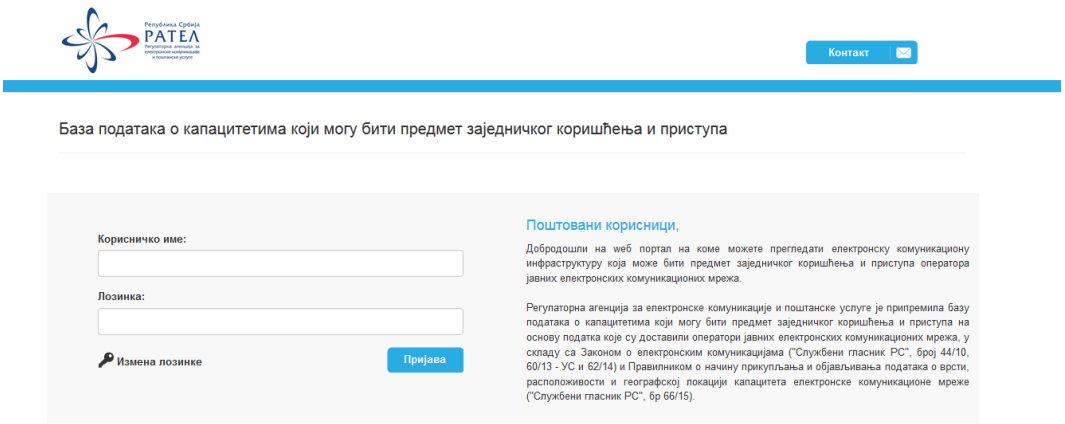
The Capacity Database was created in June 2016. Coordination with operators was established and data input into the database was enabled, by web access or through automatic data exchange systems.

In 2023, the new Law on Electronic Comminications was passed („Official Gazette of RS", No. 35/23), with Article 56 stipulationg that the Regulator shall keep an up-to-date database on the type, geographic location, and availability of all capacities of electronic communication network and associated facilities in accordance with the law and by-laws, regulating the field of the national infrastructure of geospatial data, metadata, interoperability, network services, and access to datasets and data services. Until the adoption of the new rulebook, the old Rulebook and Database remain in force.
There is a two-tier access to the Database – a read access mode and a read/

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

The users can access the application by providing a username/password combination, Figure 12.1.

Figure 12.1. Access to Web-GIS Capacity Database application



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

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

Figure 12.2. Web-GIS Capacity Database application – Home page

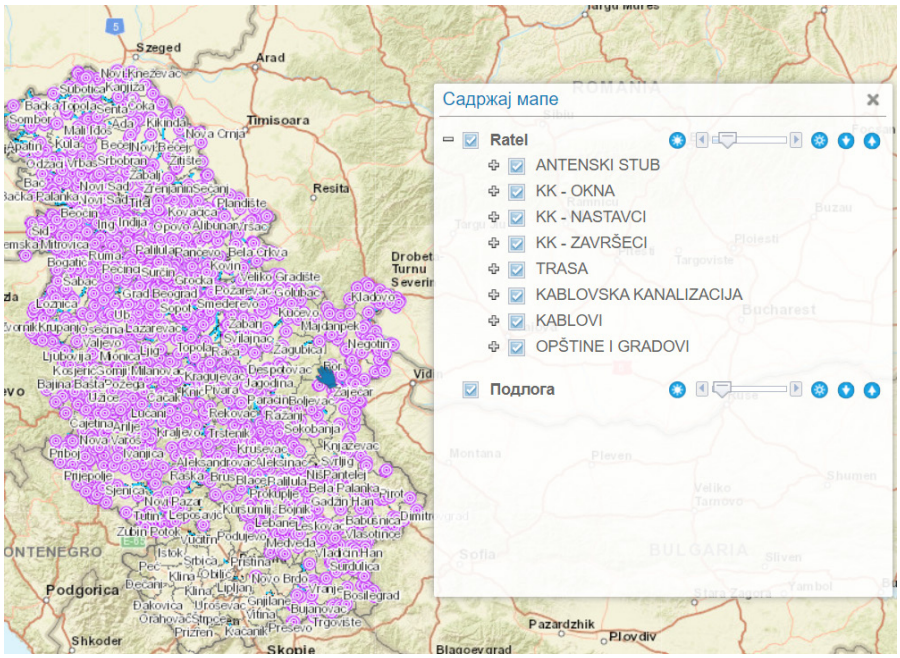
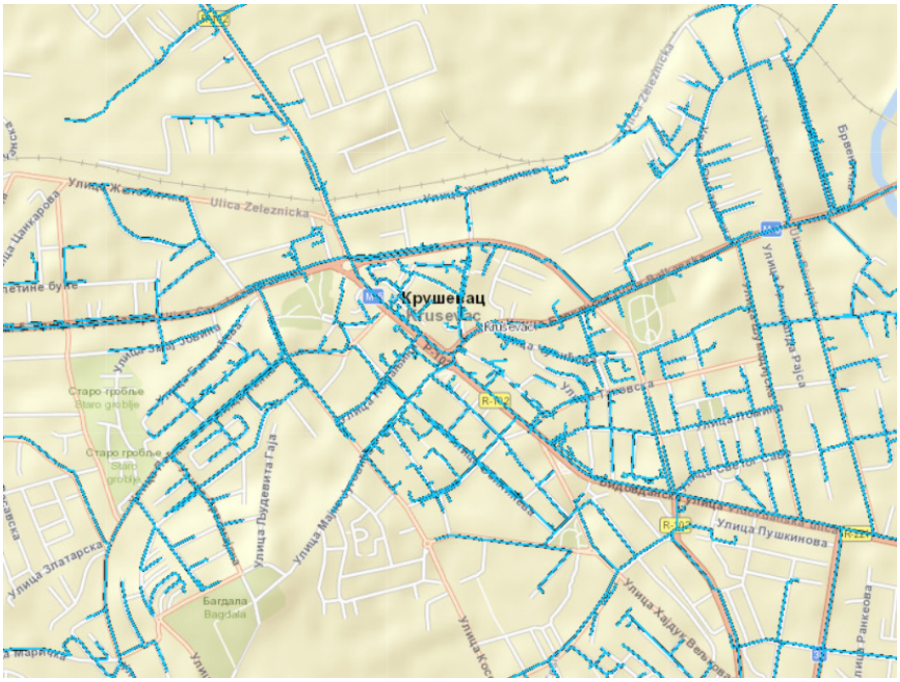


Figure 12.3. Web-GIS Capacity Database application – Enlarged detail



As of 31.12.2023, this Database includes data for 2024 antenna masts belonging to operators SKY TOWERS INFRASTRUCTURE, CETIN, A1 TOWERS INFRASTRUCTURE, Konsing Towers, JP ETV, Laser International d.o.o. and W-line d.o.o, as well as data for 271,323 cable canalization elements belonging to Telekom Srbija a.d. The Capacity Database for lease is available on the Regulator's website to all interested operators of electronic communication networks in a Web – GIS application form. There are 26 operators registered with read access right and 17 operators with read/record access right. In 2023, there were approximately 12,000 accesses to the Database.
The Web – GIS application includes standard tools for map operation, such as (Figures 12.4 - 12.7):

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

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

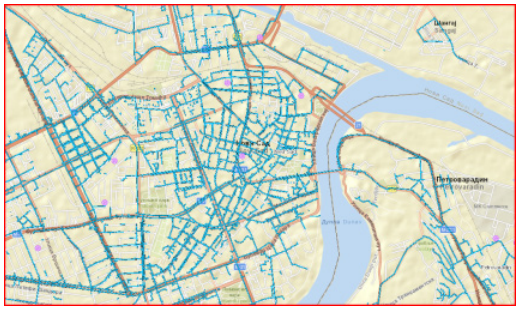


Figure 12.5. Use of standard tools – various surface types – satellite footage

Figure 12.6. Use of standard tools – various surface types – topographic map

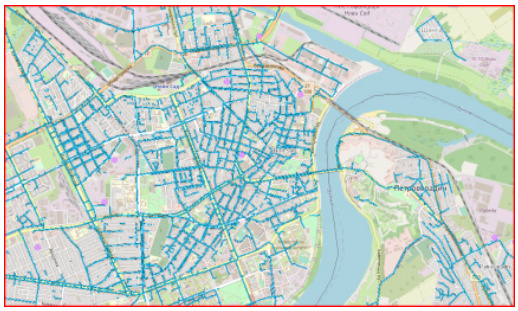
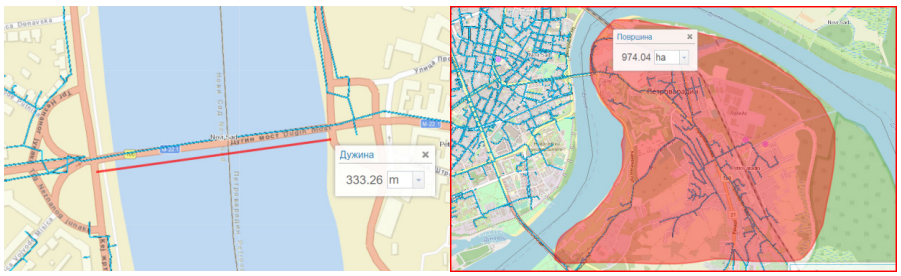


Figure 12.7. Use of standard tools – measurement of distance and surface

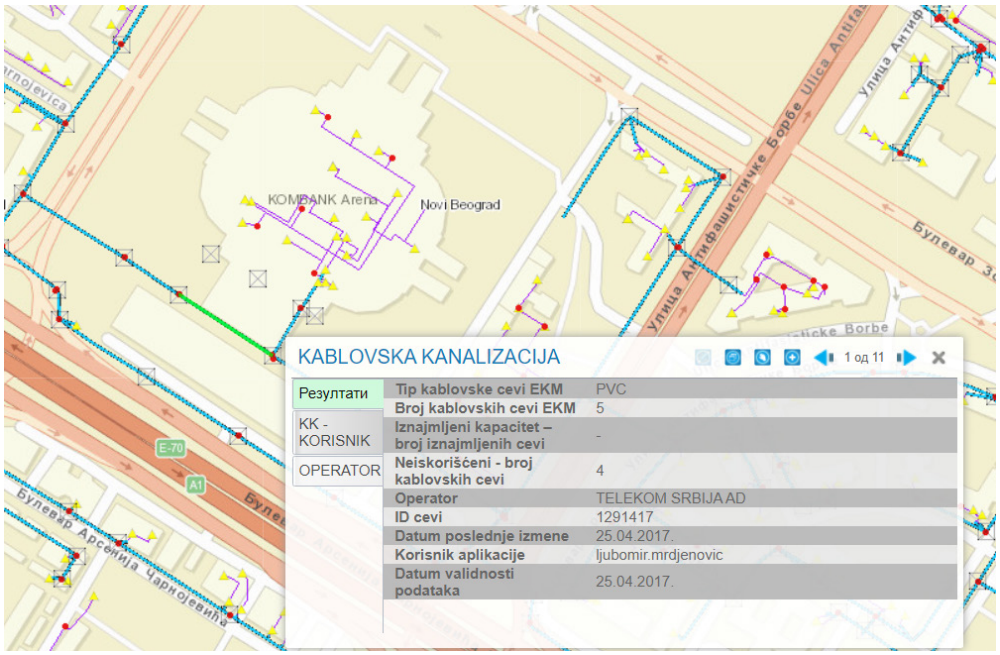


Electronic communications network cable ducts

Based on Annex 1 of the EKMI1 Rulebook form, the following cable canalization data are collected (Figure 12.8):

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

Figure 12.8 Cable duct segment details



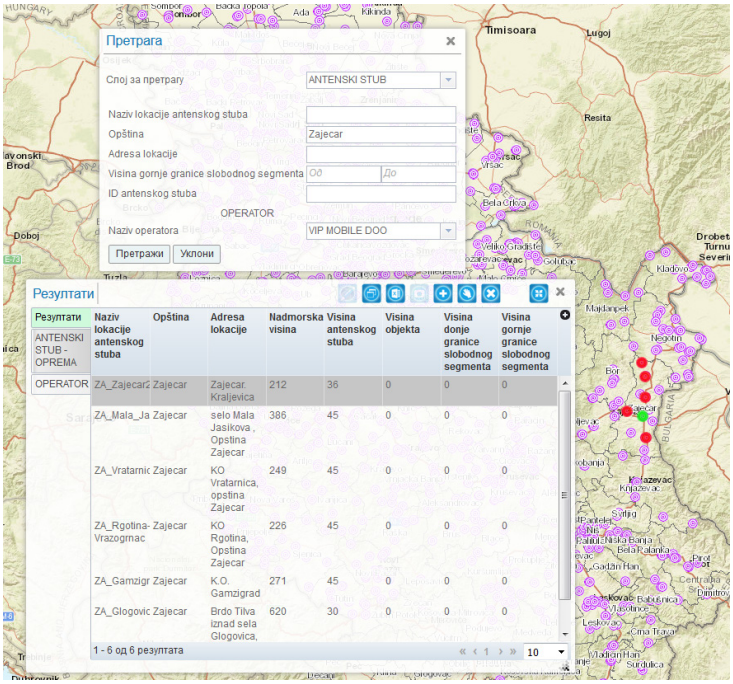
Electronic communications network antenna masts

Based on Annex 2, of the EKMI2 Rulebook form, data on antenna masts and equipment to be collected are the following (Figures 12.9. and 12.10):

- 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 12.9 Antenna mast data

Figure 12.10. Antenna mast spatial query



13 POSTAL SERVICES MARKET

13.1. Overview of RATEL's regulatory activities

According to the public data gathered and maintained by RATEL, there were[1] 55 postal operators providing postal services on the postal services market of the Republic of Serbia at the end of 2023. However, during the previous year, the licenses of some of those operators were either revoked ex officio, or ceased to be valid due to voluntary or temporary inactivity.

An overview of RATEL's regulatory activities regarding the dealings with postal operators during 2023 is given in Table 13.1.

Table 13.1: RATEL's regulatory activities in 2023

Activity	Number of authorizations/ decisions
Issuance of license to a new postal operator	**14/17**
License change upon operator's request	**7**
License revocation	**2**
Cessation of license validity	**7**
Approval of General Terms and Conditions	**39**
Approval of the PPO pricelist for non-reserved postal services from the UPS scope	**1**
Approval of the OPS pricelist	**49**

The requirements for license revocation are prescribed by the Law on Postal Services[2], therefore, 2 licenses were revoked as a result of a legal discontinuance of postal service provision, as stipulated under the license, 7 licenses ceased to be valid, 6 out of which at the request of the licence holder and 1 expired, for which the operator did not apply the renewal. One postal operator is in a state of temporary inactivity.

[1] From the Register of Issued and Revoked Licenses for Postal Operators., https://www.ratel.rs

[2] "Službeni glasnik RS" No. 77/19, hereinafter: the Law

13.2. Postal market indicators

Postal market indicators are analyzed based on collected and processed data from annual reports submitted by postal operators.

Based on the data collected from an annual questionnaire, on the market of the Republic of Serbia in 2023, postal services were provided by 46 postal operators. Universal postal service (hereinafter: UPS) is provided by 1 operator (the Public Postal Operator, hereinafter: the PPO), 28 operators are registered as express postal service providers, and 30 operators as courier service providers. The Public Postal Operator is simultaneously a universal service provider (hereinafter: USP) and provider of other postal services (OPS).

Figure 13.1: Postal operators by area of postal service provision in 2023

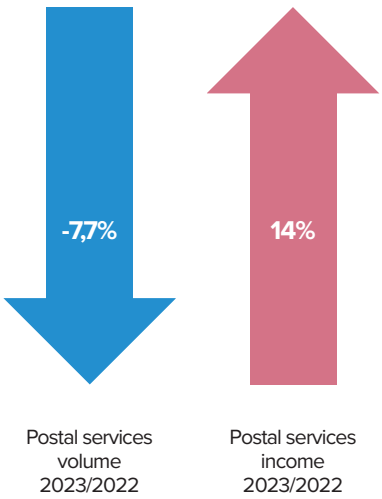
1
IPS: 10 postal operators

2
NPS: 18 express postal service operators

3
25 courier service operators

In terms of the territory covered, in national postal traffic (hereinafter: NPT), performed exclusively on the territory of the Republic of Serbia, postal services were provided by 18 postal operators, one of which is also USP. In international postal traffic (hereinafter: IPT), services were provided by 10 postal operators, one of which is USP and three of which provide services exclusively in IPT. Courier services, present in larger cities, primarily in Belgrade and Novi Sad, were provided by 25 operators, while 5 operators were inactive.

Figure 13.2: Postal services volume and income in 2023



In 2023, postal operators generated more than 277 million postal services in the Republic of Serbia, generating an income of 33.6 billion dinars (around[3] 286 million Euros). Compared to the year before, the revenues were increased by 14%, or 4.2 billion dinars (around 36 million Euros).

After a two-year decrease, the volume of services in 2023 fell by -7,7%. Postal flows contained 23.3 million items less than in 2022.

An average of 107 items per household were delivered, which is 14 items less than in 2022, out of which 87 from the UPS domain, representing a decrease by 14 items. The data were calculated against the number of inhabitants and households, according to the 2022 census.[4]

There were 42 items on average delivered per inhabitant. As for other postal services (OPS), their volume remained amlost unchanged (8 items per inhabitant), i.e. 20 per household.

The share of postal service revenues in the GDP in current prices remained on the same level as the year before (0.41%).[5]

13.2.1. Postal industry employees

Total number of employees in the Republic of Serbia in 2023 was 2,360,588,[6] which is an increase by 2.2% compared to the year before.
Despite a continuous increase in the number of employees nationally, postal industry marks an opposite trend in the past four years. Since 2019, a constant drop in the PPO workforce has been observed, contrary to the situation of other postal operators, which have augmented their number of employees.

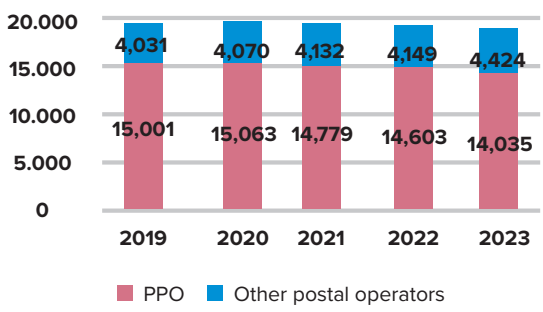
[3] National Bank of Serbia
[4] Statistical Office of the Republic of Serbia – 2024 Statistical Calendar
[5] Statistical Office of the Republic of Serbia – 2024 Statistical Calendar
[6] Statistical Office of the Republic of Serbia – 2024 Statistical Calendar

The 2023 drop in the number of postal employees by -1.6% has negatively impacted the share of postal workforce in the total number of employees in the Republic of Serbia, amounting now to 0.78%. (Table 13.2, Figure 13.3).

Table 13.2: Postal industry employees in 2019-2023

Operators	Year				
	2019	2020	2021	2022	2023
PPO	15,001	15,063	14,779	14,603	14,035
Other postal operators	4,031	4,070	4,132	4,149	4,424
TOTAL	19,032	19,133	18,911	18,752	18,459

Figure 13.3: Share of postal employees at PPO and at other postal operators in 2019-2023



In 2023, there was a significant surge by 6.7% in the number of employees at other postal operators.[7]

At the PPO, a decrease in the workforce (-4%) is still present, resulting in a steady drop in the share of the PPO employees in the total number of postal employees, amounting in 2023 to 76%.

13.2.2. Postal service volume and revenues in 2023

Dominant category in the postal service volume is universal postal service (UPS), with more than 226 million services provided in 2023, whereas within the scope of other postal services (OPS), almost 4 times less postal services were provided, namely over 51 million. However, OPS are significantly more expensive and generate an income by 50% higher than UPS (Table 13.3).

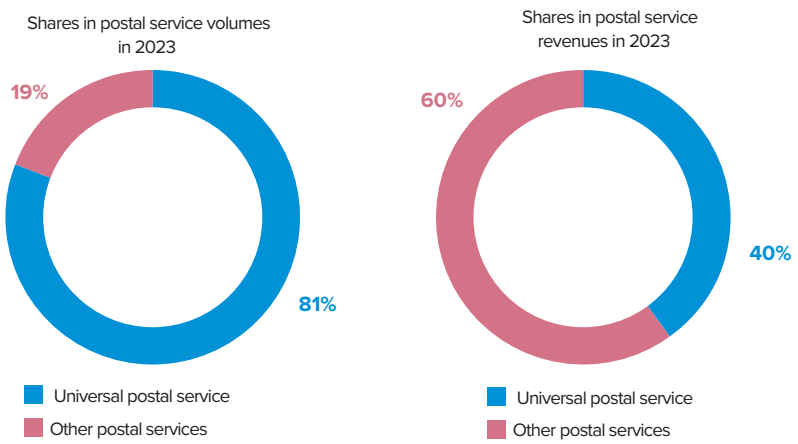
[7] Employees of transportation companies (such as AD 'Niš Ekspres' and 'Autoprevoz Kikinda'), as well as those working for logistics companies (e.g., Gebrüder Weiss, M&M, InterEuropa, Nelt, etc.), are not included in the analysis, as their primary business activities fall outside the postal sector.

Table 3: Postal service market in 2023

Type of service	VOLUME	INCOME	VOLUME	INCOME
	in thous.	in thous. din.	%	%
UPS	226,342	13,443,014.00	81	40
OPS	51,455	20,128,263.65	19	60
TOTAL	277,797	33,571,277.65	100	100

UPS generated an income of 13.4 billion dinars (40%), whereas OPS earned more than 20.1 billion dinars in revenues (60%) (Figure 13.4).

Figure 13.4: UPS and OPS volume and income shares in 2023



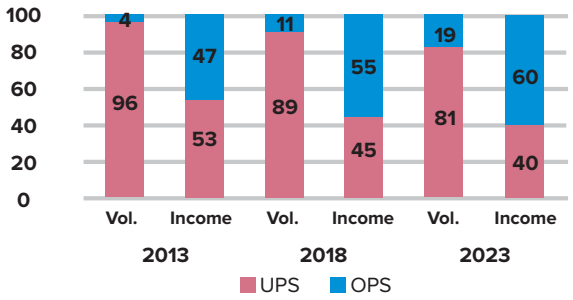
13.3. Postal market trends

In 2023, a sharp decrease in the share of UPS volume was recorded, which is due to the drop in the UPS volumes, coupled with a simultaneous increase in the OPS volumes (Table 4). Still, the increase of UPS prices at the beginning of 2023 resulted in the surge of revenues, compensating for the drop in the volumes.

Table 13.4: Postal service volume and income shares in 2019-2023

Type of service	2019		2020		2021		2022		2023	
%	Vol.	Income	Vol.	Income	Vol.	Income	Vol.	Income	Vol.	Income
UPU	87.4	42.1	85.1	38.9	83.7	40.6	83.4	37.3	81.5	40
OPS	12.6	57.9	14.9	61.1	16.3	59.4	16.6	62.7	18.5	60
TOTAL	100	100	100	100	100	100	100	100	100	100

Figure 13.5: Five-year span UPS/OPS ratio in postal volume and income - 2013/2018/2023



Since the beginning of postal market monitoring in 2010, a significant drop of the UPS share in the postal revenues has been recorded, while the OPS income has been constantly growing, up until 2022. In 2023, a modest decrease was observed, reaching 60%.

UPS volumes have been in a continuous decrease since 2013. With the exception of year 2017, when a certain growth was recorded, UPS volumes dropped by -14% over the last ten years. Postal volumes over the last five years are shown in Table 13.5 and Figure 13.6.

Table 13.5: UPS and OPS volumes in 2019-2023

Type of service	VOLUME in thousand units					Positive/negative growth (%)			
	2019	2020	2021	2022	2023	20/19	21/20	22/21	23/22
UPS	269,715	262,139	261,833	250,971	226,342	-3%	-0.1%	-4.2%	-9.8%
OPS	39,005	45,997	51,143	50,133	51,455	18%	11%	-2%	2.6%
TOTAL	308,720	308,136	312,976	301,104	277,797	-0.2%	1.6%	-3.8%	-7.7%

Figure 13.6: UPS and OPS volumes five-year trends (in thousand) in 2019-2023

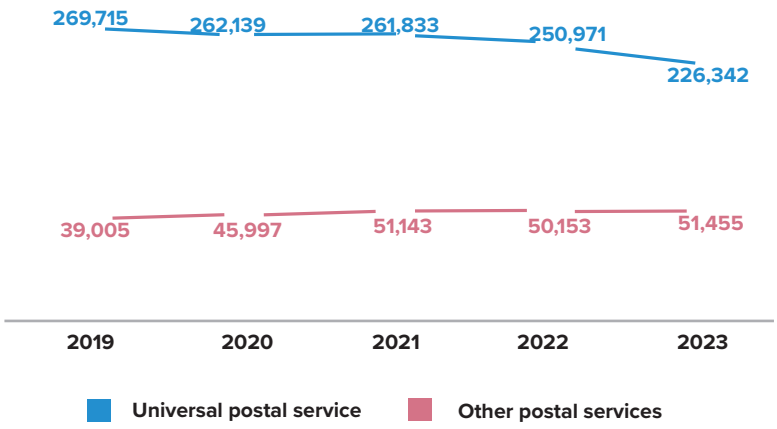
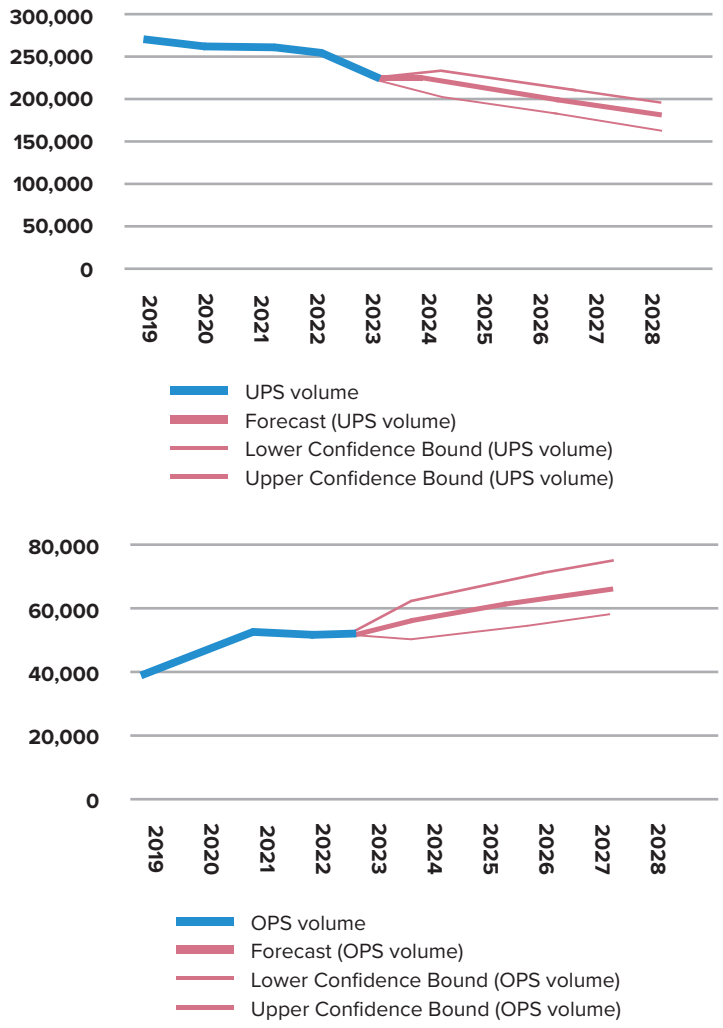


Figure 13.7: Five-year forecast of UPS and OPS volume trends



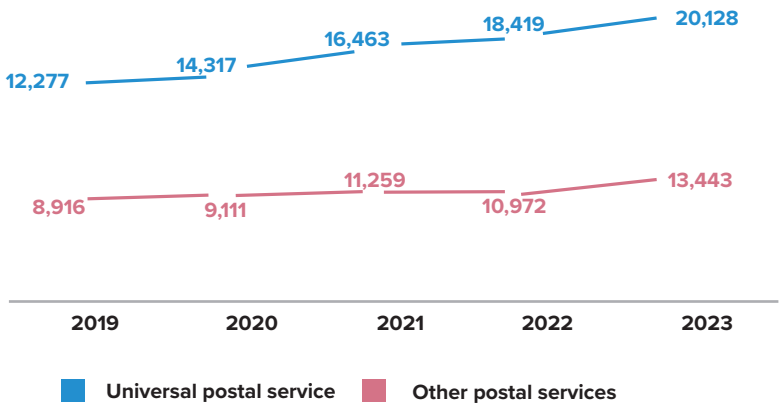
In 2023, postal services generate an income by 14.22% larger than the one in 2022. (Table 13.6, Figure 13.8).

Table 13.6: UPS and OPS revenues in 2019-2023

Type of service	INCOME in million dinars					Positive/negative growth (%)			
	2019	2020	2021	2022	2023	20/19	21/20	22/21	23/22
UPS	8,916	9,111	11,258	10,972	13,443	2.2%	23.6%	-2.5%	22.5%
OPS	12,277	14,317	16,463	18,419	20,128	16.6%	15%	11.9%	9.28%
TOTAL	21,193	23,427	27,721	29,391	33,571	10.5%	18.3%	6%	14.22%

Figure 13.6 shows the trend of UPS and OPS revenues over the last five years. In 2023, a significant 22.5% growth of UPS revenues was recorded, due to the increase of service prices applied in April 2023. The growth trend of UPS revenues continued, with the exception of 2022, when the revenues dropped by -2.5%.

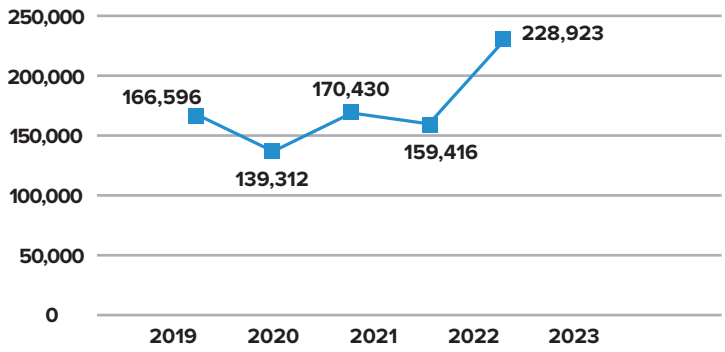
Figure 13.8: UPS and OPS revenues five-year trends in 2019-2023



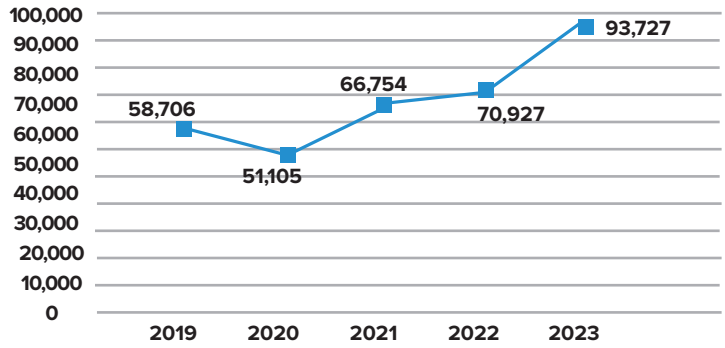
Since the beginning of postal service monitoring, the trend of continuous OPS revenue growth has been present, with an increment by 9.3% in 2023, which is directly due to the increase in the OPS volumes, taking into account that no price augmentation occurred at the operators with significant market share.

In 2023, courier services mark an exponential growth in volumes by almost 44%, followed by an increase in revenues by more than 32% (Figure 13.9).

Figure 13.9: Courier volume and income trends in 2019-2023



Courier volumes trend

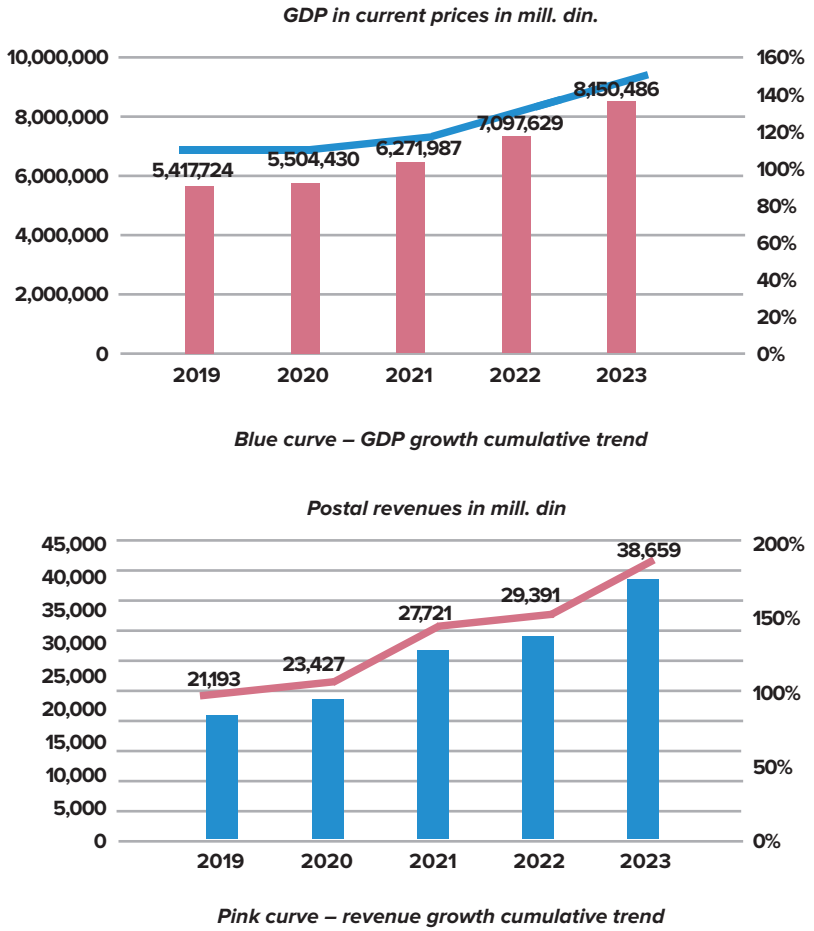


Courier revenues trend in thousand din.

When comparing the GDP in[8] current prices over the period 2019-2023 to the generated postal revenues, a constant growth can be observed (Figure 13.10), suggesting that postal revenues are in a direct correlation with the GDP growth. The following Figure shows the cumulative growth of both GDP and postal service revenues compared to year 2019.

[8] Statistical Office of the Republic of Serbia. 2023 Statistical Calendar: https://www.stat.gov.rs/sr-cyrl/

Figure 13.10: Trends of GDP in current prices and postal service revenues in 2019-2023 - cumulative growth



13.4. Analysis of UPS and OPS volumes and revenues

According to to the Law on Postal Services, postal services comprise universal postal service and other postal services.

On the territory of the Republic of Serbia, UPS is solely provided by the PPO, the Public Enterprise „Post of Serbia“, Belgrade, designated by the Law on Postal Services, and a license holder since 2010. Even though the Law foresees that other postal operators may also perform UPS, so far none of the operators have expressed interest to provide UPS, while OPS are provided by all postal operators, based on an authorization.

13.4.1. Universal postal service

Universal postal service (UPS) is a service of general interest consisting of a set of postal services provided continuously on the entire territory of the Republic of Serbia, without interruption (continuously).
UPS is normally provided at affordable prices and under equal conditions for all users, without discrimination and according to a prescribed standard.

Universal service is set by the Law as a service of general interest, very important from the social and economic point of view and therefore the legislator is obligated to establish the mechanisms of provision of this service category.

Figure 13.11: Scope of Universal Postal Service

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

Taking into account the decreasing trends regarding traditional postal services on the global level, UPS has come to represent a burden to USPs, so an intensive search for new models of universal service provision has been under way over the recent years.

Until the accession of the Republic of Serbia to the European Union is finalized, the Law stipulates the funding of UPS from the scope of reserved services, the provision of which is an exclusive right of the PPO. In the EU, market liberalization, along with abolition of the reserved area was completed in 2013.

The reserved service limits are set by the law. The prescribed limit is 50g in terms of the weight, and two and a half times the amount of the postal charge for the fastest letter-post item transmission level, in terms of the price, for the reserved services (since April 1, 2023, other postal services have not been allowed to cost below 180.00

Figure 13.13: Volume of items by weight in the reserved area

dinars, and in the first quarter of the same year, the limit price was 112.5 dinars,VAT included).

Reserved postal services are entrusted to the PPO and are part of UPS (Figure 13.12).

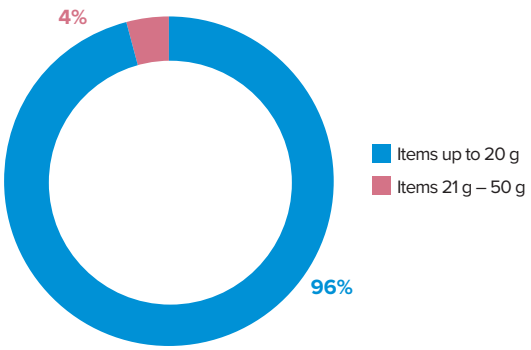
Figure 13.12: Scope of reserved area

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

The share of the reserved area in UPS in 2023 was approximately on the similar level as the year before (Figure 13). Reserved services account for 89.7% of the total volume generated by the PPO, as a sole USP. The most dominant category are non-recorded letter-post items, which make 71% of UPS (their share was increased compared to 2022) and account for 73% of reserved postal services. They are followed by the court letter, accounting for 11% of the reserved area, and the notification on the day and time of elections (more than 5.6%).

Items up to 20g are the most frequent UPS category (92%), followed by items 21-50g (4%), items weighing 101g-250g (1.5%), those of 51g-100g (1.1%), with finally all other items participating together in UPS with 1.7%.

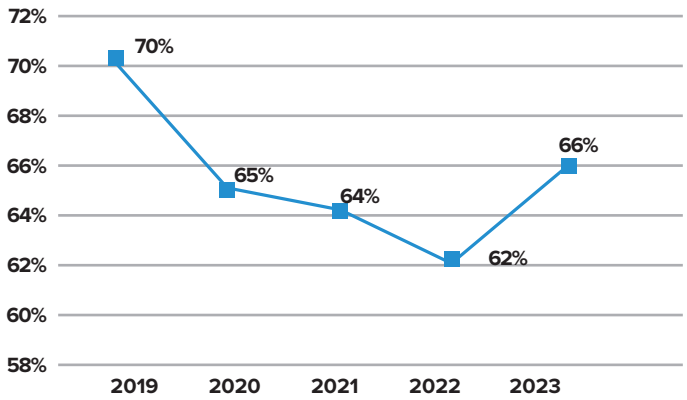
Figure 13.13: Volume of items by weight in the reserved area



Items up to 20g make more than 96% of the reserved services and are the most frequent UPS item category (92%), while items 21g-50g account for the remaining 4% in the reseved area.

As for the scope of reserved services, 89% of them stem from legal entities, while only 11% of them are accounted for by natural persons.

Figure 13.14: Reserved services revenues in the total PPO income in 2019-2023



The income share stemming from reserved services, being the most dominant category in the totality of PPO's services, has been decreasing continuously up until 2023: at the beginning of market regulation (in 2011) it was 80%, in 2019 it fell to 70% and in 2022 it reached 62%.

In 2023 however, an increase in the income share was recorded (66%) pertaining to the UPS reserved area, which is the result of price augmentation.

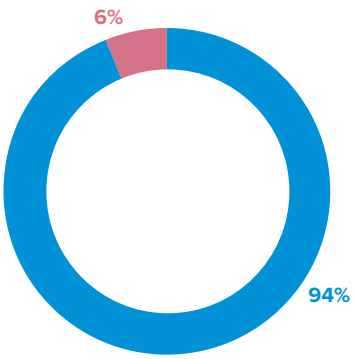
In 2023, a drop in the volume of reserved services by -10.6% has been recorded, but also a surge in revenues by 22.4%, due to a UPS price increase in the second quarter of 2023.

Due to price increase, the average UPS income per unit grew by 15.7 dinars, amounting to 59.4 dinars.

In 2023, the average income from reserved services is approximately 56 dinars and from services under special agreement 52.6 dinars, compared to the 2022 amount of 37 dinars.

The income from reserved services accounts for more than 90% of all UPS revenues, representing a negligible decrease compared to the year before.

Figure 13.15: Income of items by weight in the reserved services



Items up to 20g account for 94% of the reserved services revenues.

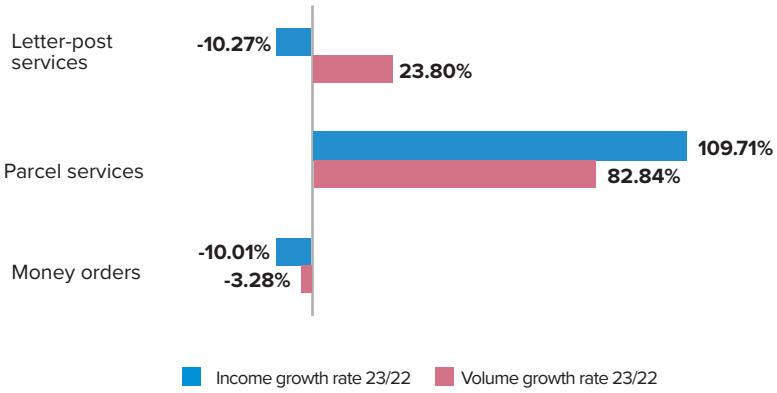
These items' revenues are dominant in the UPS income (85.7%), while within it the biggest income share comes from non-recorded items (53%) and court letters (26%).

When comparing growth rate trends of letter-post, parcel and money order services within UPS, the volume usually follows the income, except for postal money orders, where, compared to 2022, the revenues have increased despite the drop in the volume of services (Table 7, Figure 16).

Table 13.7: UPS volume and income growth rates in 2022/2021 and 2023/2022

UPS	Volume growth rate 22/21	Income growth rate 22/21	Volume growth rate 23/22	Income growth rate 23/22
Letter-post services	-4.3%	-4.5%	-10.3%	23.8%
Parcel services	144.6%	89.6%	109.7%	82.8%
Postal money orders	-5.3%	3.8%	-10.01%	-3.3%

Figure 13.16: UPS volume and income growth rates in 2023/2022



The significant increase in letter-post revenues by 23.8%, despite the volume drop by -10.3% is due to price augmentation. The negative growth trend of letter-post volumes is following the European and global indicators. The exponential growth of parcel volumes continued in 2023 as well, reaching 109.7% and is followed by a proportional increase in revenues by 82.84%.

The 2023 UPS share in IPT is around 9.1% in terms of volume and 15% in terms of income.

The UPS volume share in IPT througout 2023 was around 10 times smaller than the NPT share. In 2022, the share of these services was around 15 times smaller and in 2021 even 32 times smaller.

The volume of IPT items is steadily growing. During 2023, a growth by 22% in this market segment has been observed, with a 25% growth accounted for by inbound items. In contrast, there is a parallel and constant decrease in the outbound volumes, which, in 2023, account for -17% of items (Table 13.8).

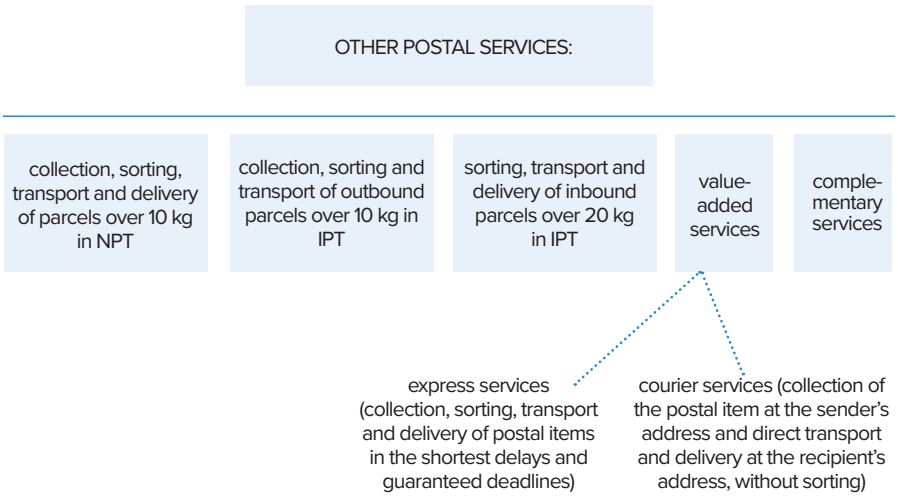
Table 13.8: UPS volumes in IPT in 2020-2023

	2020	2021	2022	2023	Growth rate 21/20	Growth rate 22/21	Growth rate 23/22
Outbound	1,952,999	1,671,889	1,418,833	1,177,902	-14	-15	-17
Inbound	4,879,559	6,163,074	16,429,411	20,596,157	26	167	25
UKUPNO	6,832,558	7,834,963	17,848,244	21,774,059	15	128	22

Inbound postal items to the Republic of Serbia make approximately 95% of the total volume of UPS international items in 2023, accounting for 75% of the total UPS revenues in IPT. The most dominant are inbound non-recorded letter-post items (up to 20 g), accounting for more than 87.6%, followed by registered items, with more than 10.5%.13.4.2. Other postal services

13.4.2. Other postal services

Figure 13.17: Other postal services



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

In 2023, OPS in NPT returned to a positive volume growth rate by 2.5%, more or less continuously present, with the exception of the year before, when a drop by -2% was observed (Table 13.9, Figure 13.18). The volume growth is followed by income growth

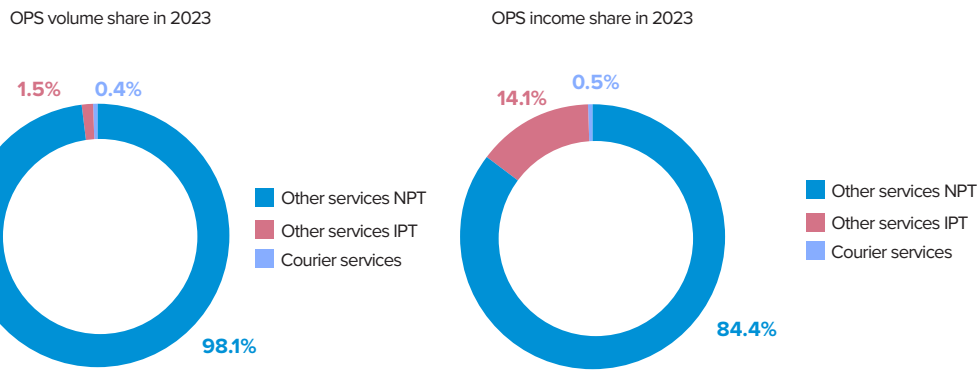
by 9.3%, representing the first growth rate in this category below 10%. There was no price augmentation for this type of service carried out by the operators in 2023.

OPS in NPT are the most dominant OPS category, accounting for 98.1% of the volumes and 85.4% of the revenues, basically on the same level as in the previous years.

The average income per OPS item in NPT has continued to grow, increasing by 21 dinar (7%) compared to 2022, reaching the amount of 341 dinars.

OPS in IPT are also the most expensive services: their volume share is only 1.5%, but generating more than 14% of the income, which is a year-long constant (Figure 13.18). The average income per OPS item in IPT has grown by 6%, amounting to 3,586 dinars. Following the drop in the volumes over the year before, an increase in the volume of IPT OPS by 2.6% has been recorded in 2023, coupled with the growth of revenues by 8.5%.

Figure 13.18: OPS volume and income shares in 2023



As the least present in the OPS market, courier services account for a constant share of more than 0.4% in volumes, and more than 0.5% in revenues. The average income per courier service was 409 dinars, which is a decrease by 35.5 dinars (8%). As courier services experience a continuous drop in volumes, in 2023 however a growth both in volume (43.6%) and in income (32.15%) were observed.

The surge in the volume and income is a result of the increased number of courier providers in Belgrade and Novi Sad, but also a consequence of the strike at the PPO. The volume of courier services has constantly been dropping, with the exception of years 2012 and 2017, however, a significant growth has been observed in 2023 (Table 13.9).

Table 13.9: OPS volume and income in 2023 and comparison to years 2017 and 2022

OPS type	2017		2022		2023		Volume growth		Income growth	
	Volume in thous.	Income mill. RSD	Volume in thous.	Income mill. RSD	Volume in thous.	Income mill. RSD	2023-2017	2023-2022	2023-2017	2023-2022
OPS in NPT	30,123	7,877	49,203	15,733	50,434	17,197	67	3	118	9
OPS in IPT	594	1,660	771	2,615	791	2,837	33	3	71	8
Courier services	210	68	159	71	229	94	9	44	38	32
TOTAL	30,928	9,605	50,133	18,419	51,454	20,128	66	3	110	9

Table 13.9 shows the OPS volume and income growth rates in the Republic of Serbia in compared to years 2017 and 2022. In 2023, in comparison to reference year 2017, OPS volumes grew by 67% and revenues by 118%. The biggest growth rate was accounted for by OPS in NPT, while the courier services marked a significant increase compared to 2022.

Figures 13.19 and 13.20 show OPS volume and income growth rates in the period 2017-2023.

Figure 13.19: OPS volume growth rate in 2017-2023

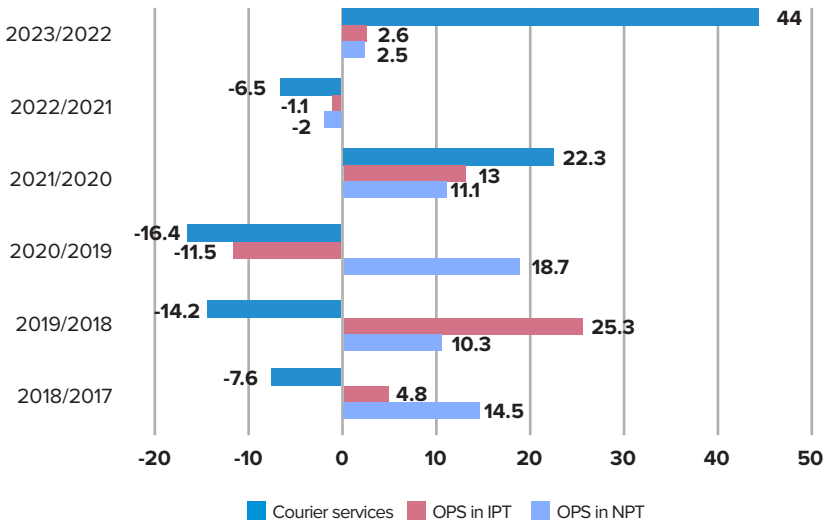
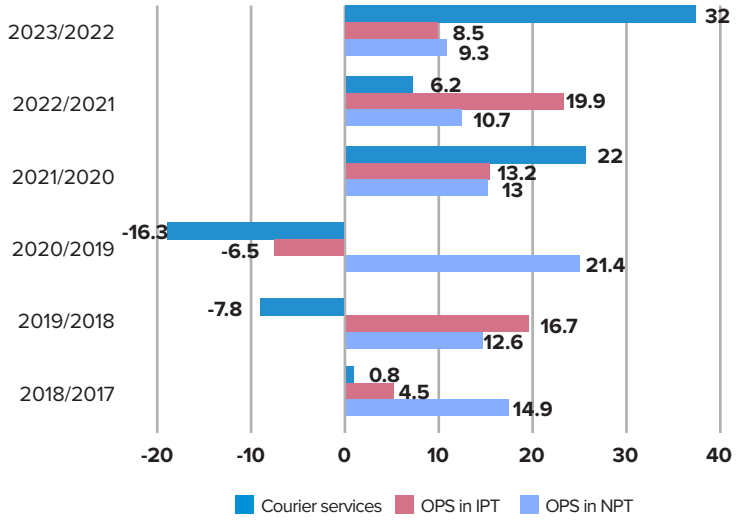


Figure 13.20: OPS income growth rate in 2017-2023



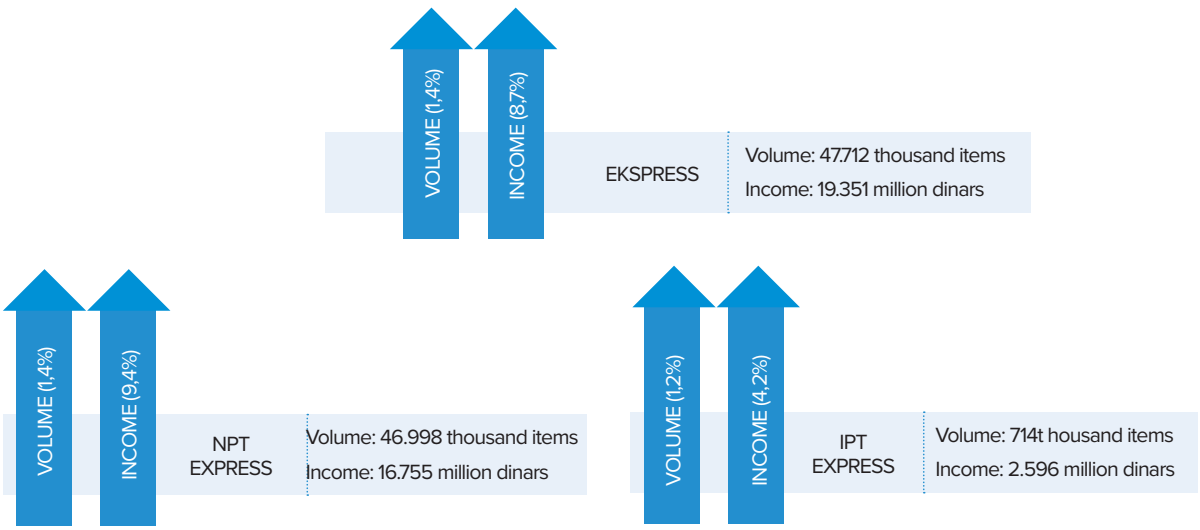
The OPS volume and income share growth trends in the Republic of Serbia over the last 5 years is shown in Table 13.10.

Table 13.10: OPS share trends in percent

Type of service/ year	2019		2020		2021		2022		2023	
%	Volume	Income	Volume	Income	Volume	Income	Volume	Income	Volume	Income
OPS in NPT	97.6	83.0	98.2	86.4	98.1	86.4	98.1	85.4	98.1	85.4
OPS in IPT	2.00	16.5	1.5	13.2	1.5	13.2	1.5	14.2	1.5	14.1
Courier services	0.4	0.5	0.3	0.4	0.3	0.4	0.3	0.4	0.4	0.5
TOTAL	100	100	100	100	100	100	100	100	100	100

13.5. Analysis of express services and impact of remote commerce

Figure 13.21: Main caracteristics of express service market in 2023 and volume and revenue trends compared to 2022



Express postal services are the most dominant OPS category and, as previously said, these services generate a considerable part of revenues in the whole postal market.

Market shares in the total express service volume and income in NPT of the most dominant postal market players are shown in Figure 13.21. As for the total postal volumes in NPT in 2023, beside the above mentioned dominant operators' volume shares, all other postal operators provided 1.3% of the volumes (up to 5% as shown in the Figure below). On the other hand, regarding the total revenues in NPT, beside the dominant operators' income shares, all other operators generated 2.7% of the revenues (up to 5% as shown in the Figure below).

Figure 13.22: Market share of postal operators in total express service volume and income in NPT in 2023

On one hand, express services market is deemed oligopolistic due to five postal[9] operators accounting for almost 98% of the express postal service volumes (together in NPT and IPT). On the other hand, the HHI index value (Herfindahl Hirschman Index) suggests that the NPT[10] express services market is concentrated.

The HHI index is one of the most reliable indicators of 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 value drops. The maximum HHI value is 10,000 (in case of a clear monopoly), while the minimum value is close to zero (the nearer the HHI value is to zero, the market is more competitive).

From the point of view of express services as a separate postal market compared to the UPS market, where the PPO holds a monopoly, and further consisting separately of express postal services in NPT and express services in IPT, HHI for 2023 in NPT is 2,096, suggesting that the NPT express market is concentrated. In IPT, HHI is slightly higher, amounting to 4,745 (Table 11).

In 2023, there were five postal operators participating with more than 1% in the NPT volumes. The HHI value is calculated based on these operators' share (these are the operators whose share in the express volumes is higher than 1%). Different business sectors use different value intervals for HHI, however the HHI value of 2,096 corresponds in most of the cases to a competitive market. As for the IPT

[9] https://www.kzk.gov.rs/kzk/wp-content/uploads/2022/10/Sektorska-analiza-ostalih-postanskih-usluga-2019-2021.pdf

[10] https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Glossary:Herfindahl_Hirschman_Index_(HHI)

express market, there are five operators as well participating with more than 1%, producing however a higher HHI value, which suggests a lower level of competition in this market segnemt. It is important to note that there are ten operators providing express services in IPT, with postal volumes manyfold lower than those in NPT and a big disproportion of shares in these operators' total volumes.

Table 13.11: HHI values in 2021-2023 in NPT and IPT express postal services market

	NPT			IPT		
	2021	2022	2023	2021	2022	2023
HHI value	2,229	2,203	2,096	4,675	4,848	4,745
Operators with express volume share over 1%	5	5	5	5	5	5

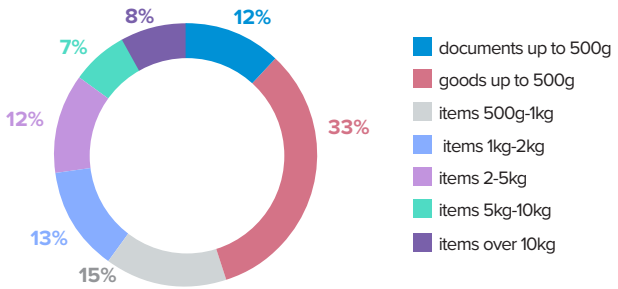
Characteristics of this postal market segment are shown in more detail with consideration to the changes in volumes, revenues, distribution according to the weight and content, share of remote selling in the generated volumes and also by the categories of outbound and inbound services in IPT.

In Table 13.12 and Figure 13.22, the 2023 structure of NPT express items according to the weight (in thousand) is shown.

Table 13.12: Structure of NPT express services according to weight in 2023 (in thousand)

	NPT express items							Total express items		Total volume
	Items up to 500 g		Items	Items	Items	Items	Items			
	Documents	Goods	500g-1kg	1kg-2kg	2kg-5kg	5kg-10kg	over 10kg	Documents	Goods	
Volume	5,496	15,551	6,855	6,374	5,697	3,206	3,819	5,496	41,502	46,998
Share in total volume	12%	33%	15%	13%	12%	7%	8%	12%	88%	100%

Figure 13.23: Structure of NPT express items according to weight in 2023



Dominance of the items containing goods compared to those with documents remains apparent during 2023 as well (almost eight-fold).

The items of up to 500 g make up almost half of the total volume of NPT express items (44.8%), out of which 74% contain goods.

E-commerce is a type of remote commerce[11] realized in such a way that the goods/services are offered, ordered and sold via the Internet.
E-commerce is performed as:

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

Merchandise payments are effectuated electronically or as COD, and the delivery of goods via mail – in national traffic usually by means of express postal items.
Items stemming from remote commerce account for almost 44% of the total volume of express postal items in 2023 in the market of the Republic of Serbia (Table 13.13).

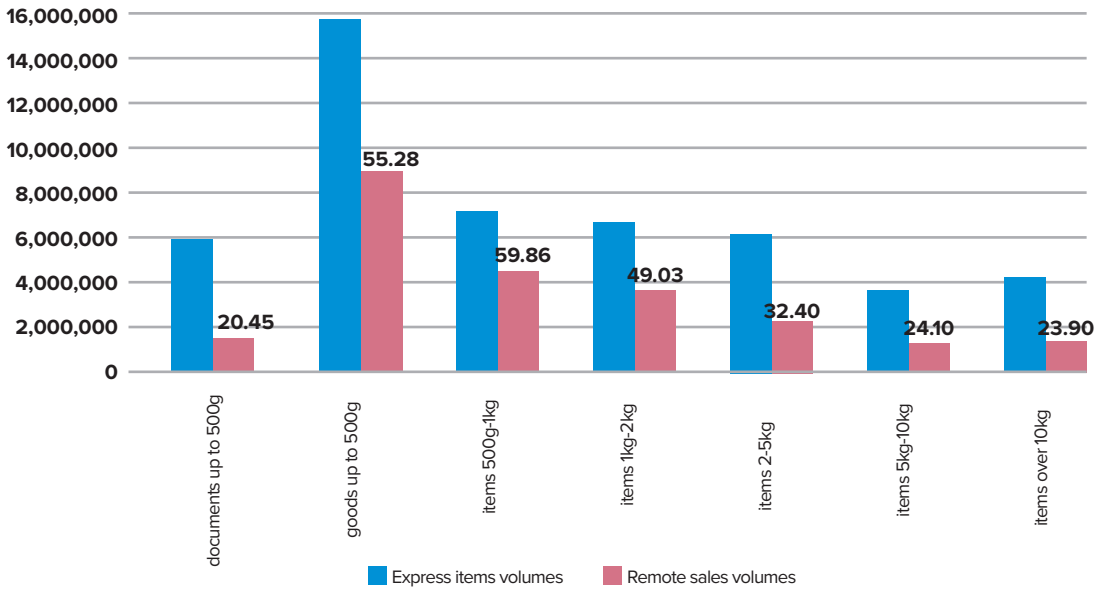
Table 13.13 and Figure 13.24 show the share of items stemming from remote commerce in the total NPT express volumes.

Table 13.13: Share of remote commerce in total NPT express volumes in 2023 (in thousand)

	Documents up to 500g	Goods up to 500g	Items 500g-1kg	Items 1kg-2kg	Items 2kg-5kg	Items 5kg-10kg	Items over 10 kg	Total
Express volumes	5,496	15,551	6,855	6,374	5,697	3,206	3,819	46,998
Remote commerce volumes	1,124	8,597	4,103	3,125	1,846	773	913	20,481
Remote commerce share by weight	20%	55%	60%	49%	32%	24%	24%	44%

[11] Distance selling refers to the presentation of an offer and the conclusion of a contract for the sale of goods or services using one or more means of distance communication. (Law on Trade, "Službeni glasnik RS," No. 52/2019)

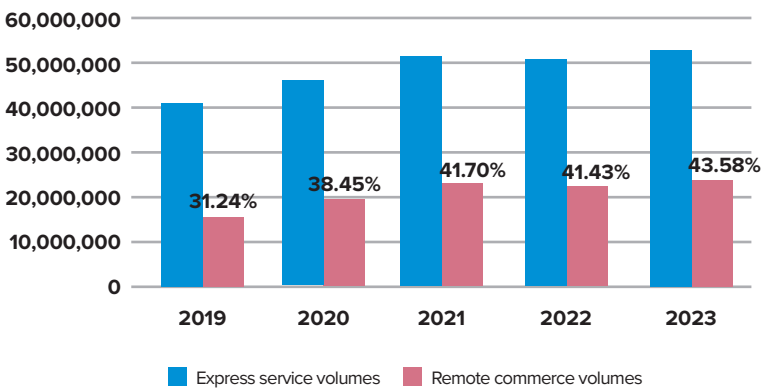
Figure 13.24: Share of remote commerce in total NPT express volumes, by weight, in 2023



The trend of items containing goods up to 500 g being the most dominant remote commerce-generated items (42%) continues in 2023 as well, followed by items weighing between 500 g and 1 kg (20%).

95% of the remote sale items contain goods, while the rest of them contain documents up to 500 g.

Figure 13.25: Share of remote commerce in total NPT express volumes in 2019-2023



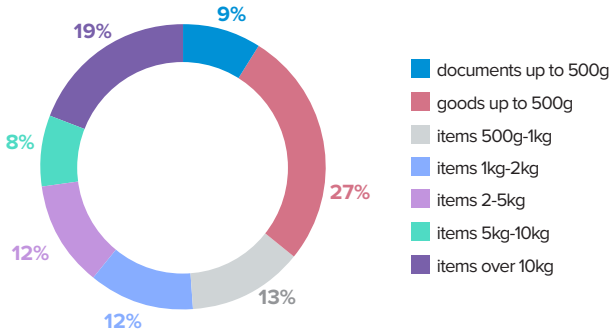
The share of remote commerce in the total 2023 express volumes has increased, compared to 2022.

Table 13.14 and Figure 13.26 show the share in the revenues from express services in NPT (in million dinars) by weight.

Table 13.14: Income share from express services in NPT (in million dinars) by weight, in 2023

	NPT express revenues in million dinars							Total express service revenues		Total income
	Items up to 500g		Items	Items	Items	Items	Items			
	Documents	Goods	500g-1kg	1kg-2kg	2kg-5kg	5kg-10kg	over 10kg	Documents	Goods	
Income	1,617	4,500	2,153	1,960	2,035	1,322	3,168	1,617	15,138	16,755
Share in total income	9%	27%	13%	12%	12%	8%	19%	9%	91%	100%

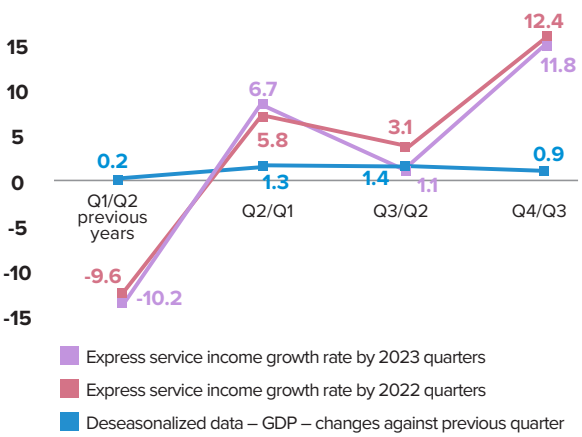
Figure 13.26: Income share from express services in NPT by weight, in 2023



Around 91% of the revenues are accounted for by the items containing goods, with the share of items containing documents being nine times smaller. The biggest share in the income is accounted for by the items containing goods up to 500g, followed by the items with goods over 10 kg, which, despite being less represented in the volume, have a significantly bigger share in the

Figure 13.27 shows the express service income growth rate and the GDP growth rate across the 2023 quarters, including the comparison to 2022.

Figure 13.27: Comparison of GDP and express postal service revenues in NPT by the 2023 and 2022 quarters



The express service income growth rate has been in the range from -10.2% for the first quarter of 2023 compared to the fourth quarter of 2022, to 11.8% for the fourth quarter of 2023 compared to the third quarter of 2023. The express service income growth rate has kept the same pace as the year before. The 2023 growth rate of the GDP deseasonalized data against the previous quarter, however, displays a somewhat different character compared to the year before. [12]

When assessing value changes on a quarterly basis, one should take into account specific features of the postal market, more specifically the fact that the last quarter of the year carries the highest growth rates, resulting in massive discrepancies when comparing the current quarter to the previous one.

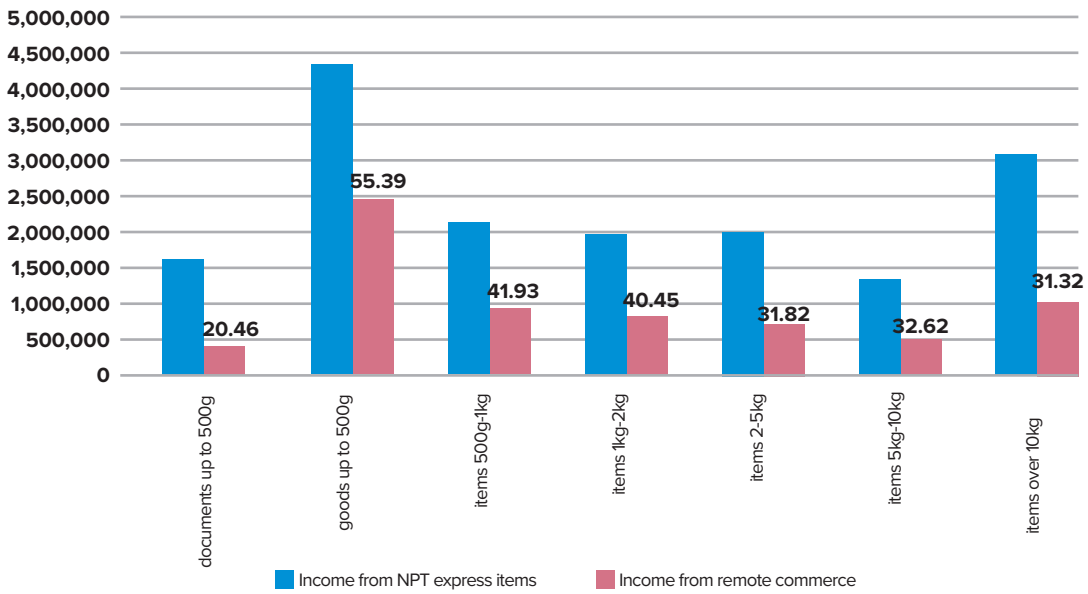
[12] https://publikacije.stat.gov.rs/G2024/HtmlL/G20241056.html; Seasonally adjusted GDP data, changes compared to the previous quarter of 2023.

Table 13.15 and Figure 13.28 show the share of the income from remote commerce in the total NPT express service revenues (in million dinars).

Table 13.15: Share of remote commerce income in NPT express service revenues (in million dinars), by weight, in 2023

	Documents up to 500g	Goods up to 500g	Items 500g-1kg	Items 1kg-2kg	Items 2kg-5kg	Items 5kg-10kg	Items over 10kg	Total
Express service revenues	1,617	4,500	2,153	1,960	2,035	1,322	3,168	16,755
Remote commerce revenues	331	2,493	903	793	647	431	992	6,590
Remote commerce share	20%	55%	42%	40%	32%	33%	31%	39%

Figure 13.28: Share of remote commerce income in NPT express service revenues (in million dinars) in 2023



The revenues stemming from remote commerce make 39% of the total income from the express items in NPT.

The dominant category of items, goods up to 500g, is the one generating most of the income. As for the revenues from items up to 500g, they account for slightly more than 36% of the total NPT express service income. Items of up to 500g generate from remote commerce an income accounting for 43% of the total revenues from remote commerce.

Figures 13.29 and 13.30 show the volume/income ratio of all express services in 2023/2022 and also the volume/income ratio stemming from remote commerce for the same time period.

Figure 13.29: Changes in express items volume and income in 2023/2022

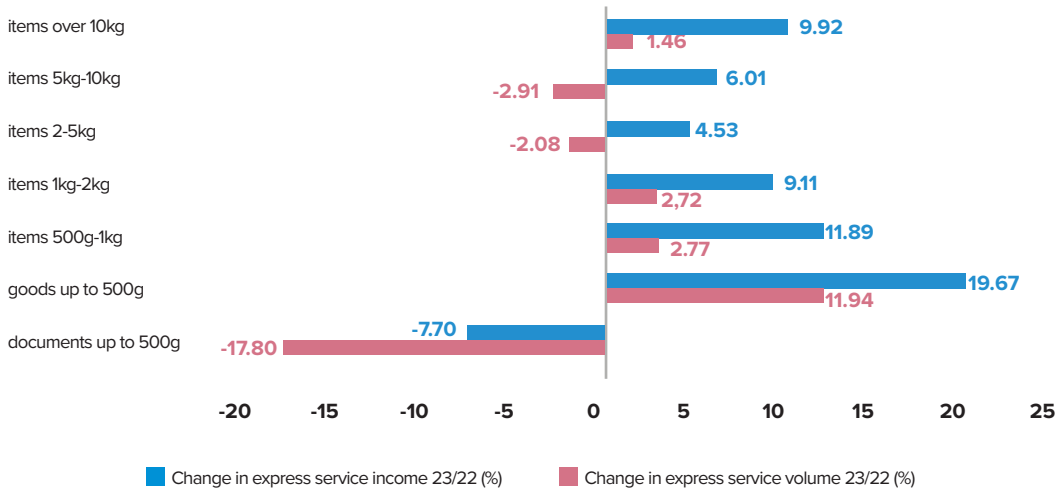
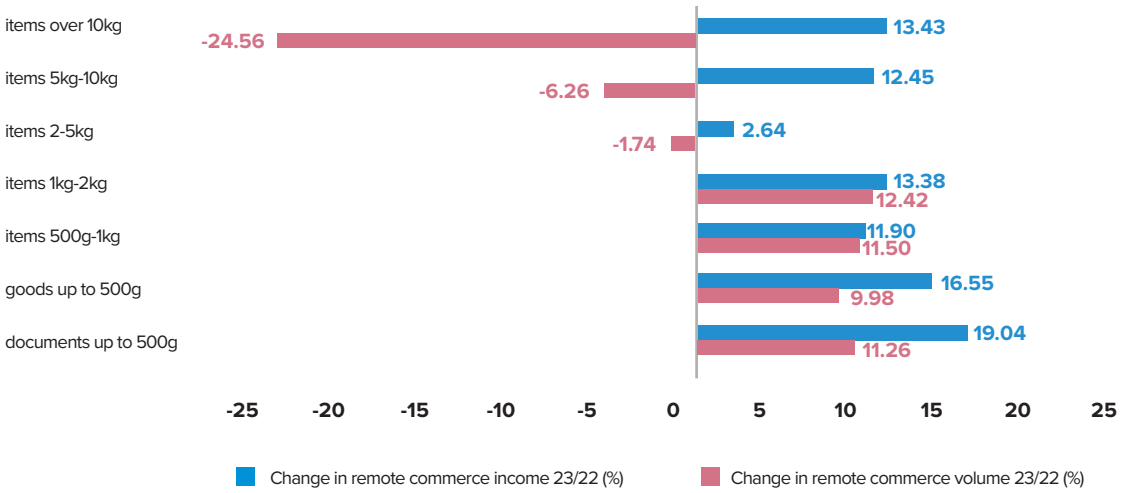
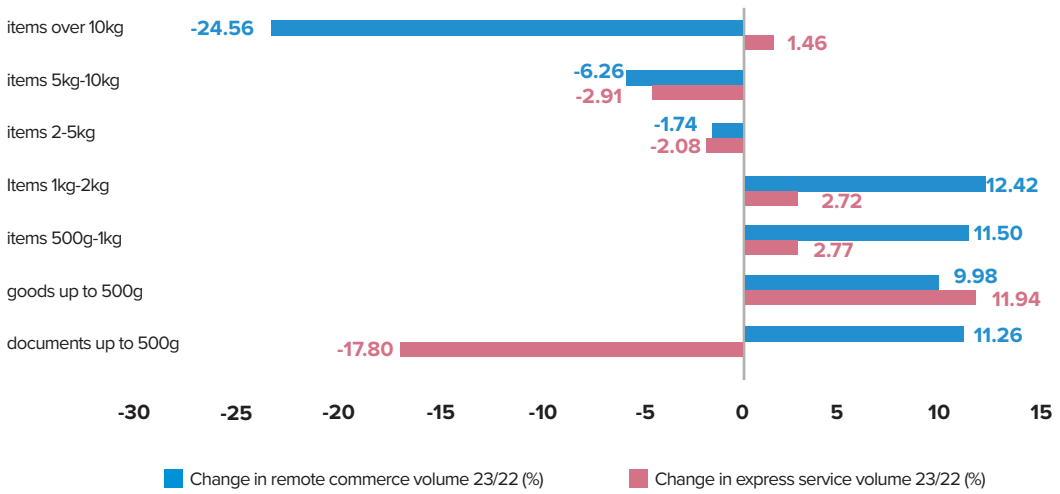


Figure 13.30: Changes in remote commerce items volume and income in 2023/2022



In comparison with 2022, the 2023 express volumes have slightly increased, and so have the remote commerce volumes (Figure 13.31). The express volumes grew by 1.42% compared to 2022, with remote commerce volumes growing slightly more (6.67%).

Figure 31: Changes in express and remote commerce items volumes in 2023/2022



The revenues, like the volumes, have increased in 2023 (Figure 13.32), but the growth rate was a bit higher compared to the volume growth rate, reaching somewhat over 9% compared to 2022. The income growth rate of remote commerce items was 13% compared to 2022.

Figure 13.32: Changes in express and remote commerce items revenues in 2023/2022

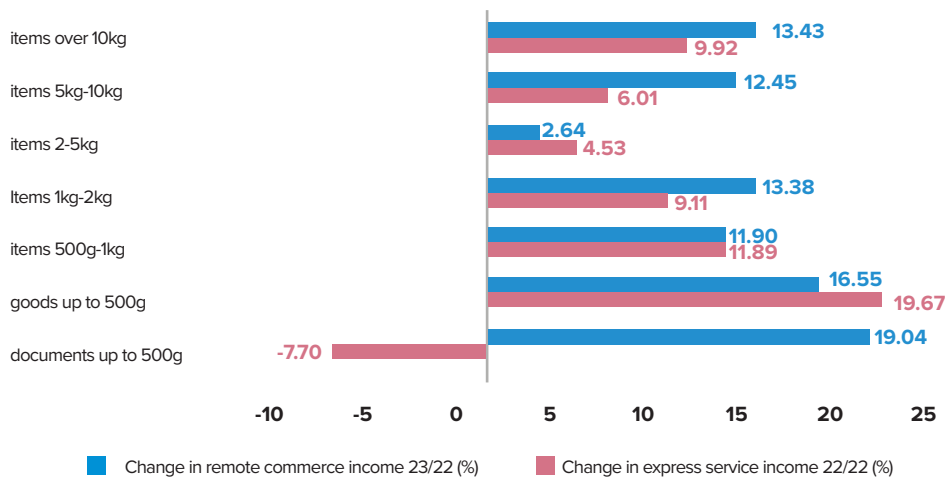
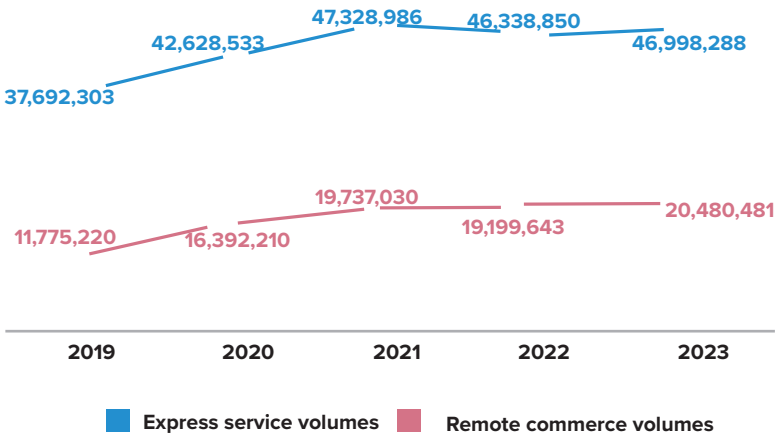


Figure 13.33: Express and remote commerce volume trends in 2019-2023

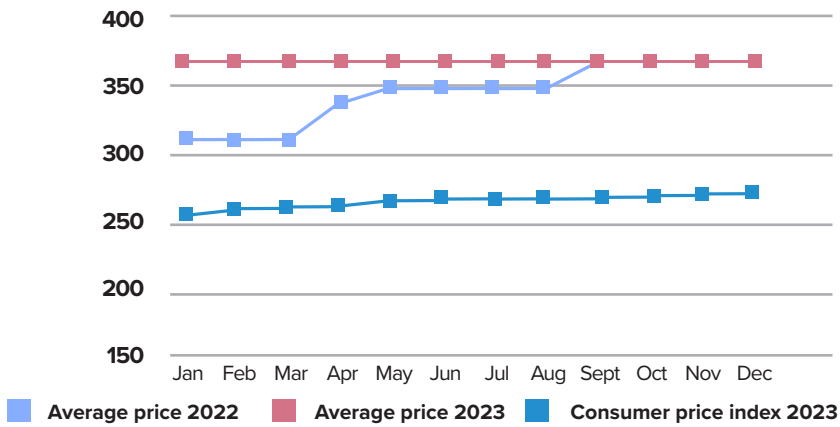


Remote commerce is one of the main motors of the NPT express service market development.

Following a negligible drop in the volumes of these items recorded over the period 2022/2021, in 2023 the observed market segment has regained the growth trend it had followed since the beginning of this market segment monitoring.

As regards the NPT express service price for items up to 0.5kg (the most dominant express service item category), in 2023 no changes have occurred regarding the price of these services at the operators jointly accounting for 99% of the NPT market (Figure 13.34).

Figure 13.34: Trends of express item average price up to 0.5kg for 2023 and 2022, and consumer price index for 2023

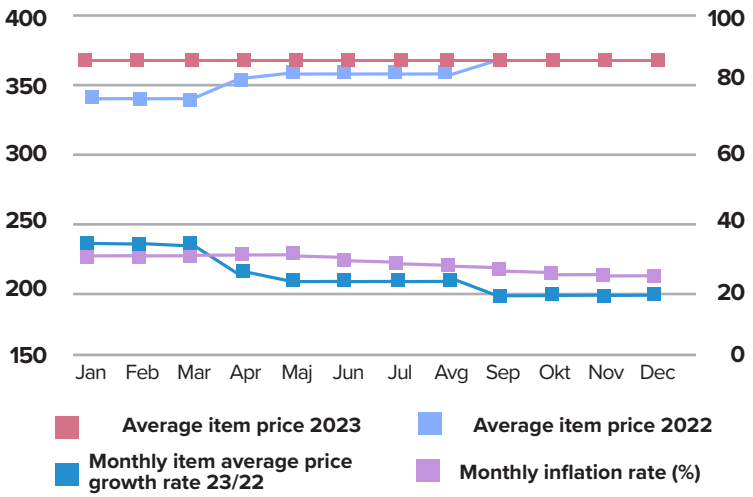


The graph shows a constant average price during most of 2023 – with a price growth being recorded in 2022, from September 2022. On the other hand, the consumer price index was continuously growing throughout 2023, at a slow pace.

[13] Statistical Office of the Republic of Serbia. 2024 Statistical Calendar. https://www.stat.gov.rs/sr-cyrl/publikacije/?d=17&r=

In 2023, the Republic of Serbia saw an average interannual consumer price growth in the amount of 12.1%. [14]

Figure 13.35: Comparison of average prices for items up to 500 g and inflation



The graph shows the ratio of monthly growth rate referring to average prices of items up 500 g (month of 2023 compared to the same month of 2022) and annual inflation rate (month of 2023 compared to the same month of 2022). Monthly growth rate of the average price for an item up to 500 g follows the changes of the annual inflation rate.

Beside the NPT express services, the IPT express items were analyzed as well, based on the postal operators' data submitted through Annual Questionnaires for 2023. During 2023, ten postal operators were providing international postal services. Table 16 shows IPT outbound and inbound express volumes in 2023, according to the weight.

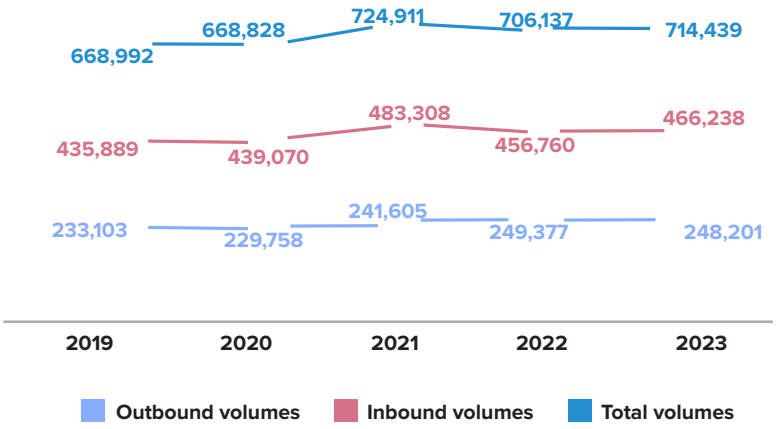
Table 13.16: Volume of international express items in 2023

	Documents up to 500g	Goods up to 500g	Items 500g-1kg	Items 1kg-2kg	Items 2kg-5kg	Items 5kg-10kg	Items 10kg-20kg	Items over 20kg	TOTAL
Outbound volumes	128,102	25,982	23,583	18,187	23,066	11,789	8,567	8,925	248,201
Inbound volumes	134,296	45,095	49,325	52,470	68,955	42,104	29,306	44,687	466,238
Share of outbound items (%)	52%	10%	10%	7%	9%	5%	3%	4%	100
Share of inbound items (%)	28%	10%	11%	11%	15%	9%	6%	10%	100

[14] https://www.stat.gov.rs/sr-cyrl/publikacije/publication/?p=15692

Inbound items make 65% of the IPT total express volumes. In IPT, dominant items are documents up to 500 g (both outbound and inbound).

Figure 36: Trends of international express volumes in the period 2019-2023 (outbound, inbound and total volume)



In comparison to 2022, an increase by 1.2% has been recorded in the total IPT volumes. The outbound volumes grew by 2%, yet the inbound volumes marked a drop by -0.5%.

13.6. Conclusion

Due to a drop in the volume of services from the UPS scope, a decrease in the total volume of services was recorded in the postal services market in 2023. As the Government of the Republic of Serbia, in April 2023, raised the prices of reserved postal services, which subsequently entailed price alignment of certain weight categories in the non-reserved area within UPS, the revenues starkly increased, contributing to a significant surge in the total postal revenues.

The last quarter of 2023 was marked by the strike of the PPO employees, causing a spillover of part of the services to the express and courier service flows.

In the UPS area, the volume of letter-post items is declining, as part of a years-long trend on a global level. As per the most recent ERGP report, a drop by 5.7% of the letter-post volumes was recorded[15] in 2022, compared to 2021. In Serbia, a decline of 4.5% was recorded in 2022, a trend which continued in 2023 as well, with a drop rate of more than twice as high (10.3%).

[15] ERGP (22) 12 Report on core indicators

The parcel services, on the other hand, have been expanding. However, despite an exponential yearly growth, parcel volumes still represent a negligible share compared to letter-post items. In 2022, letter-post volumes were more than 260 times bigger than parcel volumes, whereas in 2023 that ratio was reduced to 110 times bigger volumes in favor of letter-post items.

The most dominant categories within UPS are court and administrative letters, suggesting that there is still a need to communicate with citizens in written form, via the postal service, similar to many other countries using the „government letter" service. On the other hand, certain most developed countries, with a high level of digital literacy, completely supstituted these letters with e-forms. In Serbia, certain state institutions' services are fully available to citizens in e-form, through e-government.

The new Law on Electronic Communications, which entered into force in May 2023, stipulates obligatory e-delivery of electronic communications bills, which is likely to affect a further reduction in the letter-post volumes.[16]

After a decrease in the volumes of the year before, other postal services marked a growth, consequently followed by an increase in revenues as well. It is noteworthy that the OPS prices have not changed since September 2022, therefore the income growth was directly affected by the volume increase, partly initiated by a spillover of items from the PPO's flows into the flows of other operators providing express UPS and courier services.

After a drop in 2022, the volume of express postal services in NPT returned to the positive trends of the previous years. The increase in the express volumes has been influenced by a significant volume growth of items stemming from remote commerce.

In accordance with its legal competencies, RATEL continued to perform its activities during 2023, in order to foster competition and improve quality of postal services, by upgrading a unique GIS (postal geographic information system) „Price of Services" portal providing information to users on comparative prices of express and courier services in NPT, and comparative data on quality parameters for five express postal service operators accounting for 99% of the volumes througout 2023.

In 2023, pursuant to the Action Plan of the Strategy for the development of postal services in the Republic of Serbia („Official Gazette of RS", No. 68/21), a project „Study on the UPS sustainability and UPS definition corresponding to the changing

[16] "Službeni glasnik RS", No 35/23

user needs“ was launched, in collaboration with the PPO and line ministry. The study explores the aspects of the UPS scope, quality of the UPS transmission and availability, the results of which will be fed to an amended version of the Law on Postal Services. The redefining of the UPS scope is one of the main tasks of ERGP (European Reguators Group for Postal Services) to be carried out at the EU level.

According to the data of the Statistical Office of the Republic of Serbia, an increase in the number of users buying on the Internet has been recorded in 2023, which corresponds to the trend representing the volume of items stemming from remote commerce. In 2023, 26% of online users have never[17] used online purchasing services, so a further postal volume growth in this market segment is expected, as regards the volumes stemming from remote sales, predominantly in the form of express services in NPT. All of the above is confirmed in the official government plans to make Internet access available to the users nationwide, particularly in rural areas, for the purpose of achieving socio-economic connectivity.

Since the goods purchased through remote commerce are most usually delivered in parcels, expansion and modificaion of this type of postal service are expected in the following period, directly depending on consumer price growth rates, inflation and consumer purchasing power. The ability to identify the users' needs and tailor the services to match those needs will be a key contributor to the further development of postal services.

[17] https://data.stat.gov.rs/Home/Result/270207?languageCode=sr-Latn

14 QUALITY OF POSTAL SERVICE PROVISION

In accordance with relevant legal obligations, quality parameters for the provision of postal services[1] are prescribed by RATEL. The quality of universal postal service (hereinafter: UPS) is monitored by RATEL based on the results of an independent quality measurement carried out by the public postal operator (hereinafter: the PPO) as the sole universal service provider (USP) in the Republic of Serbia. Beside the independent UPS quality screening carried out by RATEL since 2021, RATEL has also been organizing, as of 2022, a single independent comparative measurement of express service quality parameters in national postal traffic (NPT) (quality benchmark) for five major operators with the biggest market shares. Considering the significant growth of postal express volumes, that have become popular with postal users particularly as a means of delivery of goods purchased online, this type of items was also included in the screening.

14.1. Quality of universal postal service provision

The quality of universal postal service provision is analyzed based on the data from an independent RATEL's measurement, internal PPO's measurement, international measurements with the participation of the PPO and RATEL's annual questionnaire data. Fot the UPS quality assessment, beside transmission time parameters assessing the speed of transmission, several other indicators are analyzed as well: reliability of transmission and delivery, UPS availability, efficiency of complaint resolution etc.

RATEL has set the dynamics of reaching the full targeted transmission times prescribed by the standards for 2023.

It is also stipulated that the PPO, as the sole USP, is obliged to submit to RATEL an annual report on the state of the UPS quality. The annual report shall be made in accordance with standards SRPS EN 13850:2014, SRPS EN 14508:2014 and SRPS EN 14012:2014.

Pursuant to the legal provisions, RATEL carried out a three-year long independent screening of transmission times of non-recorded letter-post items in NPT, over the period 2021-2023.

Along with RATEL's independent measurement, the PPO carried out in 2023 an AMQM screening - a continuous measurement of priority non-recorded letter-post transmission times with internal panellists. Additionally,[2] the PPO conducted a screening of parcel transmission times in NPT over 2022, via an internal application,

[1] Rulebook on Quality Parameters for Postal Services ("Službeni glasnik RS ", No. 114/20, hereinafter: the Rulebook).
[2] Internal measurement conducted by the Postal Operator (JPO) is performed in accordance with the JPO's internal act: Methodology for Monitoring Quality in Postal Traffic.

including monitoring of delivery and payment of postal money orders. The quality of services in international postal traffic (IPT) is measured by global systems for the measurement of transmission times of both letter-post and parcel items.

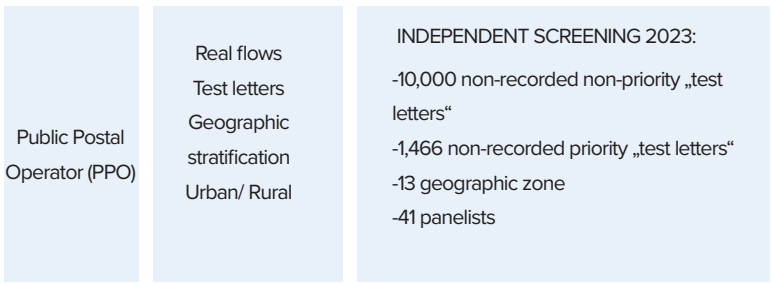
14.1.1. Speed and reliability of postal items transmission and delivery

In line with the delivery standards prescribed by RATEL, transmission and delivery times of non-recorded priority and non-priority letter-post items in NPT and non-recorded priority and air letter-post items in IPT represent the parameters by which speed and reliability of postal items' transmission and delivery are measured.

The undertaken three-year long independent screening of quality according to standard SRPS EN 13850:2014 was continued in 2023, during which transmission times of the NPT non-recorded letter-post items, i.e. priority and non-priority items, were measured over the first, second and third year.

In the aim of establishing measurement systems reflecting the real postal flows, RATEL, in collaboration with the PPO, has set necessary independent screening parameters (Figure 14.1).

Figure 14.1. Process of defining the independent screening transit times based on real postal flows



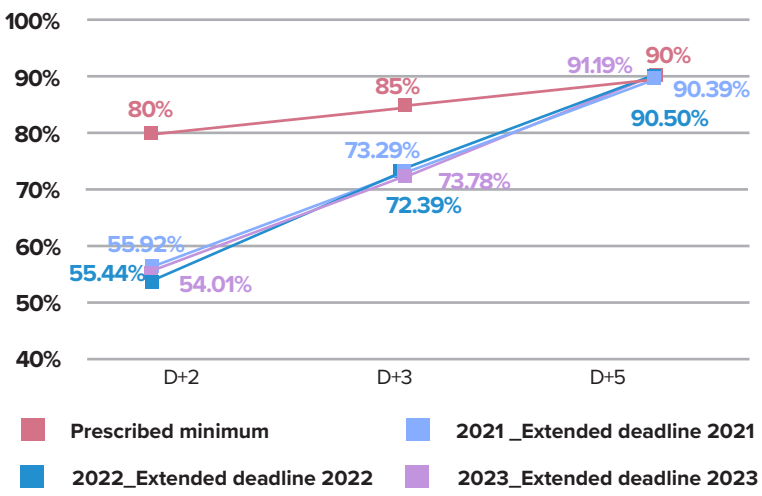
The measurement results were analyzed by RATEL on a monthly, quarterly and annual basis, and made available to the PPO, along with final conclusions and remarks.

However, the 2023 results as well were way beyond the required minimum values prescribed for non-priority non-recorded letter-post items (Table 14.1. and Figure 14.2)

Table 14.1. Delivery times for NPT non-priority non-recorded letter-post items 2021-2023

Deadline	Prescribed minimum	Non-priority non-recorded items in 2021		Non-priority non-recorded items in 2022		Non-priority non-recorded items in 2023	
		Achieved result	Achieved result (extended deadline)	Achieved result	Achieved result (extended deadline)	Achieved result	Achieved result (extended deadline)
D+2	80%	50.02%	55.92%	46.97%	54.01%	49.51%	55.44%
D+3	85%	69.97%	73.29%	68.38%	73.78%	67.98%	72.39%
D+5	90%	87.97%	90.39%	89.54%	91.19%	88.69%	90.50%

Figure 14.2. Comparison of corrected delivery times for NPT non-priority non-recorded letter-post items 2021-2023



Based on the data from Table 14.1, it is clear that there were no improvements in the transmission time values, and that the achieved results for deadlines D+2 and D+3 have been lower in 2023, whereas for deadline D+5, the prescribed minimum

[3] The deadline has been extended in accordance with Article 15 of the Rulebook on Quality Parameters for the Provision of Postal Services for areas exempt from five-day delivery.

was achieved. The results were slightly better for the areas exempted from five-day delivery (Figure 14.2).

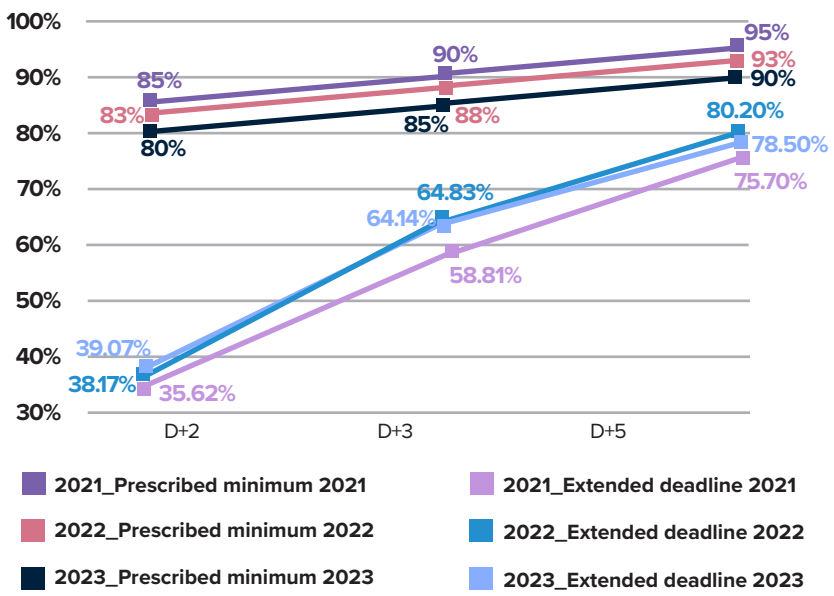
Despite priority letters being non-recorded items with priority of transport over non-recorded non-priority items, their results were also way beyond the prescribed standards for priority non-recorded letter post items (Table 14.2).

Table 14.2. Delivery times for priority letters (non-recorded letter-post items in NPT) 2021-2023

Deadline	Priority letters in 2021			Priority letters in 2022			Priority letters in2023		
	Prescribed minimum	Achieved result	Achieved result (extended deadline[4])	Prescribed minimum	Achieved result	Achieved result (extended deadline)	Prescribed minimum	Achieved result	Achieved result (extended deadline)
D+2	80%	29.74%	35.62%	83%	31.88%	38.17%	85%	32.07%	39.07%
D+3	85%	56.51%	58.81%	88%	57.91%	64.83%	90%	59.04%	64.14%
D+5	90%	73.23%	75.70%	93%	75.78%	80.20%	95%	74.05%	78.50%

A comparative overview of the corrected transmission time results, after the deadline extension for the areas exempted from five-day delivery (in accordance with Article 15 of the Rulebook), also reveal themselves to be beyond the prescribed values (Figure 14.3).

Figure 14.3. Comparison of corrected delivery times for NPT priority non-recorded letter-post items 2021-2023



[4] The deadline has been extended in accordance with Article 15 of the Rulebook on Quality Parameters for the Provision of Postal Services for areas exempt from five-day delivery.

The achieved 2023 results, in comparison to the year before, were slightly better except for deadline D+5, however still beyond the prescribed values for priority non-recorded letter-post items in 2023. Significantly better results were recorded by the PPO, by means of an internal AMQM screening, on a sample of 13,703 priority letters (corrected results: D+1: 76.13%, D+2: 90.92%, D+3: 94.52%).

In IPT, for the European countries, „end to end" transmission times[5] from collection to delivery are defined for priority non-recorded letter-post items. The „end to end" transmission times for priority non-recorded letter-post items in IPT are set by the UPU measurement system GMS WORLD. The PPO was included in this international global screening in 2023 as well, and the measurement results are shown in Table 14.3. and Figure 14.4.

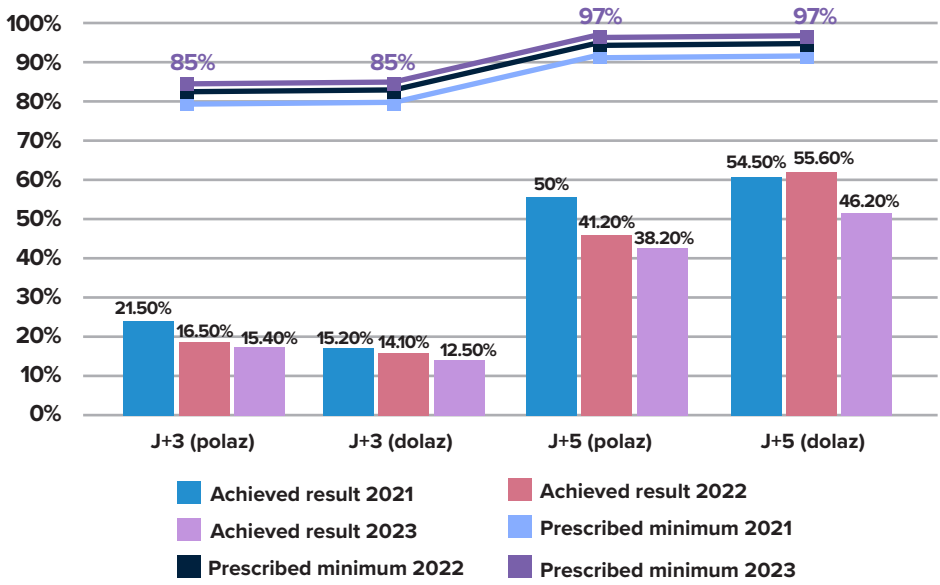
Table 14.3. Delivery times for IPT priority non-recorded letter-post items 2021-2023

	Achieved result 2021	Prescribed minimum 2021	Achieved result 2022	Prescribed minimum 2022	Achieved result 2023	Prescribed minimum 2023
J+3 (outbound)	21.5%	80%	16.5%	83%	15.4%	85%
J+3 (outbound)	15.2%		14.1%		12.5%	
J+5 (outbound)	50%	92%	41.2%	95%	38.2%	97%
J+5 (outbound)	54.5%		55.6%		46.2%	

Based on the achieved 2023 results for the IPT priority non-recorded letter-post item transmission times, it is noticeable that no quality targets for any of the criteria were reached, furthermore they were even lower than in 2022.

[5] For other countries worldwide, quality is measured within internationally recognized independent measurement systems organized by the Universal Postal Union and the International Post Corporation, with a prescribed minimum quality standard of 80% for J+5.

Figure 14.4. Comparison of delivery times for IPT priority non-recorded letter-post items 2021-2023



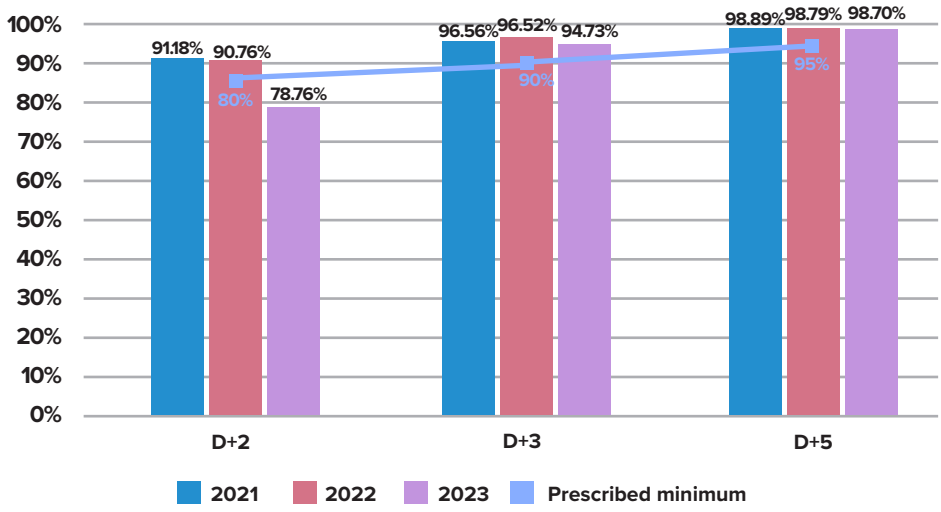
The Rulebook also prescribes the dynamics of reaching a minimum quality for the delivery of inbound priority non-recorded letter-post items in IPT. This quality requirement must be fulfilled by the UPS from the arrival in the office of exchange until the delivery. However, this year as well, the PPO reported that, due to years-long problems lasting from as early as 2017 regarding the RFID equipment installed at the office of exchange, it was not possible to establish the deadlines and submit the results on the achieved delivery times for priority non-recorded letters in IPT to RATEL. The installation and the beginning of measurement using new equipment have been put off for 2024.

The PPO measured the NPT parcel transmission times by means of an internal application on a sample of 33,786 parcels, throughout 2023. Based on the measurement results, the 2023 quality targets were reached, except for deadline D+2 (Table 14.4, Figure 14.5).

Table 14.4. NPT parcel transmission times 2021-2023

NPT	Prescribed minimum	Achieved result 2021	Achieved result 2022	Achieved result 2023
D+2	80%	91.18%	90.76%	78.76%
D+3	90%	96.56%	96.52%	94.73%
D+5	95%	98.89%	98.79%	98.70%

Figure 14.5. Comparison of NPT parcel transmission times 2021-2023



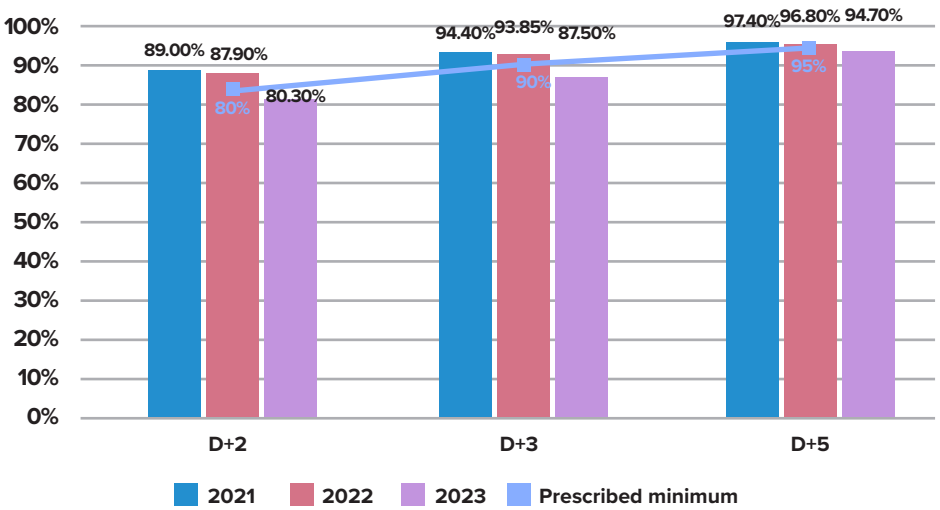
The IPT parcel transmission times are analyzed based on the data provided by the PPO, via the UPU international quality monitoring system QCS (Quality Control System). Delivery deadlines for inbound USO parcels in IPT are calculated from the moment of arrival in the office of exchange to delivery to the recipient, not counting the time spent at the customs. The measurement sample contained 69,676 parcels, arrived in the Republic of Serbia during 2023.

Inbound UPS parcels in IPT fulfill the deadline standards prescribed by the Rulebook on quality parameters for performing postal services for deadline D+2, while the targets for deadlines D+3 and D+5 were not reached (Table 14.5, Figure 14.6).

Table 14.5. IPT inbound parcel transmission times 2021-2023

Inbound IPT	Prescribed minimum	Achieved result 2021	Achieved result 2022	Achieved result 2023
D+2	80%	89.00%	87.90%	80.3%
D+3	90%	94.40%	93.85%	87.5%
D+5	95%	97.40%	96.80%	94.7%

Figure 14.6. Comparison of IPT parcel transmission times 2021-2023



Based on the PPO data, the share of postal money orders collected and sent for delivery on the first business day has remained 99.8% in 2023 as well, which is an extremely high value, exceeding the prescribed standard (90%).

As regards the overall achieved results compared to the prescribed values of postal items transmission times, the conclusion is that there was a mild decrease of quality of the NPT and IPT parcel transmission throughout 2023, however with achieved deadlines close to the prescribed targets. On the other hand, the transmission times of non-recorded letter-post items (both priority and non-priority) failed to meet the prescribed quality standards, thus continuing a negative trend. The results of RATEL's independent screening and analyses have once again shown that the PPO must undertake concrete effective measures in order to improve quality and achieve prescribed deadlines.

14.1.2. Availability of universal postal service

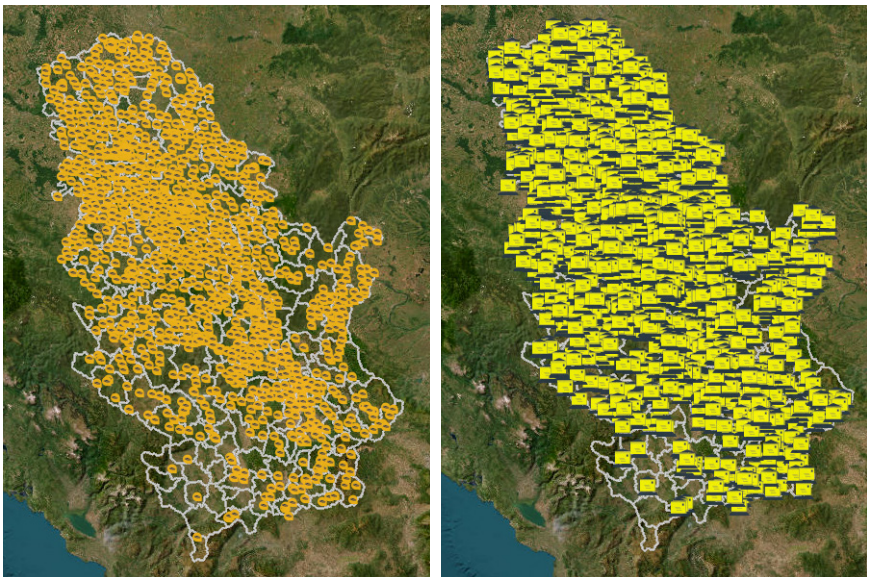
The availability of universal postal service is assessed on the basis of the territorial accessibility of post offices, accessibility of post letter boxes, working hours of post offices, availability of post office counters and availability of postal items delivery.

In 2023, the expansion of the PPO postal network has continued, with 18 new post offices (1.17%) (Table 14.6, Figure 14.7). Out of 1,558 post offices, 1,350 are corporate units, and 208 contracted units, with a recorded increase in both categories. The number of post offices adapted to the needs of the persons with disabilities has been increased as well, amounting to 274 in 2023.

Table 14.6. Availability of post offices and letter boxes 2019-2023

	Year					Growth rate (%)			
Postal network capacities	**2019**	**2020**	**2021**	**2022**	**2023**	**20/19**	**21/20**	**22/21**	**23/22**
Number of post offices	**1,526**	**1,518**	**1,500**	**1,540**	**1,558**	**-0.52%**	**-1.19%**	**2.67%**	**1.17%**
Number of letter boxes	**1,969**	**1,927**	**1,895**	**1,895**	**1,865**	**-2.13%**	**-1.66%**	**0.11%**	**-1.69%**

Figure 14.7. Network of the PPO post offices and letter boxes (source[6]: GIS portal)



Based on a ERGP report for 2021[7], the European average number of postal network units (PNUs) per 10,000 inhabitants was 2.6, whereas in the Republic of Serbia, according to the 2023 data, there were 2.5 PNUs per 10,000 inhabitants. The lowest number of PNUs per inhabitant is in the capital area, where the population density is

[6] https://gis.ratel.rs/smartPortal/postanskeUsluge

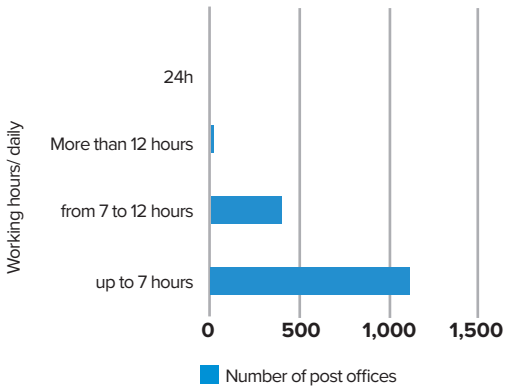
[7] ERGP (22) 12 Report on core indicators

the highest, and the post offices have considerably bigger capacities (in terms of the counters) compared to other regions of the country.

Despite a modest increase in the number of postal letter boxes in 2022, the following year (2023) marks a repeated drop in the number of postal letter boxes (-1,69%). Based on the results of an internal screening of the postal items volumes inserted in letter boxes during one month, the PPO establishes a daily average and analyzes the justifiability of postal letter boxes on specific locations.

One of the criteria for the quality of postal service availability are working hours of post offices, indicating how many hours a day the post offices are available to customers. The post office structure in terms of working hours is shown in Figure 14.8.

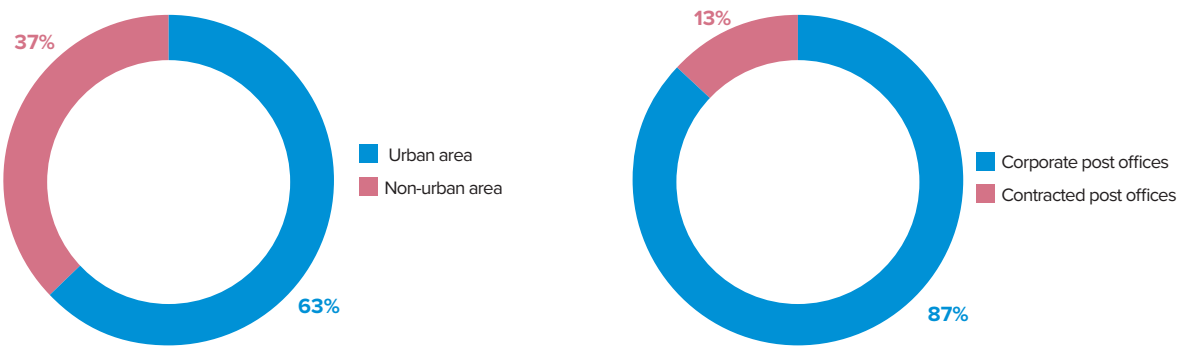
Figure 14.8. Total number of post offices by working hours in 2023



Out of a total of 1,558 post offices, 1,119 (71.8%) are identified as working with customers up to 7 hours a day, 405 (25.9%) post offices work with customers from 7 to 12 hours a day, 27 (1.7%) post offices work more than 12 hours, whereas 7 (0.5%) work around the clock.

Out of 1,350 corporate post offices, 348 units have working hours of less than 4 hours – the same number as in 2022. Compared to 2022, the number of post offices working more then 12 hours a day fell by -32%. Figure 14.9. shows the structure of post offices situated in urban and non-urban areas, and the PNU ownership structure.

Figure 14.9. Post offices area of business operation and ownership structure



One of the parameters of availability of postal counters for the UPS provision is the time of waiting in line for postal item collection, established by the PPO screening. During 2023, the PPO has not performed the screening of this particular parameter.

Regarding the current number of PNUs in 2023, RATEL performed an analysis of the distance postal users need to cross via a street network, i.e. an analysis of minimum distance between inhabitants/households and the UPS access point. Another 121 special purpose counters were added to this UPS access point network. The analysis was carried out at a municipal level, on a sample of 127 municipalities in the Republic of Serbia (75.6% municipalities). The results are shown in Table 14.7.

As can be seen in the Table, 76.76% of the inhabitants nationally are currently up to a 2.5 km distance from the closest UPS access point, with 89.35% up to a 5 km distance and 98.43% of the inhabitants up to a 10 km distance from the access point.

As regards the regions, the largest access point network availability is recorded in the region of Vojvodina (95.61% of the inhabitants up to a 2.5 km distance), followed by the Belgrade area with 90.60% of the inhabitants up to a 2.5 km distance, with the regions of Southern and Eastern Serbia accounting for somewhat smaller share (68.83% of the inhabitants up to a 2.5 km distance), whereas the lowest availability is recorded in the regions of Šumadija and Western Serbia (64% of the inhabitants up to a 2.5 km distance).

Table 14.7. Inhabitant share regarding distance from PPO access point up to 2.5km, 5km, 10km and more than 10km in the Republic of Serbia

Region	% inhabitants up to 2.5km distance	% inhabitants up to 5km distance	% inhabitants up to 10km distance	% inhabitants more than 10km distance
Belgrade area	90.60%	97.93%	99.98%	0.02%
Šumadija and Western Serbia	64%	82.49%	97.84%	2.16%
Vojvodina	95.61%	99.08%	99.95%	0.05%
Southern and Eastern Serbia	68.83%	84.95%	97.13%	2.87%
Republic of Serbia	76.76%	89.35%	98.43%	1.57%

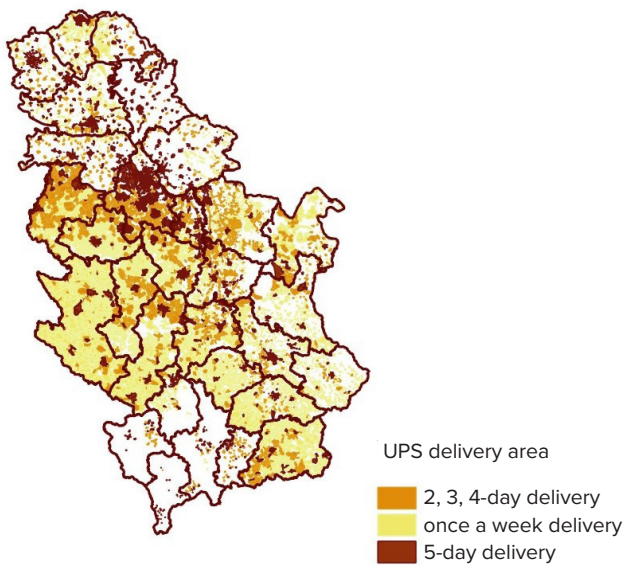
14.1.3. Availability of postal delivery

The availability of postal items delivery is the accessibility of delivery to users at the address and the operators' business premises. The Postal Directive prescribes that the USP must deliver postal items to all inhabitants at least 5 days a week, with possible exceptions. The legislation of the Republic of Serbia also prescribes a 5-day delivery, i.e, delivery on business days, with possible exceptions, defined by RATEL. The prescribed exemptions primarily refer to the settlements with less than 1,000 households, which are allowed, depending on the number of households, to have their mail delivered less than five days a week (Table 14.8).[8]

Table 14.8. Inhabitants and households per delivery area

	2022. godina			2023. godina		
Settlement category	Number of inhabitants	Number of households	% of households	Number of inhabitants	Number of households	% of households
More than 1,000 households	5,119,015	2,076,885	71%	4,726,350	2,086,052	71%
From 250 to 1,000 households	1,346,935	546,478	19%	1,253,453	553,232	19%
From 250 to 1,000 households	720,912	292,488	10%	661,394	291,917	10%
Total	7,186,891	2,915,851	100%	6,641,197	2,931,201	100%

Figure 14.10. Map of UPS delivery coverage by weekly delivery frequency (source: GIS portal)



[8] Articles 11 and 12 of the Rulebook on Postal Service Conditions (" Službeni glasnik RS, " No. 115/2020).
[9] https://gis.ratel.rs/smartPortal/postanskeUsluge

The analysis of the data regarding the delivery coverage of the inhabitants and households (Figure 14.10) according to the weekly delivery frequency revealed that 71% of the households have everyday or 5-day delivery. Around 19% of the households have delivery 2, 3 or 4 days a week, whereas 10% of the households have a once-a-week delivery.

The share of the inhabitants of the Republic of Serbia not covered by the 5-day UPS provision at the collection phase is 3.26%.

14.1.4. Security of postal items

The security of postal items is assessed based on the share of lost and damaged recorded items per 100,000 items of the respective category.
The number of lost and damaged registered items, court letters, insured letters, parcels and money orders for the period 2019-2023, based on the data provided by the PPO, is shown in Table 14.9.

Table 14.9. Lost and damaged recorded items in NPT

TYPE OF ITEM	2019	2020	2021	2022	2023
REGISTERED ITEMS					
- lost per 100,000 items	36	36	5	5	2
- damaged per 100,000 items	0	0	0	0	0
COURT LETTERS					
- lost per 100,000 items	12	14	13	16	18
- damaged per 100,000 items	0	0	0	0	0
INSURED LETTERS					
- lost per 100,000 items	0	6	1	1	1
- damaged per 100,000 items	0	1	0	1	0
PARCELS					
- lost per 100,000 parcels	2	2	2	4	3
- damaged per 100,000 parcels	1	6	4	2	4
MONEY ORDERS					
- lost per 100,000 items	0	0	0	0	0
Percentage of lost and damaged items	0,011	0,013	0,008	0,010	0,007

There was a decrease in the number of lost registered letters and parcels in 2023, as well as a modest increase in the number of lost court letters per 100,000 collected items.

Also, the independent screening carried out by RATEL has pointed to the problem of a high number of non-recorded items in NPT on a defined sample. Table 14.10 shows the number of lost non-priority non-recorded letter-post items and priority letters against the sample.

Table 14.10. Lost and damaged NPT non-recorded items 2021-2023, RATEL's independent screening

Year	Non-priority items			Priority items		
	Non-priority sample	Number of lost items	%	Priority sample	Number of lost items	%
2021	10,094	629	6,23	581	42	7.23
2022	10,089	691	6,85	1,868	105	5.62
2023	10,000	697	6,97	1,466	94	6.41

A negligibly higher percentage of lost non-priority „test letters" was recorded in 2023, compared to 2022, wheres the share of lost priority „test letters" rose from 5.62% to 6.41%.

For a third year in a row, RATEL has recorded a great number items being lost in the course of independent screening. The PPO was informed accordingly and advised to undertake more efficient measures in order to resolve the problem of postal items' security.

14.1.5. Survey on the satisfaction of postal users' needs

Every two years, RATEL undertakes an independent survey of the satisfaction of postal users' needs. The survey took place[10] from January 29, 2024 till February 23, 2024 and comprised two target groups – natural persons (1,200 respondents) and legal persons (300 legal entities).

The majority of natural persons (76%) is satisfied with the scope of services offered by the PPO. Almost half of them thinks there is a room for introducing new services related to the improvement of the system operation. Most of the respondents said

[10] https://www.ratel.rs/cyr/page/cyr-studije-iz-oblasti-postanskih-usluga

that more parcel lockers were needed in order to solve the problem of failed delivery due to various reasons.

The following results were obtained with respect to the users' needs based on the natural persons sample:

• 80% of the inhabitants of urban settlements consider that a letter can be delivered a day after the mailman collects the item for delivery;

• 59% of postal service users had negative experience over the last year during the delivery of letters/parcels by the PPO (one should take into account the one-month long strike of the PPO employees in November 2023);

• 85% of postal service users are satisfied with the distance to the post office, with the majority of dissatisfied customers being in sparsely populated areas;

• Preferred time distance to the closest post office is 7 minutes. For the users that see the need to have a closer post office opened in their neighborhood (considering the whole territory and regardless of the manner of travel) the average time distance to a post office is 15 minutes;

• 29% of the respondents have the need for extended working hours of the post office, with an expected extension by 2 or 3 hours with respect to the existing working hours. The inhabitants of Belgrade and densely populated rural areas have the most need for a working time extension;

• 73% of the urban population consider the work of post offices on Saturdays important. The proposal of postal office working hours on Mondays, Wednesdays and Fridays from 9h to 15h, on Tuesdays and Thursdays from 13h to 19h and on Saturdays from 9h to 13h was rated as acceptable by 47% of the population;

• The quality of letter-post and parcel services is most usually (78% and 76%) rated with the highest marks (4 and 5 on a five-grade scale);

• The introduction of new services (hybrid letter, e-government assistance services and services targeting vulnerable categories of the population) is rated as important. The hybrid letter service revealed to be fairly less important (60%) compared to the other proposed services (89% for e-services and 92% for services targeting vulnerable categories);

• Natural persons expressed a wish for a continued provision of the priority letter service, despite the fact of it being rarely used. The similar applies for the transmission of cumbersome parcels, that 87% of the respondents find neccessary to be provided by the PPO;

• As regards non-core postal services such as inpayments and outpayments, 97% of the population think those should be kept.

As for the legal persons sample, the following results, among other, were obtained:

• 74% of legal persons were satisfied with the scope of services currently offered by the PPO, with only 24% considering the introduction of new services to be necessary. Legal entities find it more important to improve the provision of the existing services, in particular regarding frequent delays and misoperation. A need for more parcel lockers was observed;
• The priority letter service is considered less important (37% of the respondents want to keep it). Only 17% think that direct addressed mail is important. Three out of five legal persons consider the cumbersome parcel transmission service as relevant;
• 84% of legal entities think that services targeting vulnerable population categories should be introduced, wheras 42% of the respondents would opt for the service of hybrid mail;
• 56% of the respondents consider a 2-day delivery satisfactory;
• 87% of legal entities are satisfied with the distance from the post office, as are the businesses that dispatch their mail in the Belgrade area. On the national level, the average time distance to the post office is 6 minutes, with a maximum acceptable average time distance being 13 minutes (regardless of the manner of travel);
• 11% of legal persons have expressed the need for extended working hours of post offices, with a modest expected extension by 1 or 2 hours with respect to the existing working hours. Urban area businesses are 50:50 divided with respect to post offices working on Saturdays. The similar goes for the proposal on the working hours schedule (Mondays, Wednesdays and Fridays from 9h to 15h, Tuesdays and Thursdays from 13h to 19h and Saturdays from 9h to 13h), which is acceptable to 35% of legal entities. The proposition to have a post office open for at least 4 hours a day has been poorly rated (only acceptable to 28% of the respondents). Rural businesses expect a five-day working week (77%), with business hours of at least 6 hours a day (62%);• The quality of letter-post and parcel services was rated with high marks by legal persons, despite half of them experiencing delayed delivery of letters and parcels over the surveyed year.

14.1.6. UPS related complaints

Zakon definiše razloge zbog kojih korisnik može da podnese reklamaciju poštanskom operatoru. Ukoliko pošiljalac smatra da registrovana poštanska pošiljka nije uručena primaocu, ili nije uručena u propisanom roku, ili je oštećena ili umanjenog sadržaja, ima pravo da pokrene reklamacioni postupak, odnosno ostvari naknadu štete za opravdanu reklamaciju. Takođe, reklamacioni postupak sa mogućnošću nadoknade štete pokreće korisnik za neizvršenu, nepotpunu ili pogrešno izvršenu poštansku uslugu.

In NPT, out of 44,188,368 UPS items (belonging to the following categories: registered letters, insured letters, registered printed matter, court letters, postal money orders and parcels up to 10 kg), 56,481 complaints were filed, most of which were unfounded (85%). Along a smaller volume of postal items being recorded in 2023, the number of complaints also decreased, by -2%. The majority of filed complaints concern court letters (90.4%).

Based on a justified complaint, the user is entitled to be indemnified. Out of the total number of paid damage compensation claims, the majority was regarding lost items (73.4%), other claims (12.9%), damaged items (8.1%) and exceeded transmission deadline (5.6%), (Table 14.11).

Table 14.11. Structure of indemnified claims regarding UPS in NPT in 2023

Number of indemnified claims	Resolved on the basis of:				Indemnity
	Loss	Damage	Exceeded deadline	Other complaints	Amount (in dinars)
1=2+3+4+5	2	3	4	5	6
665	488	54	37	86	1,056,536.6

As for the complaint handling procedures in NPT, they were resolved in average in 6 days, during 2023. As of 2022, the complaint resolution procedure became twice as long as in the previous years, however still within legal prescriptions. Overall complaint realization and payout were decreased from 12 days to 11 days, (Table 14.12), which also complies with the prescribed deadlines.

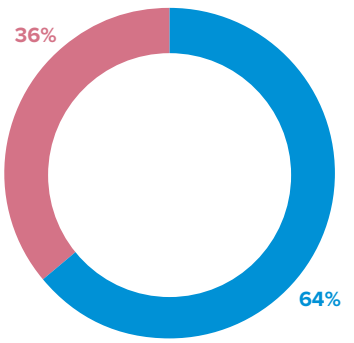
Table 14.12. Average time for complaint resolution, realization and payment of indemnity in NPT

Year	Resolution of damage claim	Indemnity realization	Indemnity payment	Total for resolution and indemnity payment
	(days)	(days)	(days)	(days)
	1	2	3	4=2+3
2019	3	6	5	11
2020	3	9	5	14
2021	3	7	4	11
2022	6	7	5	12
2023	6	6	5	11

For IPT items, the complaint procedures are more complicated, with considerably longer deadlines, due to complaint handling procedures being carried out in at least two countries (Figure 14.11).

Table 14.13. shows an overview of paid indemnities, according to the types of recorded postal items in NPT, for the period 2019-2023.

Figure 14.11. Structure of complaints regarding inbound and outbound items in 2023



In IPT, there were 3,756 complaints regarding UPS, which is by 29% more than in 2022, when 2,905 were recorded. Outbound items account for 64% of the complaints and inbound for 36%. Out of the total number of complaints, more than 94% were deemed unfounded.

Table 14.13. Paid indemnities by the type of postal items in NPT

NPT	2019		2020		2021		2022		2023	
	psc	din.	psc.	din.	psc.	din.	psc	din.	psc	din.
Registered items	2,313	983,195.00	1,604	937,539.50	549	485,237.00	585	600,655.00	493	633,934.00
Insured letters	2	8,085.00	10	64,982.00	4	5,361.00	7	28,645.00	9	19,070.00
Parcels	11	22,945.00	25	115,417.30	19	144,983.00	72	228,444.10	188	471,165.18
Money ordrs	1	2,000.00	2	1,371.00	2	40,460.00	2	10,000.00	0	0.00
TOTAL	2,327	1,016,225.00	1,641	1,119,309.80	574	676,041.00	666	867,744.10	690	1,124,169.18

A modest increase in the number of indemnity claims of 3.6% was recorded in 2023. Compared to the total number of paid claims (690) the majority is accounted for by registered items (registered letter, court letter, registered printed matter), more than 71%. The paid indemnity for 2023 was increased by 29.5%.

In IPT, the number of paid indemnities was reduced. At the expense of the PPO, 20 indemnity claims were paid, against 30 in 2022. There were 195 paid indemnity claims at the expense of other administrations, which is an increase compared to 2022 (86 claims).

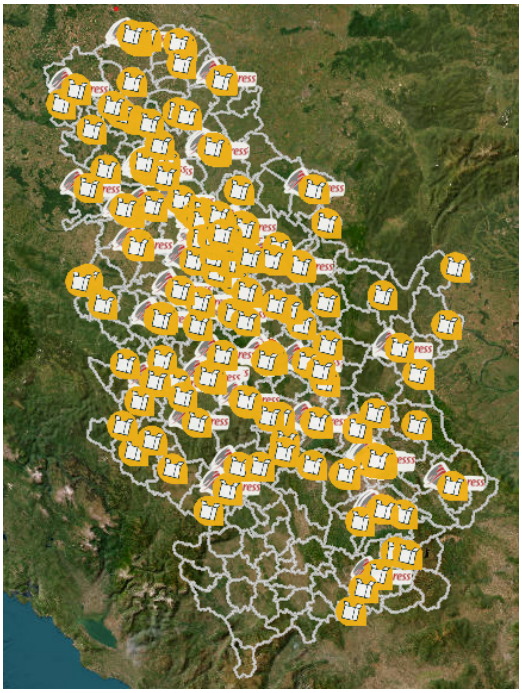
14.2. Quality of OPS provision

Quality of OPS provision is analyzed based on the data in annual questionnaires provided by postal operators.

14.2.1. Availability of postal operators' network

The total number of business units (1,733), through which postal operators provide OPS has been increased by 228 business units (15%), compared to 2022. The majority of business units is owned by the PPO, which is a sole USP, but also performing OPS. Business units adapted to the needs of disabled persons make up 22% of the total number of units, marking an increase compared to the year before (27%). Seven postal operators (postal express providers and the PPO) account for 388 business units adapted to disabled persons (Figure 14.12).

Figure 14.12. Parcel locker network in the Republic of Serbia (source: GIS portal)



The increasing trend of alternative means of postal delivery ensuring better service availability, among which the most popular are parcel lockers, has continued throughout 2023 as well. At most locations, the users can access parcel lockers round the clock and can set their own time of delivery, within the time frame determined by the operator. In 2023, the parcel locker network in the Republic of Serbia has tripled in size (598 parcel lockers), due to a surge in the number of PPO's parcel lockers. Three postal operators (PE „Post of Serbia", D Express and Ananas E-Commerce) had their own parcel locker networks during 2023.

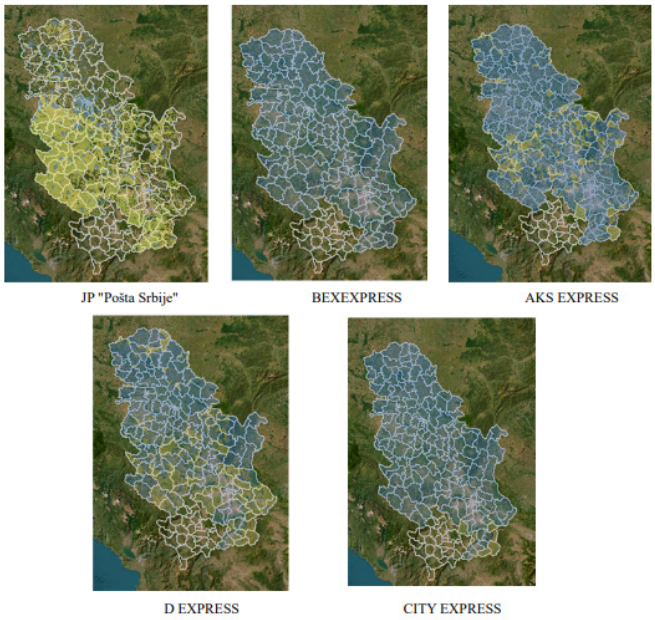
In recent years, as the environmental concerns have become recognized globally, postal operators across Europe started undertaking adequate protective measures (such as the use of electric vehicles, recyclable wrapping materials, postal sorting centers powered by solar energy, other green energy sources etc). The EU green agenda is expected to reduce carbon footprint by 50% by the year 2030 and reach the target of climate neutrality by 2050. One of the environmental protection sustainability parameters is the use of electric vehicles. In 2023, their number was 138, and in 2023 their number grew to 278. BEXEXPRESS and PE „Post of Serbia“ are the operators with the largest electric vehicle fleet. In addition, eight postal operators confirmed they use solar energy in their operations, while another six operators perform carbon footprint screening.

As for the monitoring of transmission times and other QoS indicators, pursuant to the Action Plan of the Strategy for the development of postal services in the Republic of Serbia for the period 2021-2025[11] (hereinafter: the Strategy Action Plan), RATEL organized, for the second year in a row, an independent screening of OPS quality of service, according to 4 main criteria and 13 subcriteria, for five major postal operators on the market (AKS EXPRESS KURIR, BEXEXPRESS, CITY EXPRESS, D EXPRESS and PE „Post of Serbia“). This type of quality monitoring is unique in Europe, as it ensures to the user a detailed insight into the operator's performace quality. Based on the measurement results, the operators can assess their business operations and undertake measures to improve quality related to the underserved criteria. The 2023 screening data and results are made publicly available.[12]

In 2023, RATEL continued with its activities related to GIS portal, a specialized tool for postal services with a role[13] to ensure a better reach of information to the users regarding the availability of postal networks, through the possibility for the users to check business units' and parcel lockers' locations, or the details of express service and UPS delivery at any location in the Republic of Serbia (Figure 14.13).

11 " Službeni glasnik Republike Srbije ", No 68/21
12 https://www.ratel.rs/cyr/page/cyr-studije-iz-oblasti-postanskih-usluga
13 https://gis.ratel.rs/smartPortal/postanskeUsluge

Figure 14.13. RS territory coverage[14] of express service „next day/special day delivery" offered by operators with biggest share in OPS market (source:GIS portal)



14.2.2. Study on the satisfaction of postal users' needs – OPS

As part of the survey of postal service users' satisfaction, the respondents (both natural persons and legal persons) answered the questions regarding express postal services. The majority of the population (84%) used express postal services over the year prior to the screening, most usually provided by PostExpress (72%). 30% of the surveyed participants had some negative experience with operators. The most usual remarks addressed to the operators concerned delayed delivery (59%), failure to deliver item at the door (53%) and issues regarding collection of items (39%). During the screened period, the respondents of the Belgrade area were experiencing problems with operators more often than the population of other regions in Serbia.

The population is generally underinformed about the complaint filing procedure (29%). Individuals aged over 60 and persons with only basic education are more often poorly informed about the complaint filing procedure. Among those who dealt with complaint filing (17% of the users), positive experience is twice as frequent (38%) than negative one (19%).

[14] Blue color – delivery every working day, Yellow color – delivery on specific days.

Postal operators' business units (83%) and parcel lockers (74%) in the users' vicinity were rated as extremely important. The possibility of credit card payment of postal fees and COD amounts was also rated as very important (for 84% of the users).

Almost all legal persons used express postal services during the screened year, with as much as 83% using PostExpress. State-owned companies use more often services of the PE „Post of Serbia", while trade businesses predominantly use BEXEXPRESS and DEXPRESS. Around 63% of the respondents did not have negative experience with express service operators. The most common remarks regarding service provision are: issues regarding collection of items i.e. communication with Call center (50%), delayed delivery (64%), failure to deliver item at the door (33%). The least negative experiences were in the regions of Central and Western Serbia.

Legal entities are normally better informed about the complaint filing procedure (54%) then natural persons. Among those who dealt with complaint filing (28%), there is a tie regarding satisfied and dissatisfied users. Private companies are better informed about the complaint filing procedure than the state-owned ones.

The distance from parcel lockers and business units revealed to be more important to natural persons than to legal entities. Legal persons operating in the Belgrade area prefer having closer parcel lockers than those operating in other regions of Serbia.

14.2.3. OPS related complaints

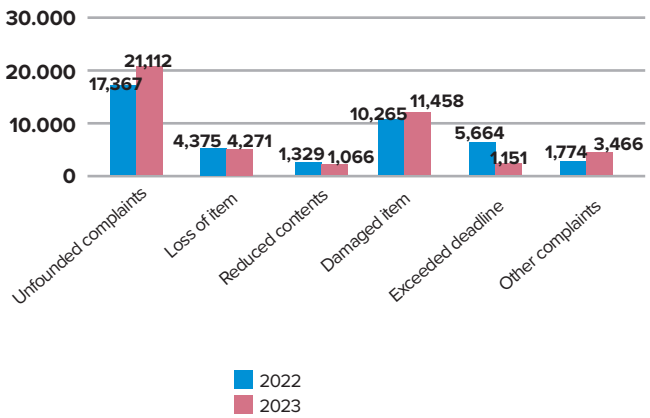
The structure of complaints about other postal services (OPS) within UPS, based on the data submitted by 11 postal operators providing express services, is shown in Table 14.14.

In 2023, a 4% increase in the number of OPS complaints in NPT was recorded.

Table 14.14. OPS complaints in NPT in 2022 and 2023

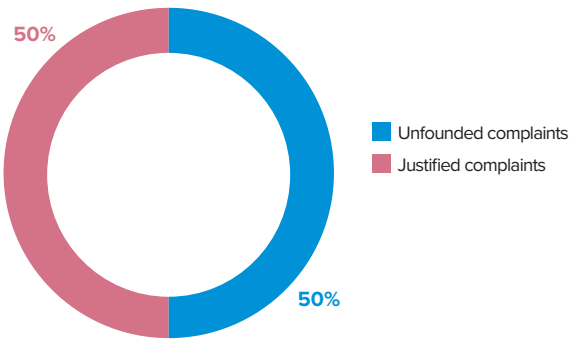
Year	Total number of filed complaints	Unfounded	Resolved on the basis of:			Indemnity		
			Loss	Reduced contents		Exceeded deadline	Other	Amount (thous. din)
1	2=3+4+5+6+7+8	3	4	5	6	7	8	9
2022	40,774	17,367	4,375	1,329	10,265	5,664	1,774	127,917
2023	42,524	21,112	4,271	1,066	11,458	1,151	3,466	121,050
Growth rate %	4%	22%	-2%	-20%	12%	-80%	95%	-5%

Figure 14.14. . OPS complaint structure in NPT in 2022 and 2023



Half of complaints in 2023 were unfounded. Compared to 2022, the biggest growth in the number of complaints occurred in the category of other complaints (95%). The number of complaints regarding exceeded deadline

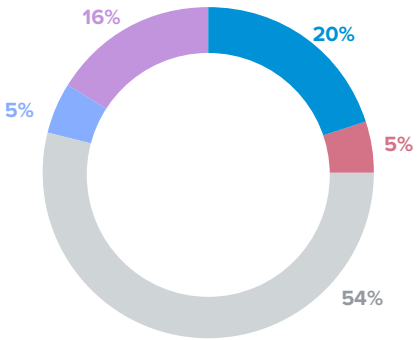
Figure 14.15. Ratio of justified and unfounded OPS complaints in 2023



During 2023, there were an almost identical number of unfounded and justified complaints (21,112 unfounded and 21,412 justified complaints).

The structure of justified complaints recorded over 2023 is shown in Figure 14.16.

Figure 14.16. Structure of justified OPS complaints in NPT in 2023

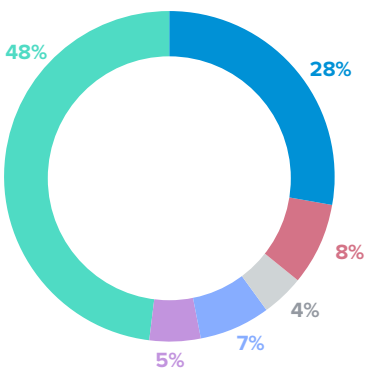


Complaints related to postal item damage remain dominant, followed by those regarding loss of items, and other complaints. Unlike in previous years, complaints regarding exceeded deadlines were fairly less frequent during 2023. The least frequent were complaints regarding reduced contents.

During 2023, the number of complaints started to rise again, regarding damaged items, which represent the most dominant NPT complaint category. Postal operators are advised to put effort in educating the employees and informing the users how to correctly pack postal items.

Four postal operators submitted data on OPS complaints in IPT. There were 1,148 OPS complaints in 2023, which is an increase by 23% compared to the year before. The structure of OPS complaints in IPT during 2023 is shown in Figure 14.17.

Figure 14.17. OPS complaint structure in IPT in 2023



More than 28% of complaints in IPT were unfounded, the majority of them being uncategorized and described as other complaints (48%). Justified complaints included those filed for the loss of item (8%) damaged item (7%), exceeded deadline (5%) and reduced contents (4%).

Since the beginning of postal market monitoring (2010), postal operators providing courier services have received no complaints, which was also confirmed during expert supervision.

14.2.4. Express service Benchmark results in the Republic of Serbia

RATEL carried out, in the period from October to December 2023, a study of Comparative Measurement and Analysis (Benchmarking) regarding OPS quality parameters in NPT, and published it on RATEL's website.[15] This survey is foreseen in the Action Plan of the Strategy for the development of postal services in the Republic of Serbia for the period 2021-2025, as part of a defined measure for the improvement of market competitiveness. The study examined express services provided by 5 postal operators with significant market power (SMP): AKS EXPRESS Courier, BEXEXPRESS, CITY EXPRESS, D EXPRESS and Post Express – Post of Serbia, using 4 basic criteria and 13 subcriteria.

The undertaken measurement has multiple targets, being intended for users, for operators and for line institutions tasked with market regulation.

The result of the benchmarking enabled the users of services to have an insight into the quality of express services in the Republic of Serbia, while the operators can use the results for identifying business segments that need to be improved in terms of quality of service. For the regulators, the obtained results contribute to the advancement of both quality of services and competition in the express service market.
Among other, the results of the study demonstrated that, in 2023, average time for the transmission of express items in the Republic of Serbia was 1.26 days, whereas in 2022, it was 1.16 days.

Average time for the communication setup with a Call center operator during the request for item collection at the address was 3 minutes and 10 seconds (against 16 seconds in 2022), while average time from making the request for item collection till the arrival of the courier to the address was 4 hours and 16 minutes (against 3 hours and 47 minutes in 2022).

[15] https://ratel.rs/sr/page/studije-iz-oblasti-postanskih-usluga

In 2023, the survey showed that 35.20% of the requests for item collection had not been met and were dismissed immediately after placing the call to the Call center or by the mere fact of the courier not showing up for the collection. In 2022, this parameter was significantly lower, amounting to 15.57%.

80.50% items were delivered within 1 day, with 3.16% of the items having transmission time longer than 5 days, while in 2022, 87.29% items were delivered within 1 day, with only 0.18% of the items having transmission time longer than 5 days.
The study also showed that, during 2023, 0.31% of the items had been lost, whereas in 2022. that share was significantly lower (0.18%).

The majority of postal operators (3 out of 5) made available postal fee payment by credit card, after the delivery of the item by the courier at the recipient's address.

As the above demonstrated, in comparison to 2022, the 2023 measurement results proved to be of lower quality. During the analysis of the benchmarking results in collaboration with postal operators, it was concluded that the PPO employees strike in November 2023 had caused a major spillover of postal volumes into other operators' postal flows, primarily in big cities, overwhelming these operators' available capacities and subsequently preventing the totality of items from the planned sample to be collected.

14.3. RATEL's competence in respect of complaints

The Law on Postal Services stipulates RATEL's competence in respect of users' complaints. RATEL is entitled to mediate in an out-of-court dispute settlement between the postal operator and the user, initiated by a complaint filed by the user. The law also foresees that the user may lodge a complaint/ objection with RATEL against the decision of the postal operator on the rejection of the complaint.

The postal operator is obligated to release a statement within eight days from the day of receipt of the complaint in national postal traffic and within the period prescribed by the acts of the Universal Postal Union in international postal traffic, by deciding on the merits of the complaint.

If the user is not satisfied with the operator's decision on the rejection of the complaint, the former may file an objection to RATEL within 15 days from the day of receiving the operator's decision on rejection of the complaint. The user may also lodge a complaint/ objection to RATEL against the operator for not submitting a decision on the merits of the complaint.

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

In 2023, RATEL saw significantly more objections regarding postal operators' decisions on the rejection of the complaint or operators' not submitting decisions on the merits of the complaint. RATEL acted upon 92 objections in 2023, with those being submitted electronically (via RATEL's Internet counter or by sending an e-mail) as well as in written form (Table 14.15).

Table 14.15. Complaints submitted to RATEL in 2023

Manner of filing the complaints	2021	2022	2023	difference 2023-2022 %
Electronically (Internet desk, e-mail)	39	29	75	158.6
In writing	52	23	17	-26.1
Total	91	52	92	76.9

Oout of 75 objections for which RATEL requested the operators to reconsider the corresponding previously submitted complaints, 31 objections (more than 41%) were resolved in favor of the applicant. Most of objections (79%) refer to OPS – express postal services, while UPS-related issues received 19 objections (Table 14.16). There was also one objection in 2023 which was unrelated to postal services.

Table 14.16. Complaints by the type of service submitted to RATEL 2021-2023

Type of service	2021	%	2022	%	2023	%
UPS	13	14%	5	10%	19	21%
OPS	78	86%	47	90%	72	79%
Total	91	100%	52	100%	91	100%

Table 14.17. Structure of complaints filed with RATEL 2021-2023

Complaint type	2021	2022	2023
Exceeded deadline	42%	27%	34%
Damaged item	39%	42%	38%
Lost item	/	10%	1%
Non-delivery	12%	6%	17%
Overpaid postage fee	2%	4%	1%
Other	5%	11%	9%

Over 2023, RATEL acted upon 40 objections more than during 2022. Also, in 2023, the majority of the filed objections referred to damaged items 38% (Table 14.17). Out of the total number of the 2023 objections, 70 were related to the outcome of the postal operator's decision, and 11 to the failure of the operator to submit a decision on the merits of the complaint.

14.4. Conclusion

A three-year long cycle of an independent measurement of transmission times of postal items in NPT, carried out in accordance with standard SRPS EN 13850:2014 as a reference quality element, was completed in 2023.

Based on the results of the third year of measurement, transmission times remained drastically below the prescribed targets, except for transmission deadline D+5 for non-priority items, which was successfully achieved across the three-year screening period. Quality standards were not reached for priority letters for either of the prescribed deadlines. In addition, following a minimum increase in 2022, there was a decrease in 2023 for targets D+2 and D+3.

As the prescribed deadlines for non-recorded letter-post items in NPT were not reached, consequently, the same happened with international items. A significant drop regarding targets J+3 and J+5 both for inbound and outbound items was recorded, which were well beyond the prescribed deadlines.

Since the independent screening revealed a continuous breach of quality standards, which RATEL was pointing out to the PPO over the three-year long measurement, urgent and effective measures became necessary in order for the targeted deadlines to be improved and achieved.

Despite not being part of an independent quality screening, the prescribed standards for postal money orders and both NPT and IPT parcel transmission times are measured by the PPO internally. For the first time, in 2023, the NPT parcel transmission standard D+2 was not achieved. The same happened for the prescribed D+2 minimum regarding IPT inbound parcels.

The problem regarding lost postal items (non-priority non-recorded letter-post items and priority letters) continued in 2023 as well, as confirmed by the independent

screening. The PPO must undertake efficient measures to improve quality of services and security of postal items.
In 2023, there was a smaller number of complaints related to the UPS scope in NPT, which is a consequence of reduced postal service volumes during that year.

On the postal services market, OPS in NPT saw a rise in the number of complaints (by 4%), with damaged items accounting for the biggest share. Category „exceeded deadline" was drastically reduced (-80%), while category „other complaints" grew in number (90%).

In 2023[15], RATEL put continuous effort to upgrade portals Price of Services and GIS, in order to provide better availability of information to the users and transparency for all market players.

By means of the Price of Services tool, the users can check and compare prices of NPT express services „today for today" and „today for tomorrow", while for the operators providing services only in B2C (business-to-consumer) and B2B (business-to-business) express service and courier service segments the search of price lists and general terms and conditions is available at one place.

On the other hand, GIS portal, which represents a unique digital geographic atlas of postal services, enables the search of the PPO post offices availability, OPS business offices availability, parcel lockers, as well as the territorial coverage of UPS delivery and OPS delivery for each operator.

This way, users have at their disposal yet another dimension based on which they can choose their most adequate provider and access all important information at one place. By means of these tools, postal operators are able to compare their performance and use the available information in the process of business decision making.

A survey published by RATEL about the level of postal service users' satisfaction revealed a need to expand parcel locker network, introduce hybrid letters service, organize assistance for the use of eGovernment services and put forward services for vulnerable population categories.

Users expressed the need to pay postal fee and COD amounts by credit card during the delivery of the item at the recipient's address, and pointed out that the issues of

[15] https://www.ceneusluga.rs/

courier not showing up at the address for delivery and of delayed delivery should be solved.

Despite the wish expressed by natural persons to keep priority letter service, the cancellation of this service needs to be considered due to its low frequency of use and poor quality compared to the prescribed standard. The majority of the respondents suggested that addressed advertizing material be canceled as well, despite 1/3 of the population and 17% of businesses still considering it important. Users finally also think that non-core postal services, such as inpayments and outpayments, should be kept both in urban and rural settlements (inhabitants of rural areas also find these services important).

Users expressed the need to keep Saturday business hours in urban areas. There are indications that, otherwise, the loss of working hours could be compensated through the extension of working hours on some other business day till 7 or 8 p.m.

The population of rural settlements pointed to the necessity of keeping the scope of services already present in these areas and not to curtail it at any price.

In addition, the need for the population and businesses to be adequately informed about the complaint procedure was pointed out.

In 2024, activities to change and amend the Law on Postal Services are foreseen, as defined in the Strategy Action Plan for the period 2021-2025. During the drafting of new provisions, the above activities will be guided by the expressed needs of the surveyed users, as well as the results of the independent screening of transmission times and other postal market quality parameters in the Republic of Serbia.

15

SECURITY RISKS IN ICT SYSTEMS

Cyber security worldwide

1. Statistics of attacks by different types of malware

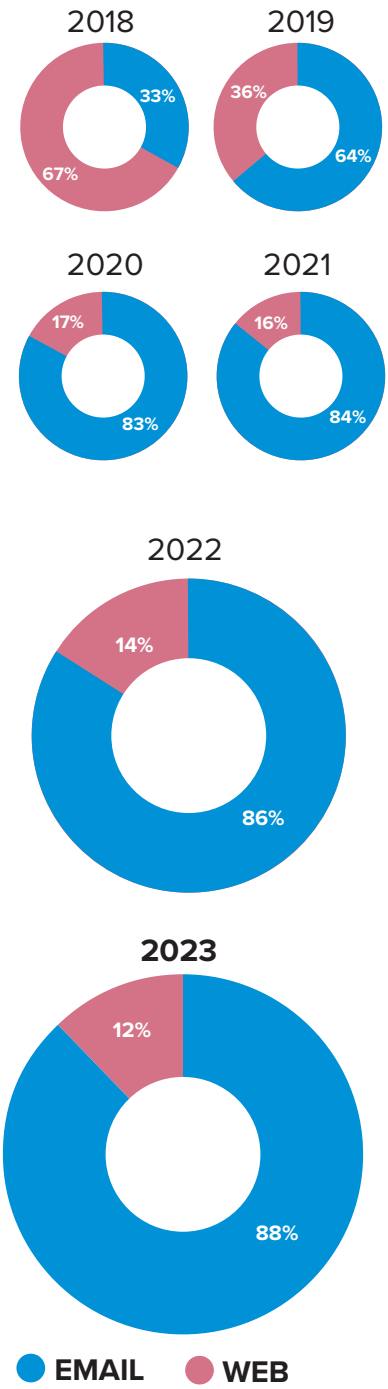
Figure 15.1. shows the shares of different malware (malicious software) types worldwide in 2023 (as reported by Check Point). The highest incidence of attacks comes from multipurpose malware. It is followed by malware type Infostealer, used by the attackers in early phases of the attack to collect data about the target. The third in the ranking is Ransomware, marking a surge from the fifth position in the number of attacks, compared to the year before. The next in the ranking is a malware type overtaking the victim's device resources in order to "mine" cryptocurrencies (Cryptominers), with the bottom of the list taken by malware types developed for attacking mobile devices.

Figure 15.1. Shares of different malware types at global level

2. Ways of malware distribution

While in 2018 the dominant way of malware distribution was through the web pages, the following year the situation changed, making the e-mail the primary way of malware distribution. This trend survived over the following years, growing in percentage year after year. Compared to 2022, the e-mail distributed malware is slightly higher (by 2% in 2023). as shown in Figure 5.2.

Figure 15.2. Comparative view of attacks using e-mail and web pages for malware distribution (2018 - 2023)



3. Statistics of attacks by different malware families

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

One of the observable changes compared to the last year's malware ranking is the emergence of a new malware family FakeUpdates, known also under the name SocGholish. This malware type feeds on the network of compromised internet sites which redirect users to the pages where download of malicious software and Internet browser updates is carried out. By downloading the files for supposed updates, the users are basically lead to download and activate JavaScript downloader, which serves as an initial attack vector, thus enabling further infection with other malware types such as GootLoader, NetSupport and DoppelPaymer.

Qbot takes second place on the list. This malware type is intended for Windows users, was discovered in 2008 as a banking Trojan, only to resurface over the last December in many phishing campaigns.
Emotet fell from the first place, where it was in 2022, despite which it still affected 4% of the global corporate networks during 2023.

Among the malware placed in the second and third position used for data theft (Infostealers) throughout 2023, AgentTesla and Formbook can be found.

Figure 15.3. Distribution of malware on a global scale

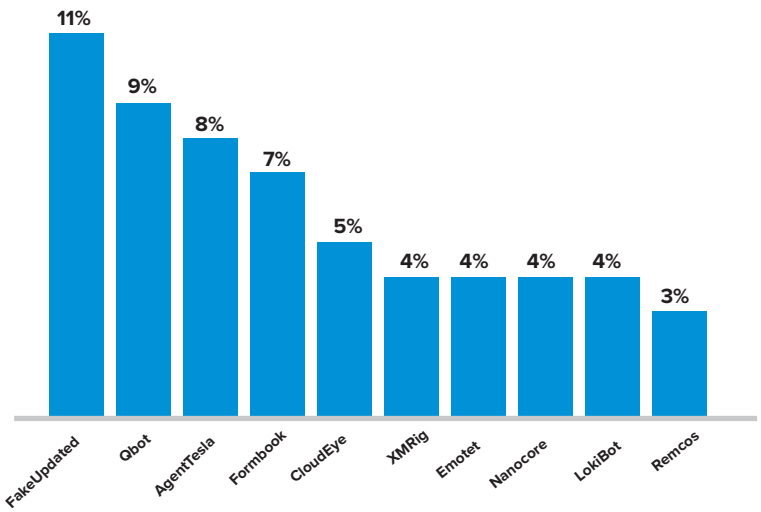
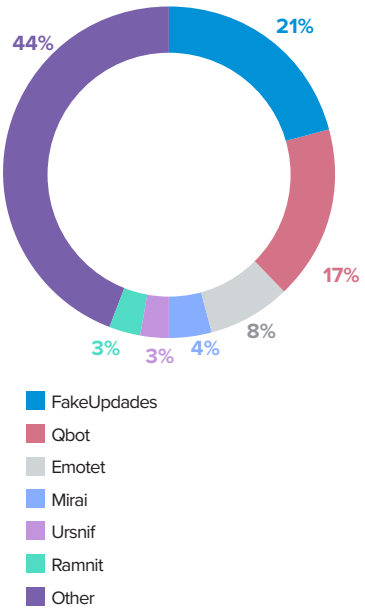


Figure 15.4. Share of different multipurpose malware families at global level



4. Statistics of attacks by different multipurpose malware families

The most frequent attacks in 2022 were those using multipurpose malware as initial vector to gain access to the system. For these attacks the following malware tools were used: FakeUpdates (21%), Qbot (17%), Emotet (8%), Mirai (4%), Ursnif and Ramnit (3% each), as well as other malware (Figure 15.4).

In the second half of 2023, DarkGate gained significant popularity due to its ability to avoid security systems' detection. Unlike Emotet and Qbot, this malware type uses direct strategy of the Malware-as-a-Service (MaaS) model.

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

This family is dominated by several malware types, as shown in Figure 15.5, with most prominent ones: AgentTesla (20%), Formbook (19%) and LokiBot (10%), widely distributed this year as well.

AgentTesla was first discovered in 2014, with its current version having been improved for credential theft from various applications, including Internet browsers, VPN, FTP services and e-mail clients.

Figure 15.5. Statistics of attacks by different malware families designed for theft of user data

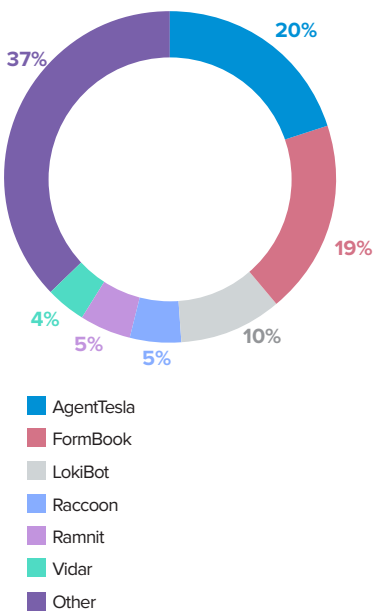
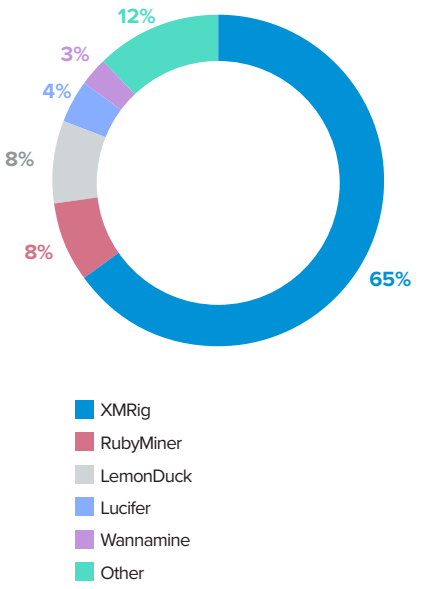


Figure 15.6. Statistics of attacks by different malware families designed for cryptocurrency theft

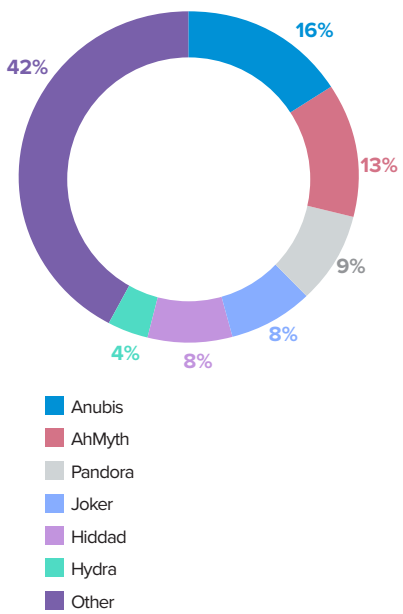


6. Statistics of attacks by different malware families designed for cryptocurrency theft

Illegal cryptocurrency mining continues to drop during 2023, due to the failure to reach the 2021 Bitcoin value. Only 9% of global corporations were affected by cryptocurrency theft malware in 2023, compared with 16% in 2022.

Monero, a cryptocurrency known for its privacy, remained profitable for mining, with its usual open source data mining tool, XMRig, being used in 65% of the 2023 crypto mining attacks (Figure 15.6).

Figure 15.7. Statistics of attacks on mobile devices by different malware families



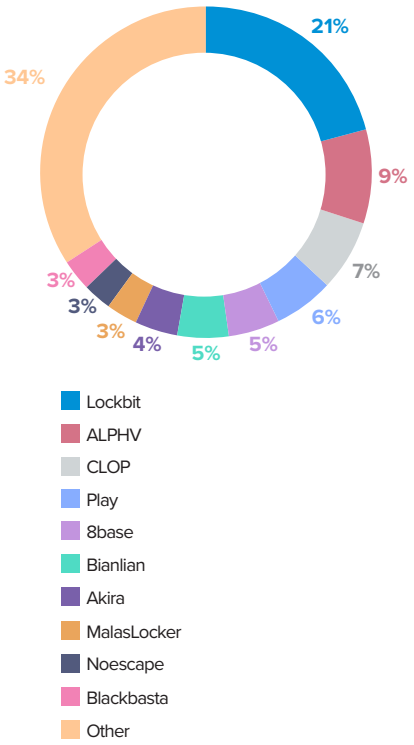
7. Statistics of attacks on mobile devices by different malware families

Mobile devices are most likely targets of cyber attacks due to their pivotal role in the everyday life of their users and the value of the data stored therein.

Anubis, still at the top of the list of the most usual malware (42%), as shown in Figure 15.7, is a banking Trojan designed for Android mobile devices, detected in the hundreds of various apps available at the Google Play store.

AhMyth, Remote Android Trojan (RAT), is an open code malware available free-of-charge at GitHub, and is often used as base of attack. A variant of this malware, AhRat, has been discovered in an app called „iRecorder-Screen Recorder", availabe at the Google Play store, with more than 50,000 downloads.

Figure 15.8. Statistics of attacks by Double Ransomware by malware families



8. Statistics of attacks by Ransomware

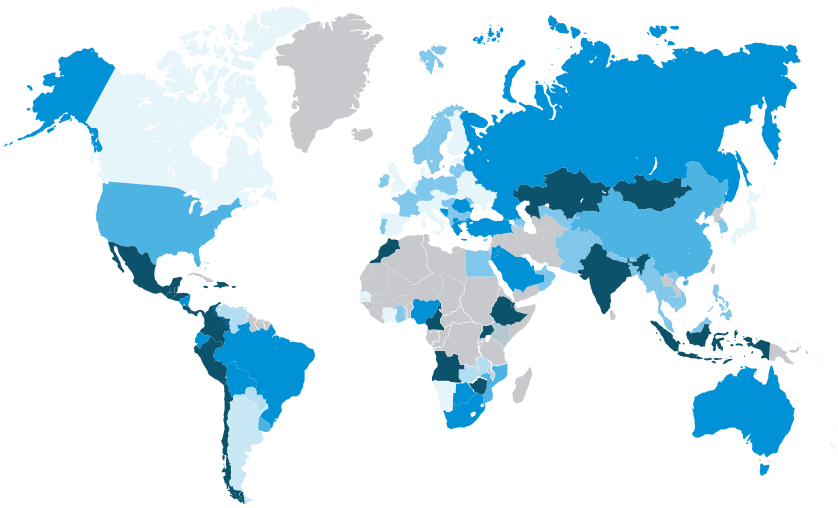
In 2023, 68 active ransomware groups published that they had successfuly carried out cyber attacks on companies, publicly extorting more than 5,000 victims, which is a significant increase compared to the previous years. Cyber attackers also use the technique of double ransom in order to exert pressure on the victims who do not pay the ransom instantly.

Lockbit is at the very top of the list (Figure 15.8), responsible for 21% of the reported incidents in 2023, with more than 1,050 cases. The attackers usually grant their victims a week or a two-week deadline to pay the ransom, in order to avoid public exposure of the company, suggesting that the actual number of victims could be considerably higher.

9. Check Point Global Threat index

Figure 15.9 illustrates Check Point Global Threat Index values by country, in 2023. This index is calculated based on the data on attacks collected in real time through the Threat Cloud World Cyber Threat Map platform and describes the probability that a device in an observed country be infected by a malicious software. It has been observed that different countries have different levels of probability of infection. Darker shades indicate higher probability of malware infection, while grey shades represent areas that did not provide enough data for analysis.

Figure 15.9. Graphical display of Check Point Global Threat Index values by country

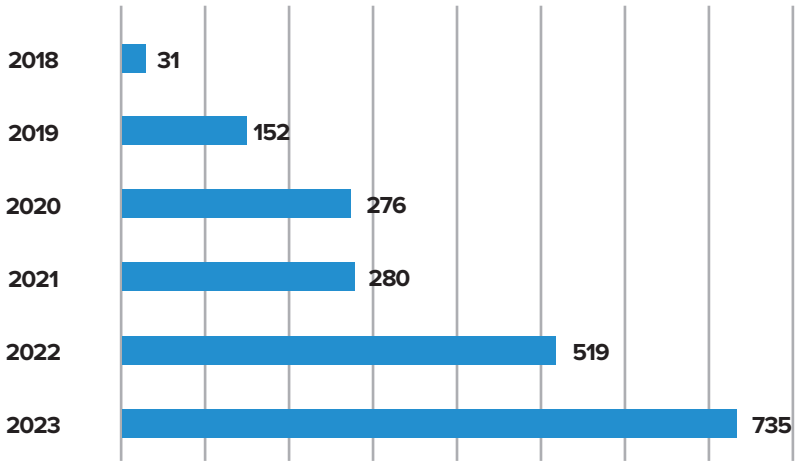


Information security in the Republic of Serbia

Pursuant to the Law on Information Security („Official Gazette RS“, Nos. 6/16, 94/17 and 77/19), all special importance ICT systems operators of are obligated to inform the competent authorized body about the incidents in ICT systems that could severely disrupt the information security.

In the period 2018-2023, a significant increase in the number of incidents reported to the National CERT was observed (Figure 15.10). This trend not only points to a growing number of threats, but also to an increased awareness of the citizens and ICT employees about the importance of information sharing and reporting to the relevant institutions, as well as to the level of public confidence in the recommendations given by the National CERT.

Figure 15.10: Incidents reported to National CERT 2018 – 2023



In 2023, 735 incidents were reported to the National CERT, which is an increase by 40% compared to the year before. Incidents breaching the ICT security pertaining to the execution of a criminal act are reported in accordance with legal provisions and regulations or forwarded to the Special Prosecutor's Office for High-Tech Crime. The number of such incidents in 2023 was 47.

Figure 15.11. features reported incidents by incident group. Most of the reports relate to fraudulent activities such as phishing attacks, unauthorized use of resources and other types of fraud.

During 2023, there have been several big phishing campaigns targeting Internet users in Serbia. Among those, particularly striking were the campaigns that targeted users of postal services and e-commerce platforms. The users were usually informed by an e-mail about the arrival of a parcel, which supposedly could not be delivered due to an unpaid customs fee or an outdated recipient's address. By clicking on the link provided in the e-mail, the user is redirected to a fake website mimicking the Post of Serbia online payment page, with a request to fill in the credit card data, thus enabling the attacker to gain access to the victim's bank account and money. The phishing campaign targeting e-commerce users ran in a scenario in which a supposed buyer asks the advertiser about the availability of a product and the possibility to purchase it online. The attacker than, in his own name, or on behalf of the „e-commerce platform administrator" sends the victim (advertiser) a link leading to a fake Internet page showing that the supposed buyer has already paid for the purchase via an application and that, in order to finalize the payment, the advertiser only needs to fill in their banking information (credit card number and CVV code) in the provided web form. That way, the attacker was able to illegaly withdraw money from the victim's bank account. The Natonal CERT has repeatedly, through online alerts and notifications, warned the public about the incidence and sophistication of these phishing attacks.

Figure 15.11: Reported incidents in 2023 by incident group

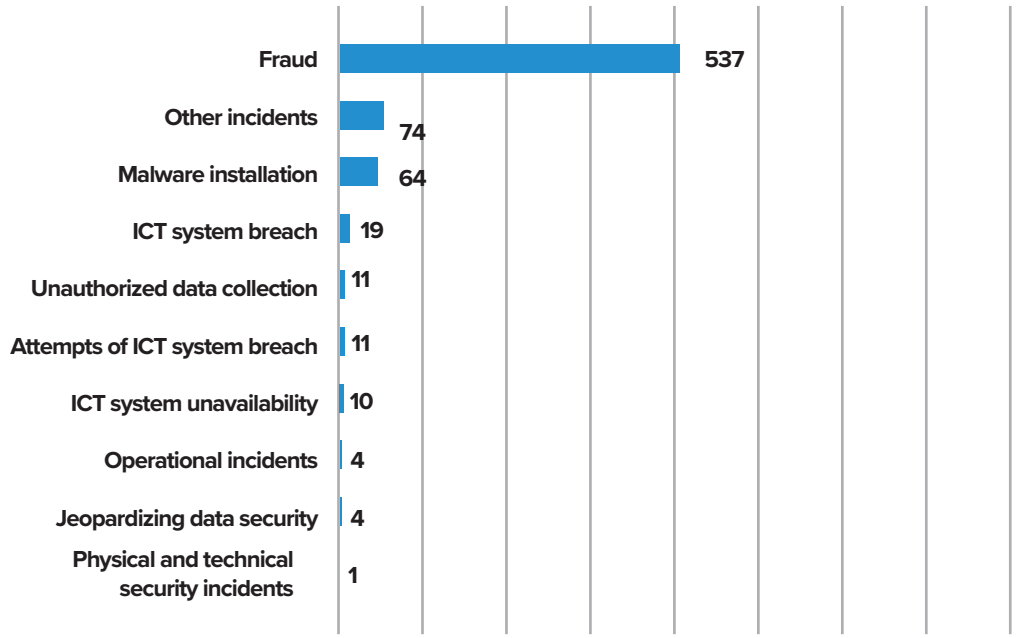
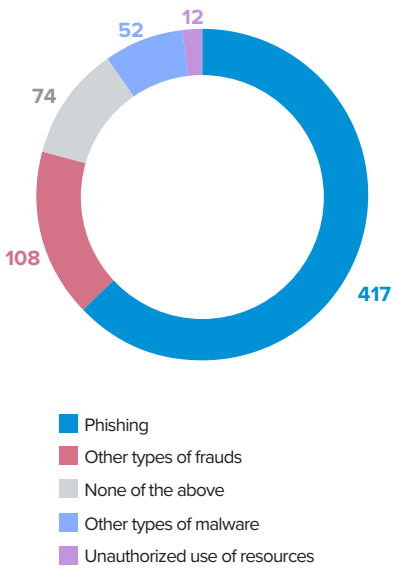


Figure 15.12: Top five reported incidents in 2023



Top five reported incidents in 2023 are shown in Figure 15.12.

Phishing is the top reported cyber attack in 2023. It is carried out via e-mail, social networks, telephone calls or text messages, along with a request to click on a link or open an attached document. The attacker uses social engineering to appear as a familiar sender or a renowned institution and make the victim wilfully disclose their personal information or download a malicious software. This type of attack is often involved with the cases of identity theft, stealing money from bank accounts, malware installation, botnets and cyber espionage. There were 417 reports of phishing forwarded to the National CERT in 2023, the majority of which were targeting postal and e-commerce platform users.

The National CERT received 108 reports on other types of frauds, namely those referring to stealing money from bank accounts.

Incidents that are none of the above, as quoted in the Ordinance on reporting the incidents in ICT systems of special importance, can be, for instance, detection of potentially unsafe applications, unauthorized financial transactions or fake accounts on social networks, anr the number of these reports was 74.

Malware (malicious software) is any software created for malicious purposes, or with an aim to cause damage to computer systems or networks. These programs include computer viruses, computer worms, ransomware, computer trojans, spyware and rootkits. A total of 52 incidents referring to the malicious programs that did not qualify to be classified under any of the above categories were reported to the National CERT.

Unauthorized use of resources is a type of incident belonging to the fraud group and the number of reported cases in 2023 was 12.

Criminal offenses against computer and data security

Over 2023, 6,456 investigations were opened by the Special Prosecutor's Office for High-Tech Crime, namely:
- 485 cases against known adult perpetrators,
- 2,907 cases against unknown perpetrators and
- 3,064 cases related to various criminal offenses.

The total number of formed cases was increased by 14.67% compared to 2022, when 5,630 cases were formed.

The following data refer only to criminal charges pressed against known adult perpetrators in 2023, and actions undertaken during that period by the Special Prosecutor's Office for High-Tech Crime, and represent the number of persons and not the number of cases or proceedings:

- Reported individuals – 554;
- Individuals requested to provide necessary information – 172;
- Individuals under investigation – 15;
- Individuals against whom evidence was demonstrated – 178;
- Individuals with bills of indictment – 105;
- Individuals officially indicted – 28;
- Plea agreements – 61.

16 ICT DEVELOPMENT INDEX

The Information and Communication Technologies Development Index (IDI) is an index created by the International Telecommunication Union (ITU) to measure the level of development of the ICT sector. ICT development is a multidimensional concept requiring various indicators to assess the level of development, with the aggregate measure, or composite ICT Development Index, serving to sum up the values of multiple indicators into a single value.

This index was published annually from 2009 to 2017, and according to the 2017 methodology, it included 11 indicators, grouped into three areas: access to ICT, use of ICT and ICT skills. The index calculation methodology was revised in 2017, when it included 14 indicators, however, in practice, problems arose regarding the availability and quality of data, which resulted in the abandonment of the newly adopted methodology. The publication of this index was discontinued in 2018, and although attempts to revise the index continued in the following years, no consensus was reached on the proposed changes.

In 2022, it was decided that a new methodology would be adopted for the calculation of the index, which was to be published in 2023. After several stages of changes, the ITU member states, in November 2023, adopted the final methodology for a period of four years. The reference period for calculating the value of the ICT Development Index in year t is always t-2, which means that for a publication published in 2024, the reference year is 2022.[1]

The new methodology has introduced the concept of universal and meaningful connectivity, which represents the possibility for everyone to enjoy a safe, satisfying, enriching and productive online experience at an affordable price, with the aim of shifting the focus from the quantitative to the qualitative aspect of ICT. Digital connectivity must be both universal and meaningful in order to maximize its impact on society and the economy. Accordingly, the aim of applying this index is to assess the extent to which a country's connectivity is universal and meaningful. These two dimensions of connectivity are complementary: neither universal connectivity of poor quality, nor meaningful connectivity for a few brings significant benefits for the whole society. At the same time, the two dimensions reinforce each other: greater use can lead to more meaningful connection, and vice versa.

Accordingly, the ICT Development Index is structured around two pillars: universal connectivity and meaningful connectivity (Figure 16.1). Achieving universal connectivity requires attention to the connectivity of people, households, communities and

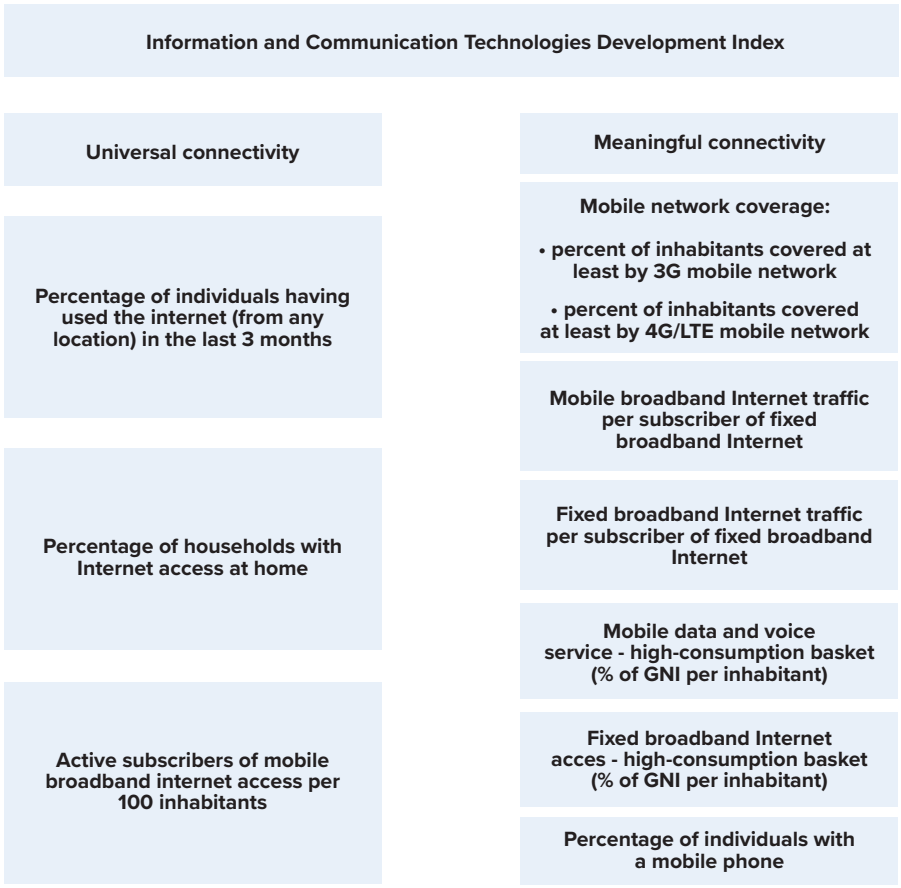
[1] https://www.itu.int/en/ITU-D/Statistics/Documents/IDI/IDI_2023_Version3_1_Oct2023.pdf

businesses, not just the connectivity of the average population. Focusing on people helps achieve universality by ensuring that everyone can connect regardless of their urban or rural environment, gender, level of education, etc. Focusing on households, communities and businesses helps ensure that the main places where people can connect are covered: at home, in schools and community centres and at work.

Achieving meaningful connectivity depends on several enabling factors: infrastructure, accessibility, devices, skills, safety and security. Meaningful connectivity first requires high-quality infrastructure that is not only available and functional, but also favors fast and reliable connectivity. Following a technology-neutral approach, connectivity via satellite, fixed and mobile terrestrial networks is considered. Furthermore, accessibility of ICT-based devices and services is essential for enabling people to be online, while accessibility itself is a relative concept that depends on social and economic conditions. Access to devices, as an additional enabling factor for connectivity, represents the ability to access the Internet from a specific device. These can be either mobile phones or desktop computers, with the most basic mobile phones being cheaper, while desktop computers provide a richer experience. It should also be borne in mind that lack of skills is an important barrier that prevents people from accessing the Internet or from fully realizing the benefits of being online. In addition to digital literacy, great importance should be given to safety and security when using the Internet, despite indicators on skills, safety and security not yet being included in the calculation of the value of the ICT Development Index.

Figure 16.1 shows the structure of the ICT Development Index indicators. The selected indicators are measured on different scales and expressed in different units. Therefore, normalization was applied to bring all indicators to a common scale.

Figure 16.1. ICT Development Index structure



When calculating the total value of the index consisting of different indicators, a neutral approach was used, i.e. the application of equal weights at each level of aggregation. The final, total value of the index is calculated by applying a simple average of the individual scores for universal and meaningful connectivity.

The universal connectivity pillar consists of three indicators. The value of this pillar is the average of the normalized scores of the three indicators. The meaningful connectivity pillar consists of seven indicators, two of which – the percentage of the population covered by at least 3G mobile network and the percentage of the population covered by at least 4G/LTE mobile network – are combined into an indicator called mobile network coverage, calculated as a weighted average of the scores for the two basic indicators: 0.4 for 3G and 0.6 for 4G/LTE. The score of the meaningful connectivity pillar is the average of the combined mobile network coverage indicator and the other five indicators of this pillar.

Table 16.1. shows the results of the indicators of the Information and Communication Technologies Development Index for 2023 in Serbia.

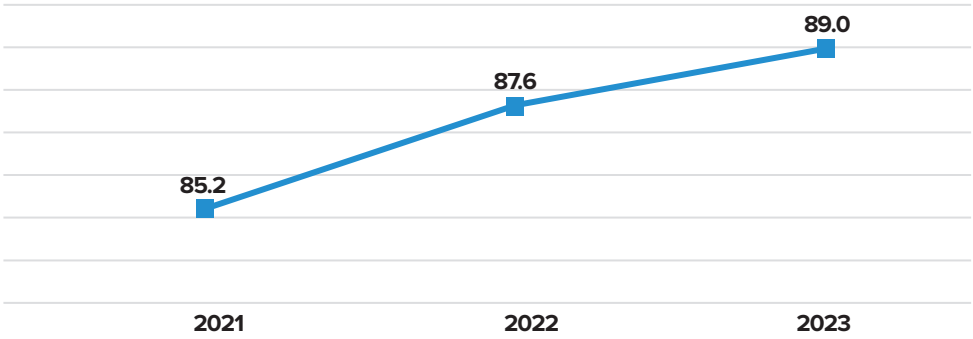
Table 16.1. Results of ICT Development Index indicators for 2023 in Serbia

Indicator	Weight	Value	Result
Universal connectivity (U)			84.9
Percentage of individuals having used the Internet (from any location) in the last 3 months	0.33	85.4	89.9
Percntage of households with Internet access at home	0.33	85.6	90.1
Active subscribers of mobile broadband Internet access per 100 inhabitants	0.33	112.0	74.7
Meaningful connectivity (M)			93.0
Mobile network coverage:	0.17		99.1
- percent of inhabitants covered at least by 3G mobile network	0.4	99.5	39.8
-percent of inhabitants covered at least by 4G/LTE mobile network	0.6	98.8	59.3
Mobile broadband Internet traffic per subscriber of mobile broadband Internet access in GB	0.17	143.8	80.0
Fixed broadband Internet traffic per subscriber of fixed broadband Internet acces in GB	0.17	2051.4	82.8
Mobile data and voice service - high-consumption basket (% of GNI per inhabitant)	0.17	0.8	100.0
Fixed broadband Internet access - high-consumption basket (% of GNI per inhabitant)	0.17	2.2	96.4
Percentage of individuals with a mobile phone	0.17	95.7	100.0
ICT Development Index (0.5*U+0.5*M)			89.0

Source: RATEL

The value of the Information and Communication Technologies Development Index in 2023 is 89, which is a slight increase compared to the year before, when this index was 87.6. The trend of the Information and Communication Technologies Development Index value over the last three years is shown in Figure 16.2.

Figure 16.2. ICT Development Index value for Serbia in the last three years*

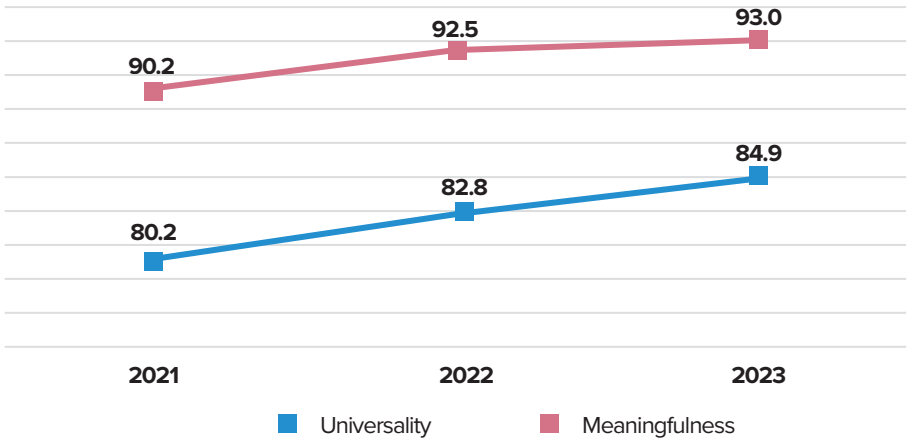


Source: RATEL

* Values for Serbia may differ from those published by the ITU, due to different data availability at the time of calculation, as well as differences in the population data used.

Figure 16.3. shows the trend in the values of the universal and meaningful connectivity indicators. Both universal and meaningful connectivity recorded growth in 2023 compared to the year before.

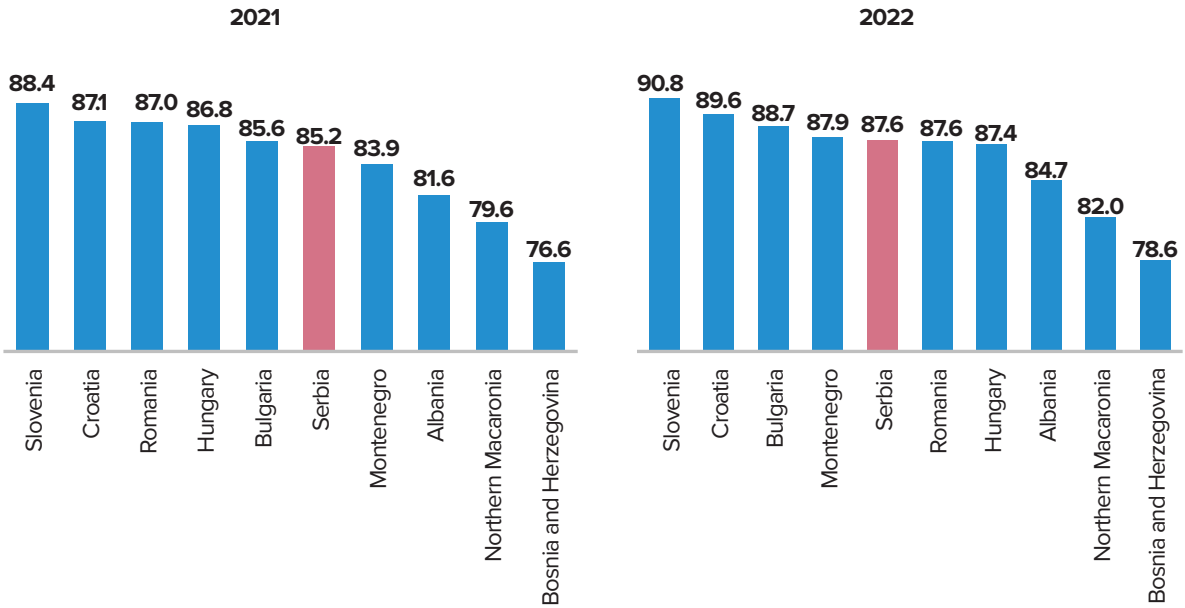
Figure 16.3. Universal and meaningful connectivity trend values in Serbia



Source: RATEL

Figure 16.4 shows the values of the Information and Communication Technologies Development Index of the countries in the region in 2021 and 2022, since the ITU will only publish the values for 2023 in 2025, so it is not possible to make a comparison with Serbia for this year. Among the observed countries, Slovenia and Croatia have the highest ICT Development Index values, while North Macedonia and Bosnia and Herzegovina have the lowest values.

Figure 16.4. ICT Development Index of the countries in the region in 2021 and 2022



Source for Serbia: RATEL

Source for other countries: ITU https://www.itu.int/itu-d/reports/statistics/idi2024/