UKE | Office of Electronic Communications

Report on the state of the telecommunications market in Poland in 2021

Warsaw, June 2022

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INTRODUCTION

We present to you the report on the state of the telecommunications market in Poland in 2021. The publication consists of two parts. The first part deals with the type and scope of services provided by telecommunications enterprises, the second concerns the telecommunications infrastructure and broadband coverages.

This report is based on data obtained from obligated entities:

- pursuant to Article 7(1) of the Telecommunications Law – part I "Telecommunications Market,"
- according to Article 29(2) of the Act on supporting the development of telecommunications services and networks – part II "Telecommunicationsinfrastructure and network coverages."

In 2021, the value of the telecommunications market amounted to PLN 40.8 billion, thus remaining virtually unchanged compared to the previous year. The value of expenditure for telecommunication investments amounted to PLN 8.9 billion.

In recent years, the penetration of broadband internet access services has steadily increased in Poland. Fixed-line internet services were used by 59.8% of households in 2021, an increase by 3.1 p.p. from the previous year. Cable TV connections continued to be the most popular fixed-line technology, with a 33.8% share of users. However, cables are being gradually and quite rapidly replaced by fibre-optic lines, through which access was offered to 32.9% of users in 2021. **The internet is significantly speeding up, services provided on high bandwidth links are becoming more and more popular.** The internet with a minimum of 100 Mbps was already used by 66.6% of fixed-line internet users in 2021, and the number of lines with the highest bandwidth (minimum of 1 Gbps) has doubled over the past two years. Mobile internet, in the form of dedicated devices such as modems, cards and keys, was used by 51% of total internet users[1]. In 2021, the share of 4G traffic in the total data transmitted over mobile internet connections was 45.2%. Poland was one of the three EU countries in which prices of fixed-line internet access were the lowest.

Year after year, fixed-line telephony is losing popularity among users in Poland. In 2021, the services were used by just over 2.7 million subscribers, 12.4% less than in the previous year. Revenues from service provision amounted to just under PLN 1.2 billion, down 12% compared to 2020. The penetration of fixed-line services (lines) has been steadily declining. Last year, the percentage rate for the country as a whole was 7.6%, down 10.9% compared to 2020. The total duration of phone calls was about 3.9 billion minutes, down 12% from the previous year.

The fixed-line telephony market is among the cheapest in the European Union.

Traditional fixed-line services continue to be displaced by VoIP telephony, which in 2021 accounted for nearly 49% of total fixed-line voice services[2] in terms of the number of users.
Taking revenues into account, VoIP accounted for 21% of these services. More than 94% of total VoIP revenues came from users to whom the services were provided on a subscription basis. 80.2% of VoIP telephony service customers were residential users.

Mobile telephony accounted for 1/3 of the value of the telecommunications market. In 2021, service revenues grew by 7% to PLN 13.4 billion. **The upward trend in the number of users continued, with the total number of SIM cards reaching more than 56 million, 10% of which were M2M cards.** The latter saw an increase of 1.2 million compared to 2020, due to the automation of processes, such as the replacement of traditional cash registers with online cash registers and the change in the highway gate system. Changes are also promised for the short text messaging services. Figures from 2021 show a large increase in interest in RCS messages (221 million messages sent), which could replace traditional SMS in the future. A2P SMS accounts for an increasing share of the SMS market, with the total number accounting for one-fifth of all SMS sent in the country in 2021.

[1] Total internet in this case means fixed-line access plus mobile access via modems, cards, keys.

[2] Traditional fixed-line telephony plus VoIP.

The cessation of the pandemic and the successive opening of individual countries to tourism and business resulted in an increase in roaming services.

Data roaming increased by more than 43%, producing the best result in five years.

In 2021, the bundled services market in Poland will be worth PLN 11.0 billion. The number of subscribers remained slightly lower than the previous year, at 13.4 million (down 2.2%). In contrast, the popularity of individual packages has not changed significantly.
The operator with the largest number of bundled service users was P4 (38.8% of the bundled services market), but its shares, compared to 2020, dropped significantly.
Similarly to the previous year, the most popular of all service bundles were invariably “Mobile telephony + mobile internet” (47.3%) and “Fixed-line internet + TV” (12.4%).

In 2021, 76.4% of bundled service subscribers used a package of 2 services, known as double play.

The market for pay-TV services depleted by just over 20,000 users (10.8 million in 2021), while minimally increasing its value to PLN 6.7 billion (up PLN 0.04 billion). The largest market share invariably belonged to Cyfrowy Polsat (30.1%). **Penetration with pay-TV services was 93.0%, which positions Poland above the EU average (88.3%).** The most popular type of access to services was satellite access (49.5%). IPTV has increased its share to 14.2%, thus, according to UKE's forecast, it could reach 17.1% by 2025.

Part II of the Report presents information on the coverage of the country's territory with infrastructure and networks enabling broadband internet access. There was a marked increase in the number of data submitted this year. Growth can be observed in every category of infrastructure elements.

A very positive trend that can be observed is that the length of fibre-optic lines in our country is increasing year after year. Last year, there was more than a 4% increase in network length compared to 2020. Data provided by operators, local governments and utility companies show that at the end of last year the length of the optical network in Poland amounted to 421,000 km. As the length of the fibre-optic network increases, the number of fibre-optic nodes increases.
At the end of 2021, there were 288,000 fibre-optic nodes in Poland. Compared to the previous inventory, more than 29,000 nodes have arrived, an increase of more than 10%.

The report shows that the ability to access fixed-line internet with a speed of min. 30 Mbps is now available in almost 60% of buildings. Residents of every second residential building in Poland currently have access to services with top speeds of at least 100 Mbps.

In Poland, 80.1% of households have access to internet speeds of at least 30 Mbps. Compared to 2020, the share of such households increased by 4.2 p.p.

Implementation of investments related to Measure 1.1 of the Operational Programme Digital Poland should increase this indicator to 84%.

The report also presents the results of analysis of localities completely deprived of internet access, including with the use of mobile technologies. The number of such localities has dropped from 15 to 11 as compared to 2020.

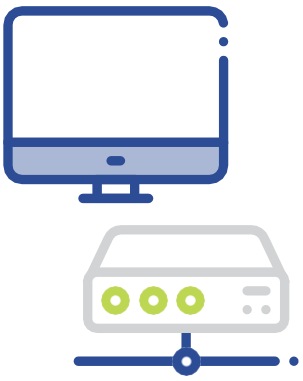
1 INTERNET ACCESS

PART I
THE TELECOMMUNICATIONS MARKET

A very large number of players are active on the internet access market in Poland. The penetration of internet services has been increasing steadily, if not very rapidly, during the last few years. This trend also applies to revenues from internet access services. The total value of this market[3] in 2021 was PLN 7.1 billion, an increase of 10% as compared to the previous year.

According to a survey commissioned by UKE and conducted by Danae[4] , 77.3% of surveyed Poles were using internet access in 2021. Fixed access was the form of internet use to which users were far more attached. In contrast, the use of mobile access was primarily motivated by the possibility of using it outside one's home.

According to PMR[5] forecasts, internet access services will positively impact the performance of the telecommunications market in the coming years. The value of this market segment will be significantly influenced, in particular, by the use of lines with higher bandwidths, which, due to their higher price, will increase the revenues of entrepreneurs.



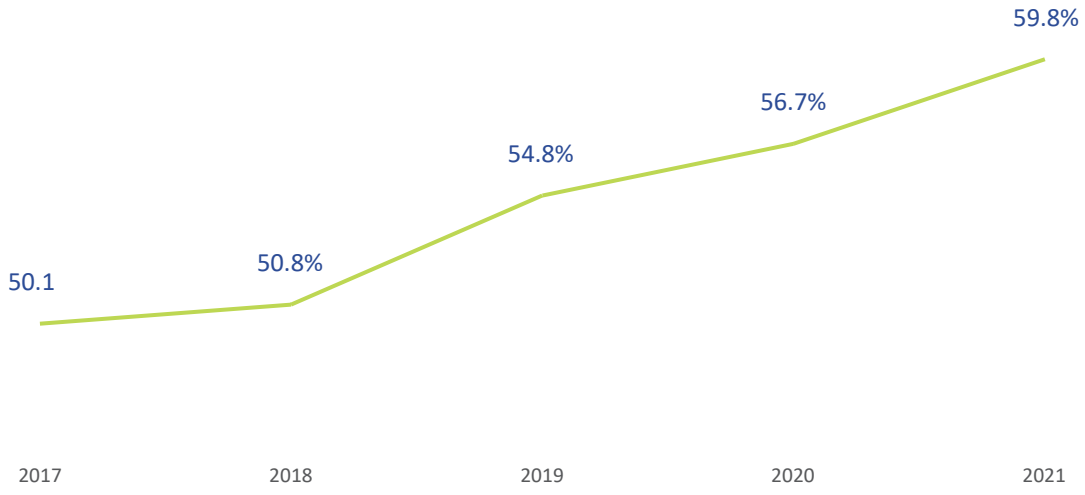
59.8% fixed-line internet penetration per household

1.1. FIXED-LINE INTERNET

1.1.1. GENERAL INFORMATION

Fixed-line internet was used by 59.8% of households in 2021, meaning that service penetration increased by 3.1 p.p. compared to 2020.

Chart 1. **Fixed-line internet services saturation rate**



Source: UKE

[3] Market value calculated for fixed-line access plus mobile access via modems, cards, keys.

[4] A research and consulting agency engaged in market analysis and opinion polling.

[5] PMR, Telecommunications market in Poland 2021 – Market analysis and development forecasts for 2021–2026. December 2021

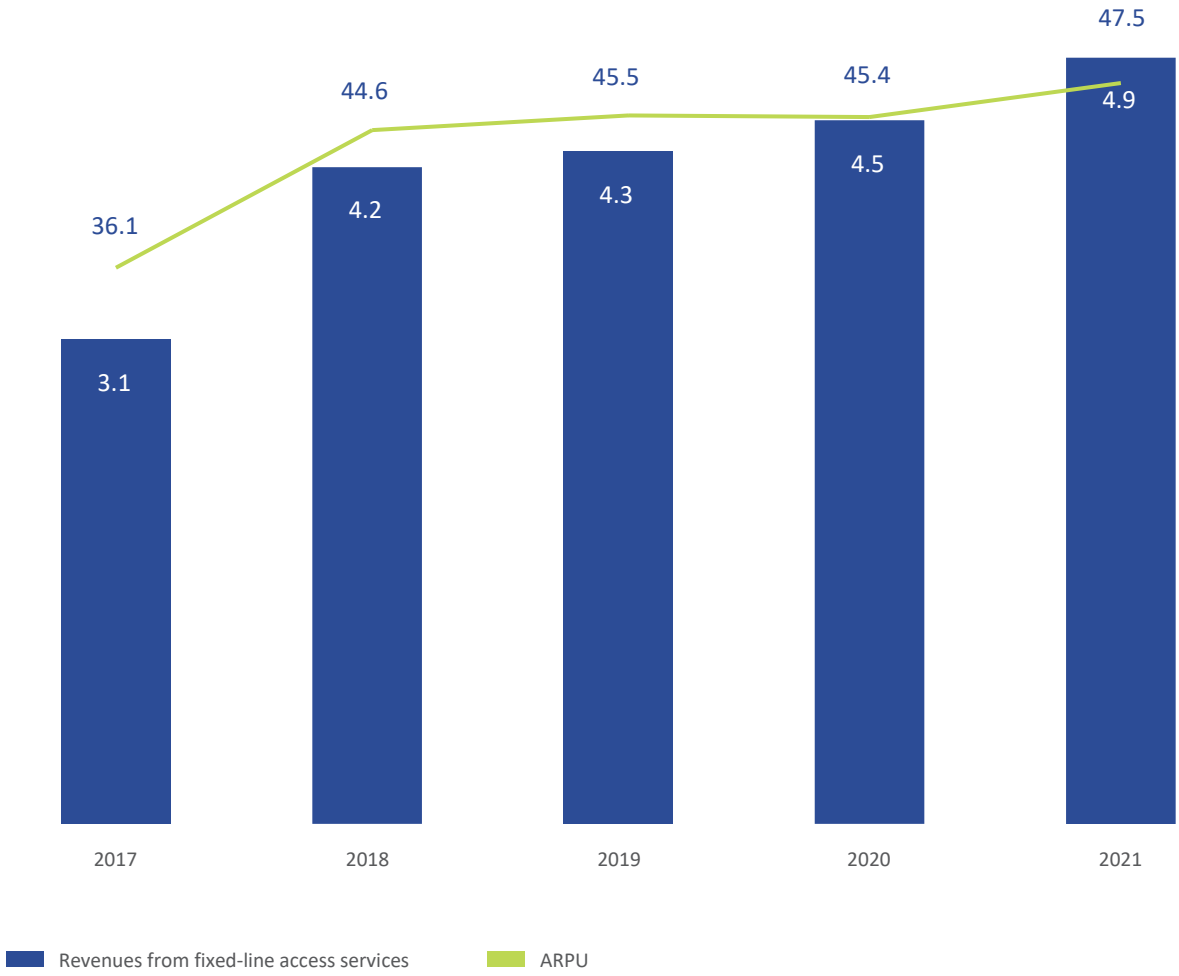
1.1.2. REVENUES

In 2021, revenues from fixed-line internet services grew nearly by 11% compared to the previous year, reaching PLN 4.9 billion. Average monthly revenue per user increased by 8.6% and amounted to PLN 47.5.

PLN 4.9 billion

revenues from the fixed-line internet access market

Chart 2. **Revenues from the fixed-line internet access market (PLN billion) and average monthly revenue per user (ARPU, in PLN).**

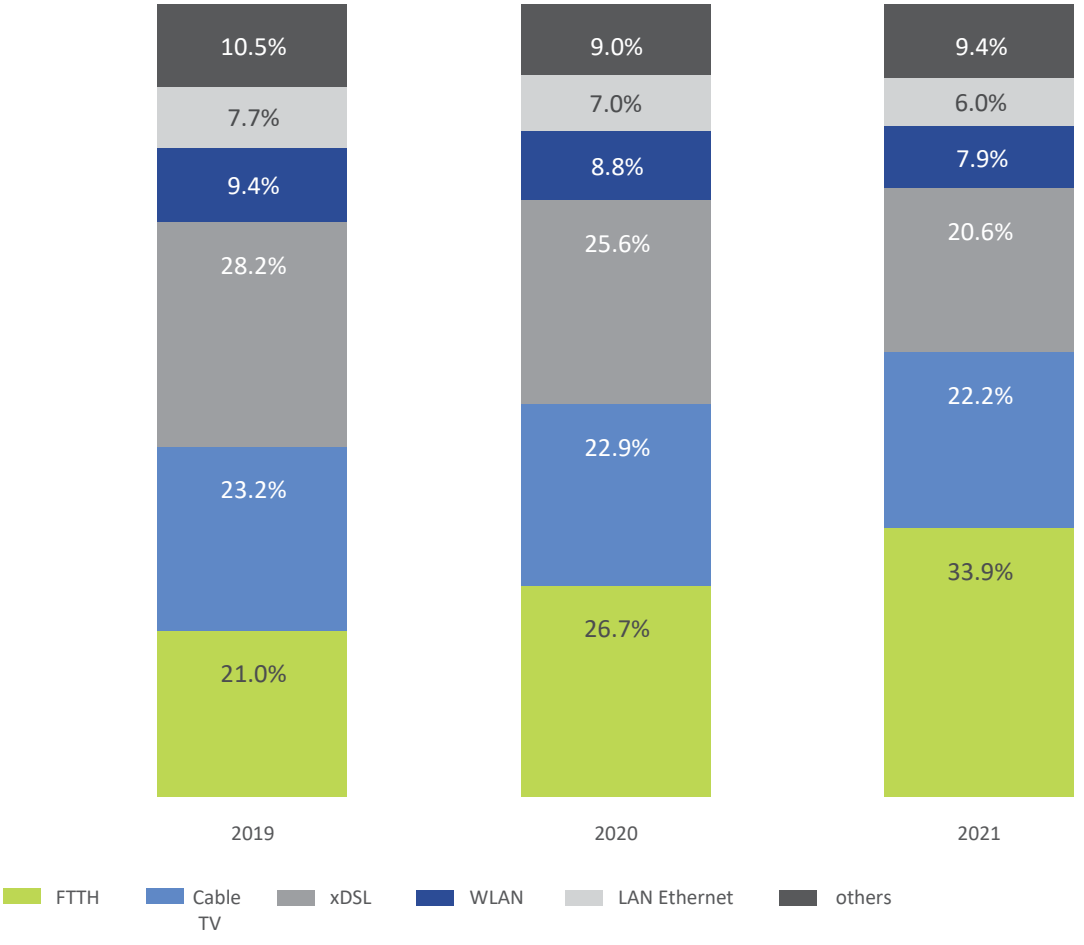


Source: UKE

Fibre-optics (PLN 1.7 billion) accounted for the largest share of fixed-line internet access service revenues for another year in a row, rising by 7.2 p.p. to 33.9%. A little over 22% of enterprise revenues (more than PLN 1.1 billion) were derived from services provided through cable TV modem connections. Despite the 7.5% increase in value compared to 2020, the share in total revenues from fixed-line access declined slightly.

A declining trend can also be observed in xDSL revenues (PLN 1.0 billion). In 2021, their value decreased by 11%. Analogous to previous years, declining revenues were also generated from WLAN (PLN 0.4 billion) and LAN Ethernet (PLN 0.3 billion) services.

Chart 3. **Structure of revenues from fixed-line internet access in terms of the technology used**



Source: UKE

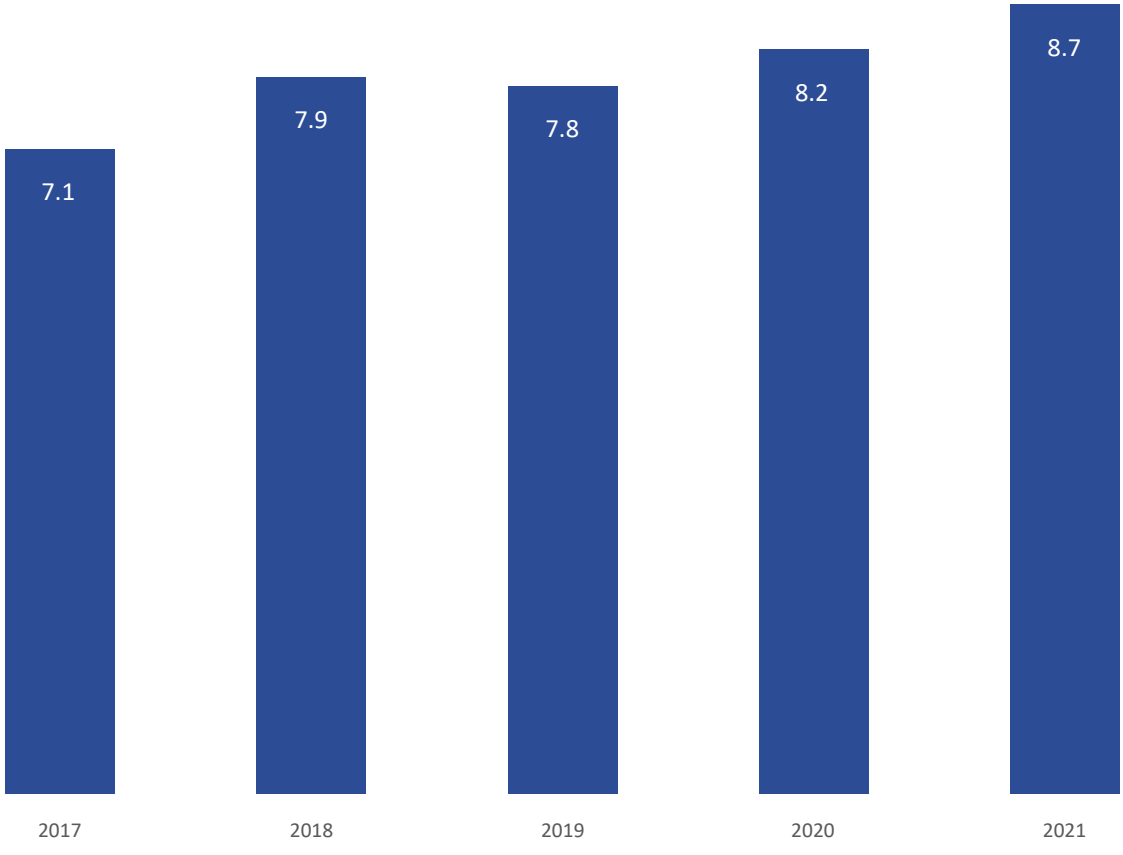
1.1.3. USERS

The number of fixed-line internet access users is steadily increasing. In 2021, the total number of users with this kind of access was 8.7 million , which is 5.5% more than in the previous year.

8.7 million

fixed-line internet access users

Chart 4. **Number of fixed-line internet users (in millions)**

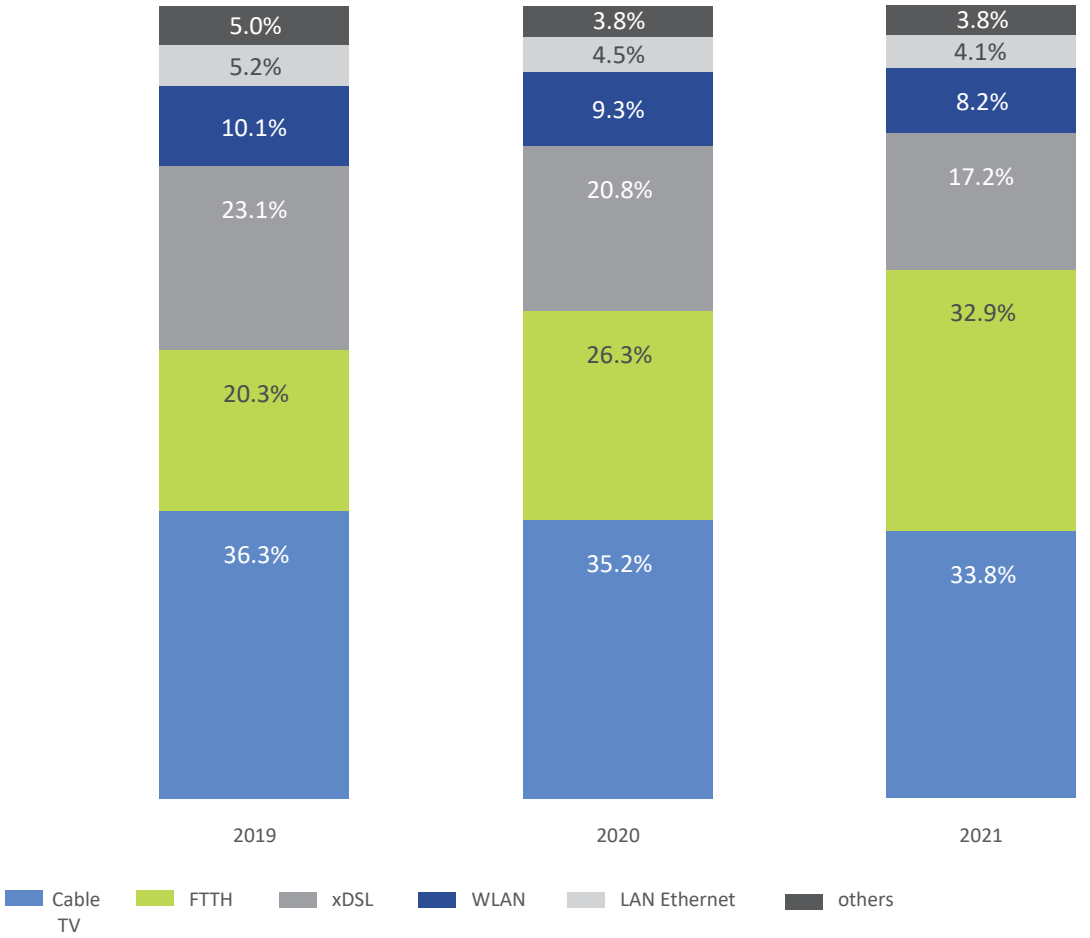


Source: UKE

For another year in a row, the largest number of fixed-line internet users used access provided by cable TV modem (33.8%). However, it can be noted that the share of this technology is declining year after year.
In contrast, fibre-optics is among the fastest growing access technologies, already accounting for almost 33% of all fixed access in 2021.

In the previous year, the number of FFTH users rose by 32%, and during the two previous years – by 79%. The number of people using the internet via xDSL technology has declined for another year in a row. In 2021, this number decreased by almost 13% compared to the previous year, and their share fell to 17.2%. The share of other connections, such as WLAN and WAN, also dropped.

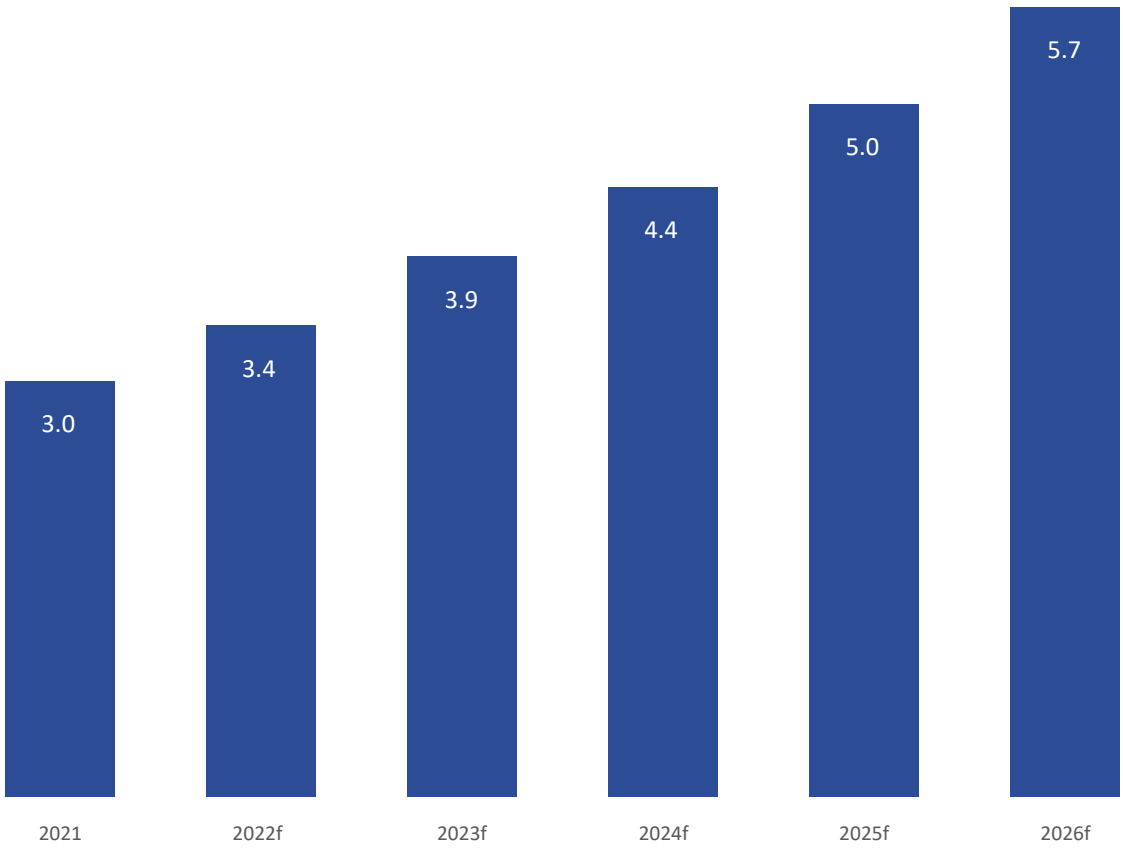
Chart 5. **Structure of fixed-line internet users in terms of the access technology used**



Source: UKE

According to the Analysys Mason[6] forecast, the number of fibre-optic lines will grow steadily. According to the estimates of this research company, the number of FTTP/B fibre-optic accesses in Poland will grow at an average annual rate of 13.3% to reach 5.7 million in 2026.

Chart 6. **Number of FTTP/B links in Poland**



Source: Analysys Mason, DataHub

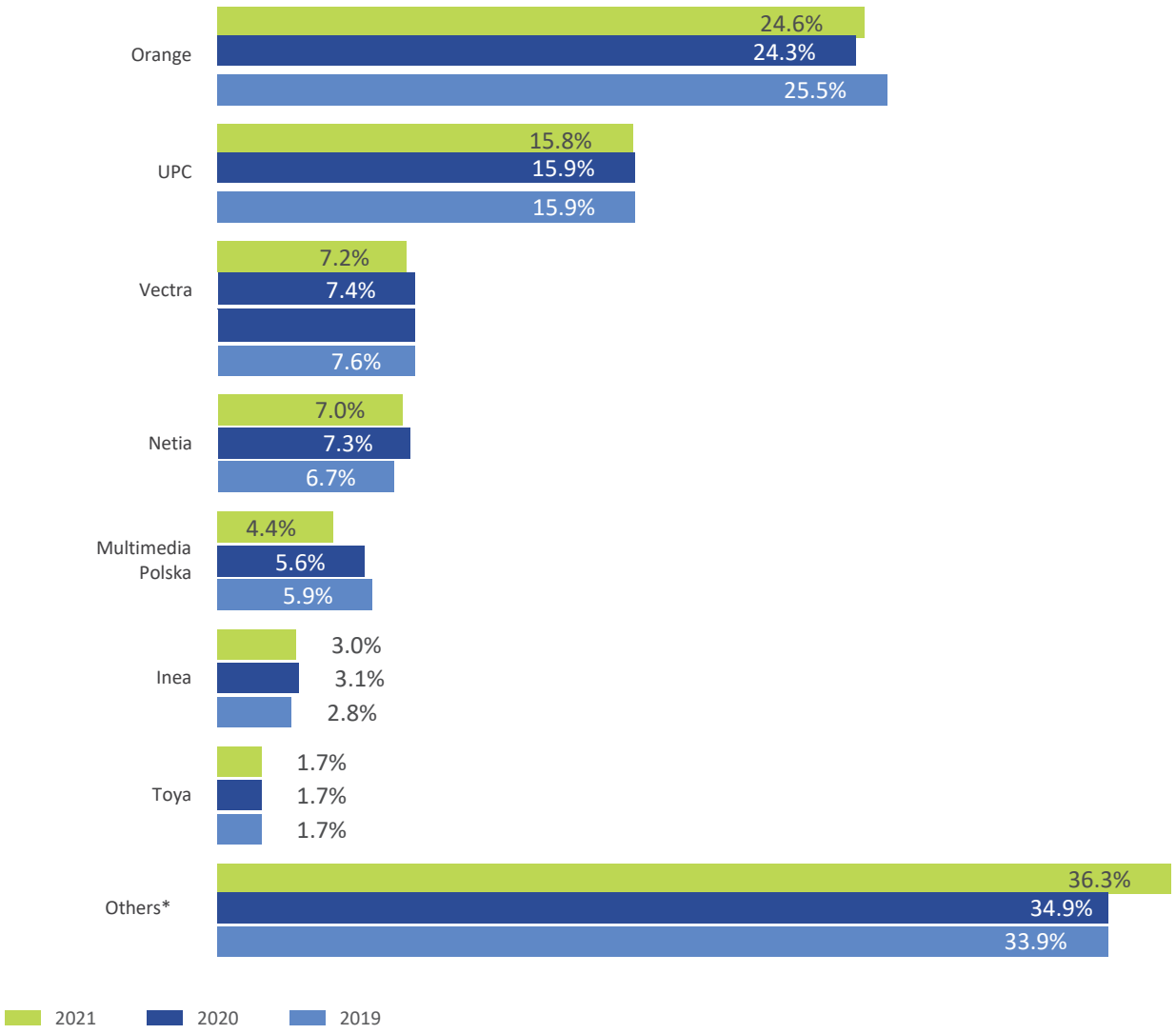
f-forecast

[6] An analyst company specialising in researching telecommunications markets.

The share structure in terms of the number of fixed internet users has not changed much.
Orange Polska remained the market leader. Its share[7] increased slightly to 24.6%. With a share of 15.8%, as in the previous year, UPC took the second place.

Vectra and Netia, who had 7.2% and 7.0% of users, ranked third and fourth respectively. The threshold of 1% share in the number of customers was additionally exceeded by Multimedia, Inea and Toya. Other entrepreneurs provided services to 36.3% of users.

Chart 7. **Shares of operators in terms of number of fixed-line internet users**



Source: UKE

* Others – enterprises with individual share not exceeding 1%

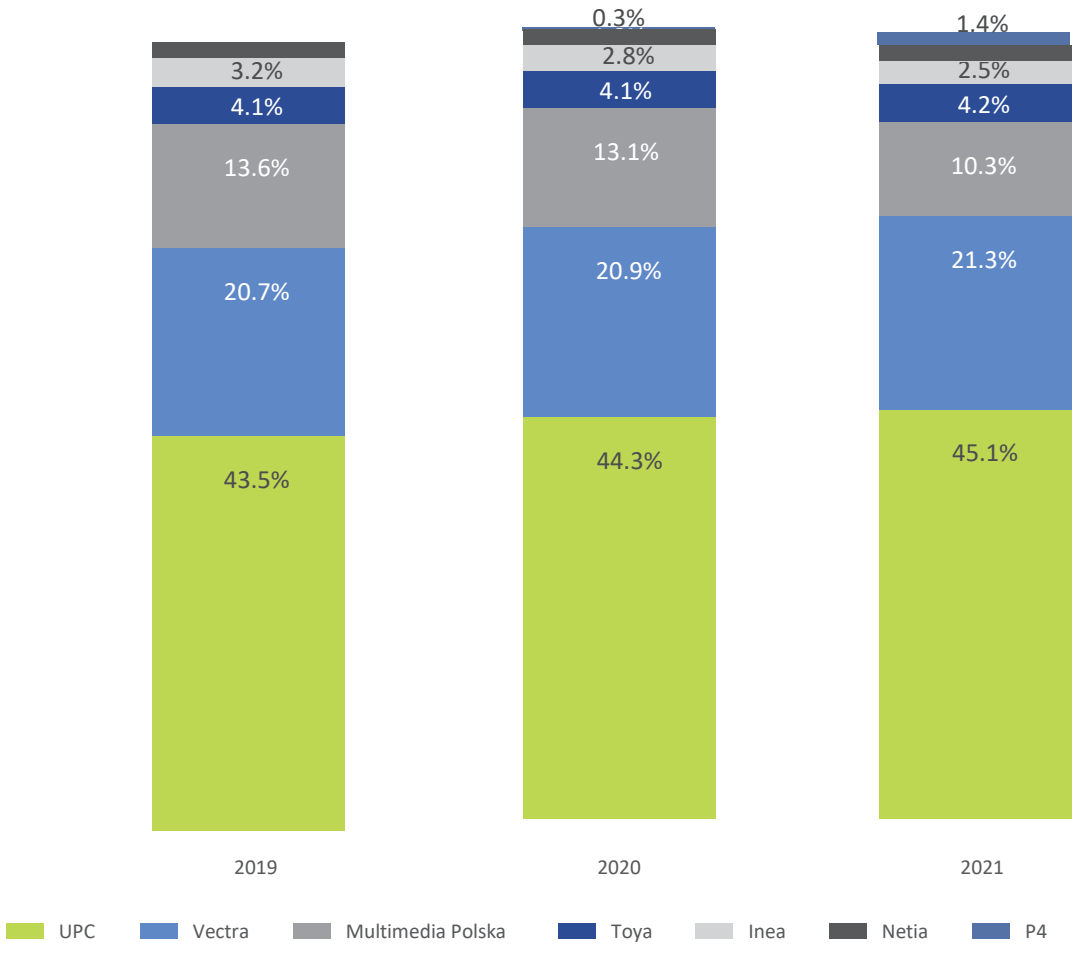
[7] Shares shown for telecommunications enterprises with more than 1% share of the market.

1.1.3.1. CABLE TV MODEM

For internet access via cable TV modem, the three largest companies provided services to nearly 77% of users in 2021. In terms of customers served, as was the case the year before, UPC took the first place. Its share grew by 0.8 p.p. compared to 2020, up to 45.1%.

Vectra, which offered services to almost 21% of users, ranked second. Recent years have seen a decline in the share of Multimedia Polska, which covered a tenth of the market with the service in 2021.

Chart 8. **Shares of operators in the total number of users using the cable TV modem service to connect to the internet**



Source: UKE

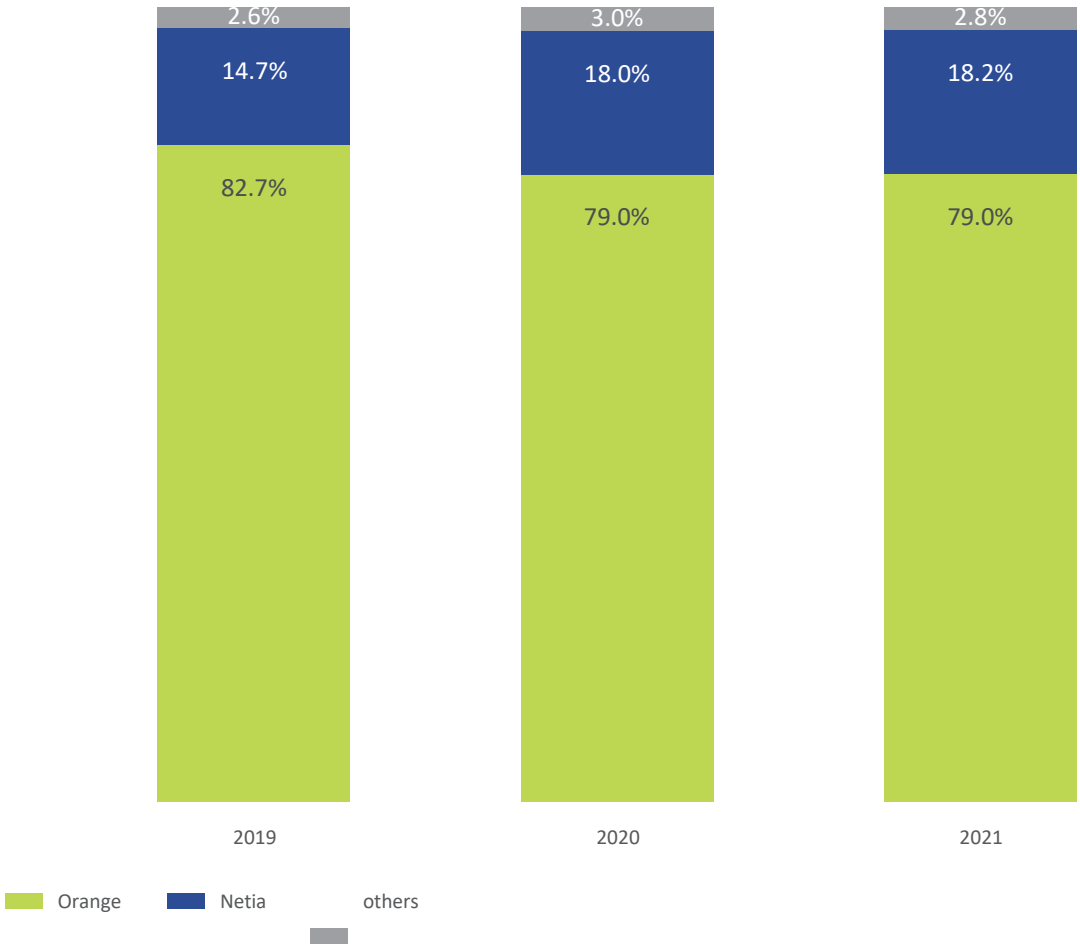
* Others – enterprises with individual share not exceeding 1%

1.1.3.2. xDSL

Internet access services via xDSL technology have been provided over the past few years mainly by two major companies: Orange Polska and Netia. In 2021, these operators provided xDSL internet to 97.2% of users of this technology.

As in the previous year, 79% of the market belonged to Orange Polska. Netia provided xDSL services to 18.2% of users. The share of other entrepreneurs was small, at just 2.8%.

Chart 9. **Shares of operators in the total number of users using the xDSL internet access service**



Source: UKE

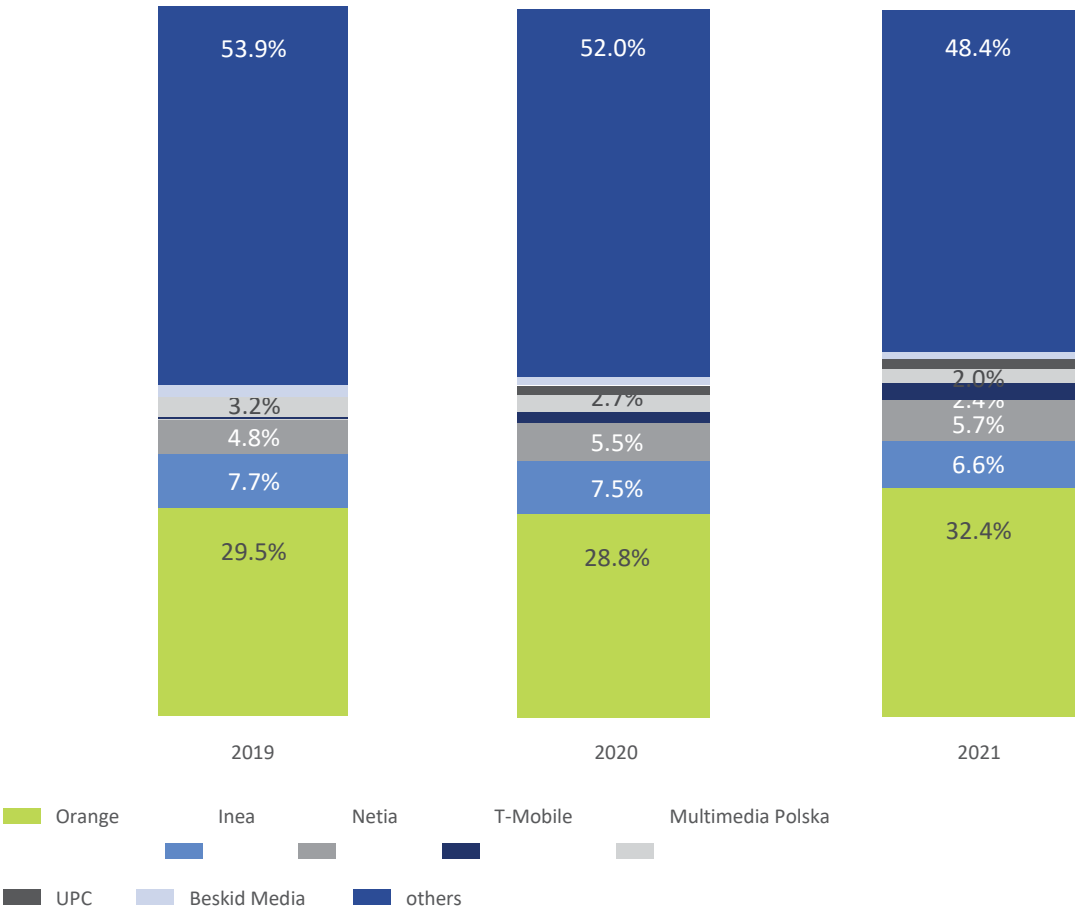
* Others – enterprises with individual share not exceeding 1%

1.1.3.3. FIBRE-OPTIC CONNECTIONS

The leading company in FTTH technology was, as in the previous two years, Orange Polska. Its share in terms of users, after a slight decline in the previous year, increased by 3.6 p.p. to 32.4%.
Inea, following structural changes[8] in 2021, lowered its share to 6.6%. Netia serviced 5.7% of users, 0.2 percentage points more than in the previous year. The fourth position was held by T-Mobile, which gained 2.1 p.p. over the past three years and had 2.4% of FTTH customers.

The fibre-optic access market is still quite fragmented. In 2021, only seven companies, out of nearly 1,200, provided services to more than 1% of customers each, with the remaining companies collectively serving more than 48% of FTTH users. However, it can be noted that the share of small players is decreasing year by year in favour of larger telecommunications companies.

Chart 10. **Shares of operators in the total number of users using the FFTH internet access service**



Source: UKE

* Others – enterprises with individual share not exceeding 1%

[8] As a result of an internal split of Inea S.A. into Fiberhost S.A. and independent service provider Inea Sp. z o.o. in July 2021, the retail portion of the business was transferred to Inea Sp. z o.o.
Fiberhost (the former Inea S.A.) is currently engaged only in wholesale operations, including the provision of a fibre-optic network.

1.1.3.4. WLAN AND LAN ETHERNET

Services provided using the WLAN and LAN-Ethernet technology were used by about 1.1 million users in 2021, 6.4% less than in the previous year.

The vast majority of enterprises did not achieve even a 1% share in services provided to customers. In the case of WLAN technology, this threshold was reached or slightly exceeded by only five companies. In the LAN-Ethernet segment, the shares of the largest 15 companies ranged from 1% to 7.4%.

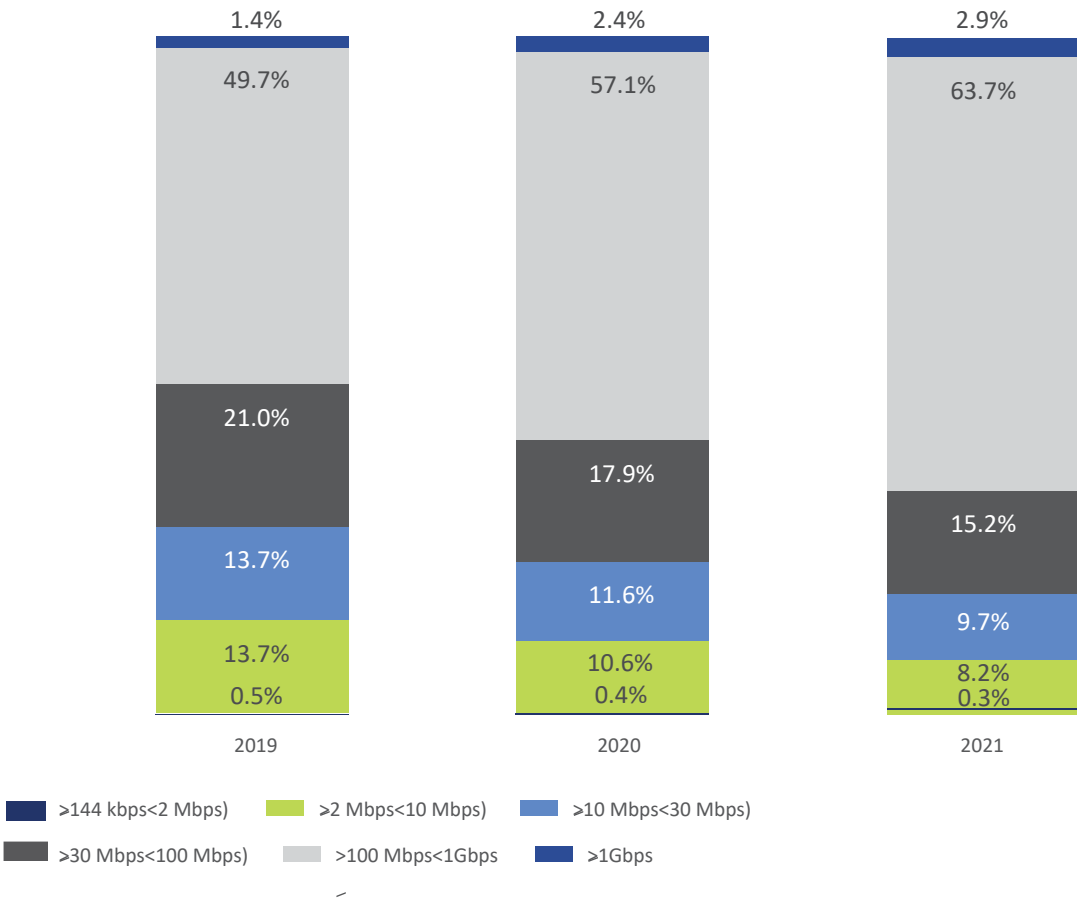
1.1.4. CONNECTION CAPACITY

Fixed-line internet is steadily accelerating.
This trend is particularly visible in recent years. While in 2019, 51% of fixed-line internet users were using lines with a minimum of 100 Mbps, in 2021 there were already 66.6% using high-speed internet.

Links with the highest bandwidths, i.e. a minimum of 1 Gbps, are becoming increasingly popular. Their number increased by 24% compared to the previous year, and more than doubled in two years. In 2021, very high-speed lines were used by 2.9% of users.

66.6% share of links
with the access of 100 Mb/s and greater capacity.

Chart 11. **Shares of connections broken down by capacity**



Source: UKE

1.1.5. RETAIL SERVICES BASED ON BSA AND LLU

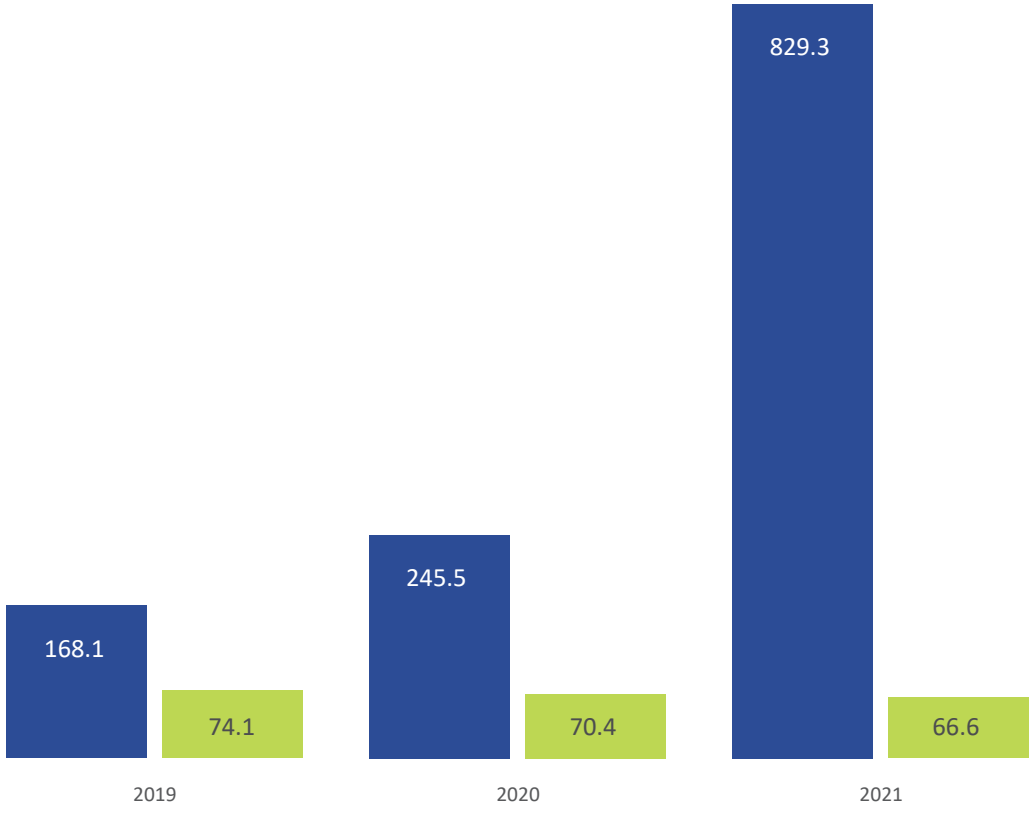
In the Polish broadband market, either wholesale bitstream access (BSA) or local loop access (LLU) was used by 10.5% of fixed-line internet users in 2021.
In 2021, the total number of customers serviced based on BSA and/or LLU was 0.9 million, an increase by about 184% compared to 2020.

The increase in the number of users to whom service was provided under the wholesale network access model was due to the significant increase in the importance of the service provided on the basis of BSA access. In 2021, the number of users of this type of access increased by almost 238% compared to 2020 and amounted to 0.8 million. The prevailing trend in the market of providing fibre-optic networks in a wholesale model to other operators, especially those without their own fibre-optic infrastructure, has helped increase the number of entrepreneurs providing services in BSA mode to 164 in 2021, up 39% from the previous year.

The increase in the number of BSA users was significantly influenced by structural changes in the market, including the transfer of part of Orange Polska's infrastructure to the operator Światłowód Inwestycje and Orange Polska's use of wholesale BSA services on that operator's network.
In addition, the increase in the number of BSA-type customers was affected by the aforementioned split of Inea S.A. As a result, Inea Sp. z o.o. was established, which began providing internet access services using wholesale access to the Fiberhost network in the form of wholesale BSA services.

At the same time, the number of LLU users decreased by 5% to 66.6 thousand.

Chart 12. **Number of users provided with internet services based on BSA and LLU (in thousands)**



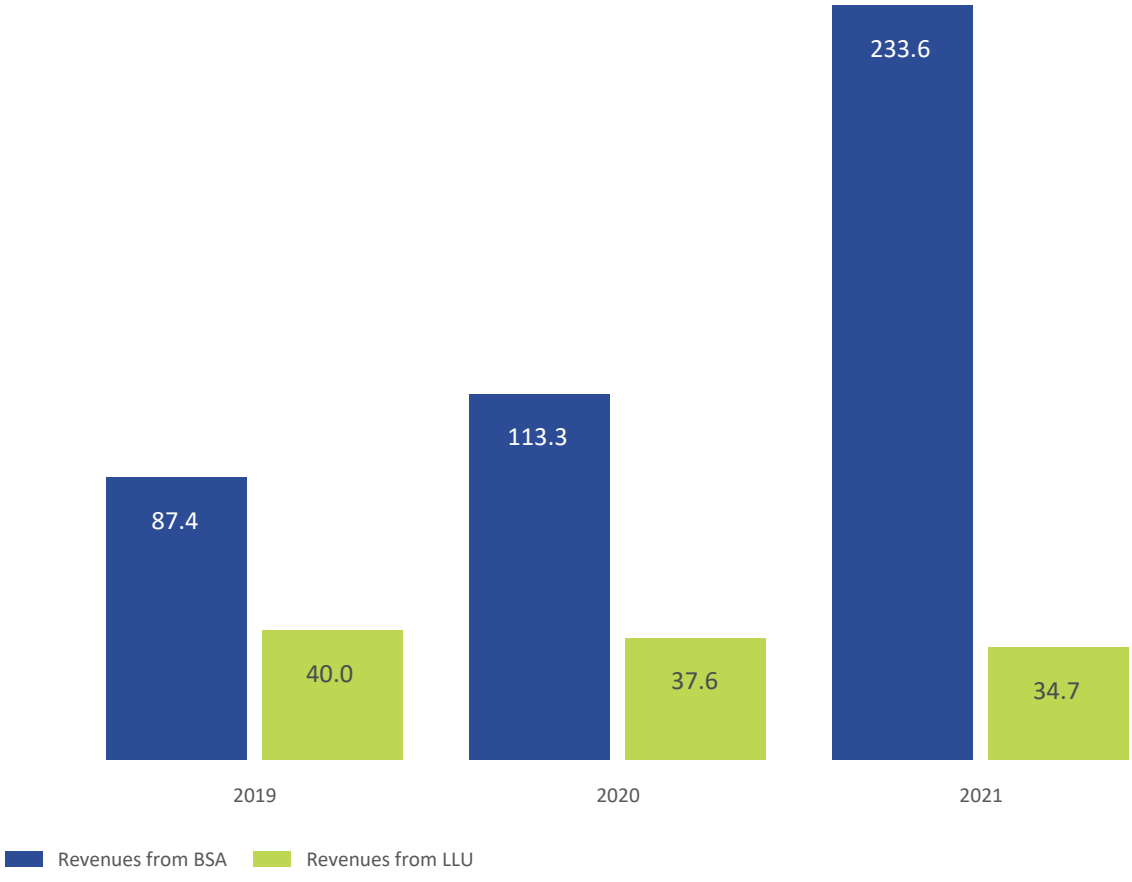
Source: UKE

Source: UKE

The total revenues from services based on BSA and LLU amounted to PLN 268.3 million in 2021. Revenues from BSA accounted for 4.7% of total fixed-line internet revenues, while 0.7% of total revenues came from access provided via LLU.

BSA revenues saw a significant increase in 2021, although not as significant as the number of users. Their value increased by 106% and amounted to PLN 233.6 million. LLU revenues dropped by 7.5% to PLN 34.7 million.

Chart 13. **Revenues from users provided with internet services based on BSA and LLU (in millions / PLN)**

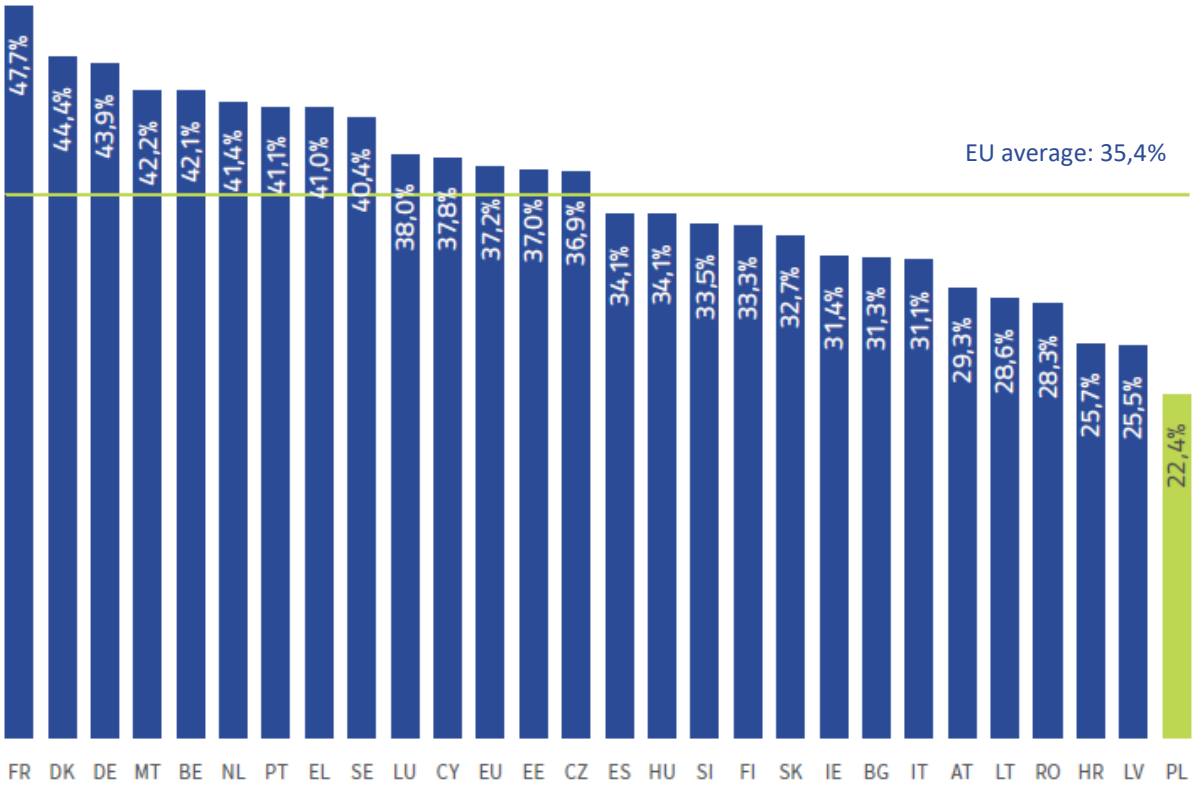


Source: UKE

1.1.6. COMPARISON WITH EUROPEAN COUNTRIES

In 2021, the penetration of fixed-line internet service in Poland, calculated by the number of users per population, despite a slight increase, was still the lowest among EU countries – at 22.4%.
The index increased by 1.6 p.p. compared to 2020 and was 13 p.p. lower than the average for EU countries.

Chart 14. **Penetration of fixed-line internet services in the EU (per 100 inhabitants)**

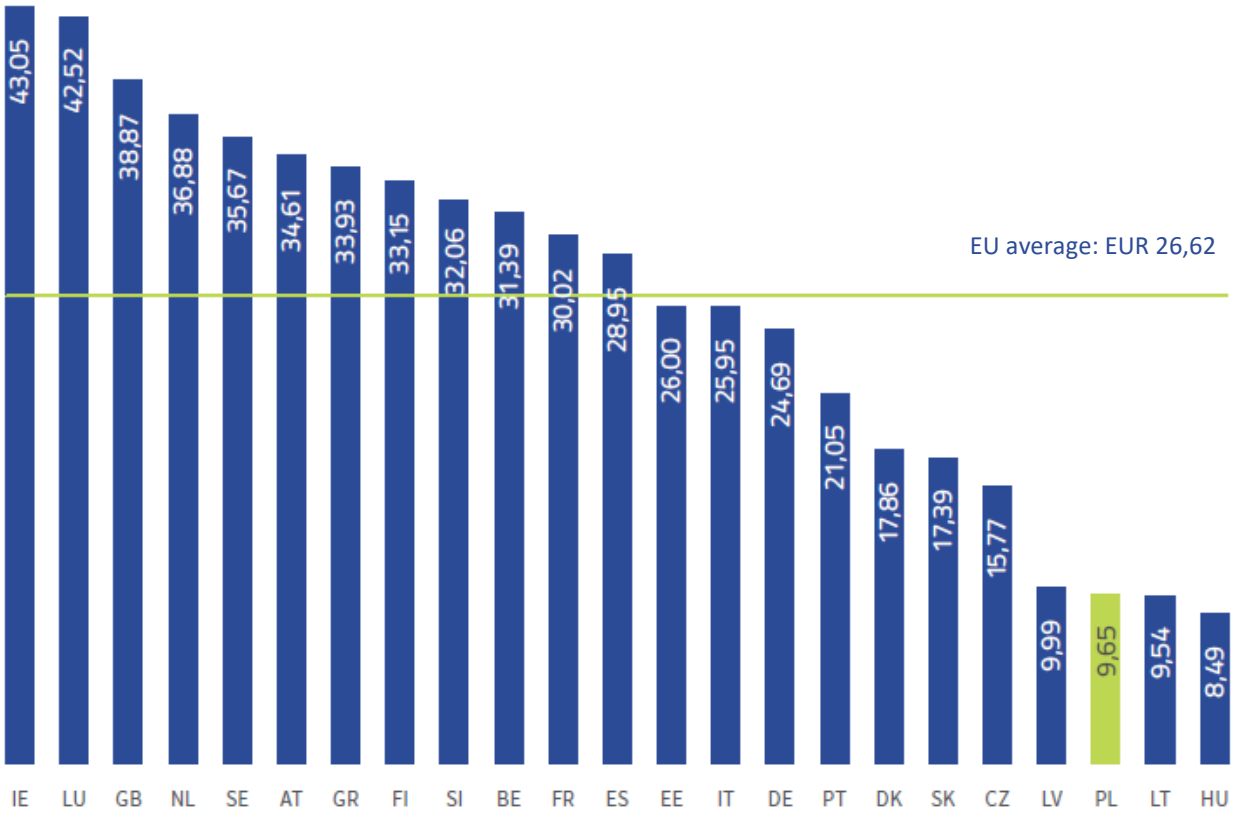


Source: Digital Agenda Scoreboard, July 2021

Prices for fixed internet access services in E countries were compared using the *OECD Fixed Broadband Price Benchmarking database*[9]. The cheapest offers from operators priced based on the OECD Medium price basket are included: 120 GB/>100 Mbps (120 GB data cap, internet speed over 100 Mbps).

In 2021, the cost of fixed-line internet access service in Poland, calculated according to OECD methodology, stood at EUR 9.65 and was as much as EUR 16.97 lower than the average in the rest of the EU. Poland was one of the three countries in the Community with the lowest service prices. Only Hungary and Lithuania could trumpet cheaper internet access. The service was the most expensive in Ireland and Luxembourg.

Chart 15. **Average monthly cost of service in EU countries, calculated for the OECD Medium basket: 120 GB/>100 Mbps [EUR, incl. VAT]**



Source: UKE based on Fixed Broadband Price Benchmarking, Strategy Analytics

Note: tariffs for residential and business customers who purchased an internet access service only (bundles were not analysed) were taken into account. For Poland, the offering of UPC, internet 150 Mbps (24 months) was chosen.
Service cost as of December 2021, without taking purchasing power parity into account.

[9] Database developed by the *Strategy Analytics* company.

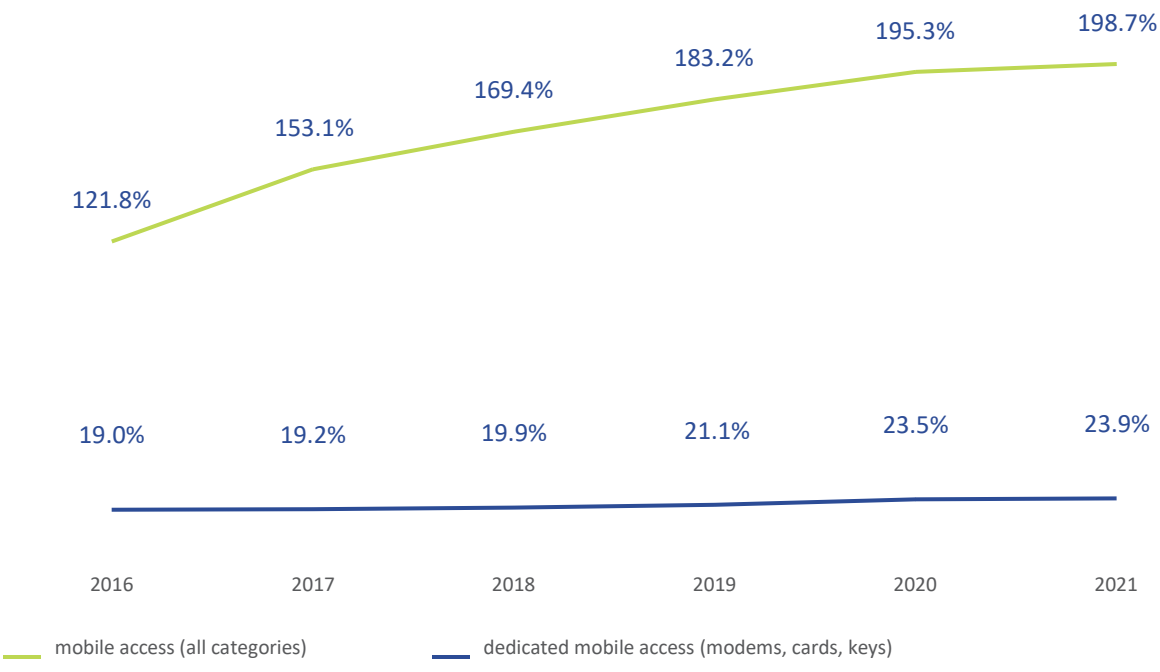
1.2. MOBILE INTERNET

1.2.1. GENERAL INFORMATION

Similar to the previous year, the penetration of mobile internet services has been presented in a twofold manner. Access was analysed separately for all possible categories of mobile access[10] and for dedicated offerings provided solely through modems, cards, or keys.

198.7% mobile internet penetration

Chart 16. **Mobile internet services saturation rate**



Source: UKE

Considering all mobile internet access options (including access on phones), there is a further increase in the service saturation rate, albeit somewhat less dynamic. In 2021, mobile internet penetration in relation to population was 198.7%,[11] that is 3.4 p.p. higher than the year before.

Dedicated mobile access through modems, cards and keys was used by 23.9% of the population. This represents a slight increase compared to 2020 (by 0.4 p.p.). The penetration rate for this type of access also demonstrates a steady, albeit smaller, upward trend.

[10] The mobile access categories include: actually used active SIM cards in mobile networks, dedicated data transmission offers for additional voice service bundles that require an extra fee, and dedicated data transmission offers for services sold separately and provided solely via cards/modems/keys (e.g. USB modems, PCMCIA cards, ExpressCard).

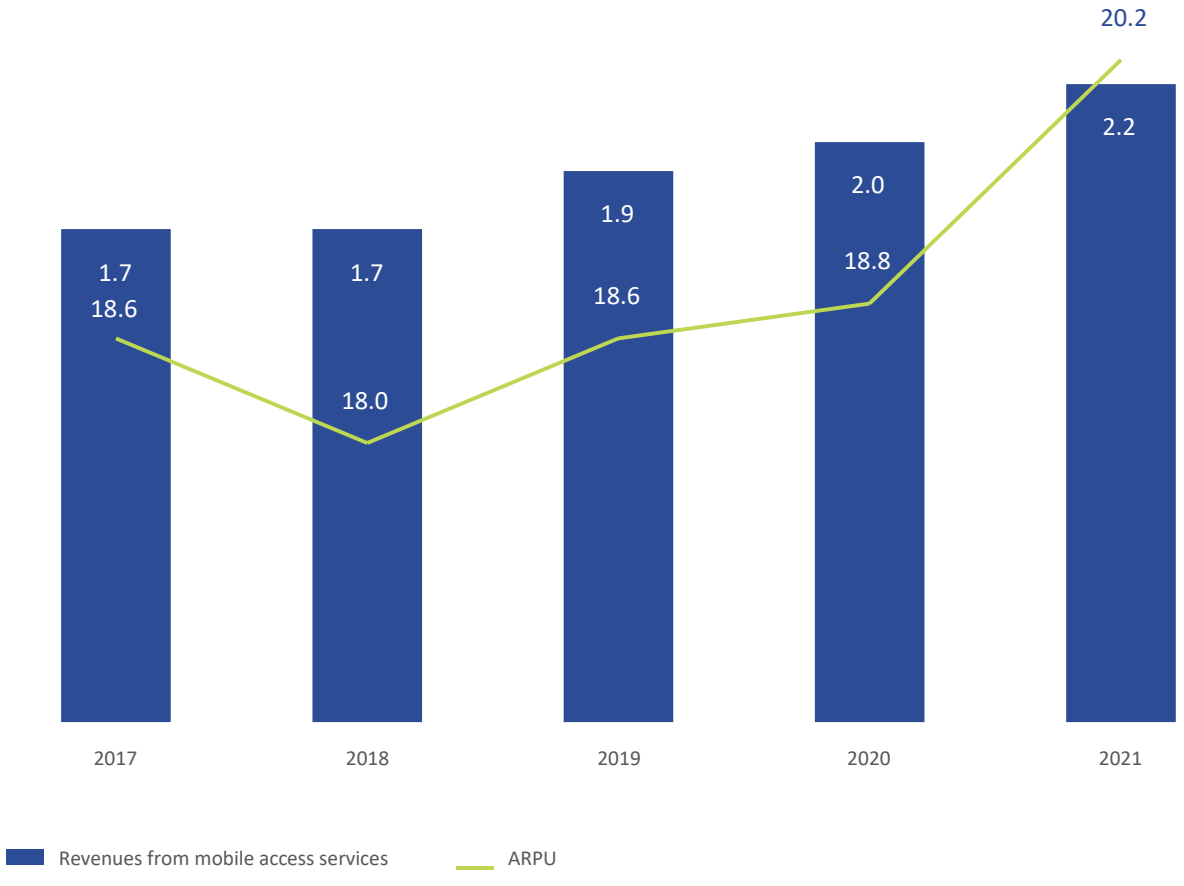
[11] In this case, penetration above 100% means that a user can access mobile internet using more than one kind of device.

1.2.2. REVENUES

As with fixed-line access, revenues from mobile internet access services via modems, cards, keys continue to show an upward trend. In 2021, mobile access revenues grew by 8.6% to reach PLN 2.2 billion.

Average revenue per user in mobile access increased by 7.5% and amounted to PLN 20.2. It was as much as PLN 27.3 lower than for fixed-line access.

Chart 17. **Revenues from the mobile internet access market (PLN billion) and average monthly revenue per user (ARPU, in PLN).**

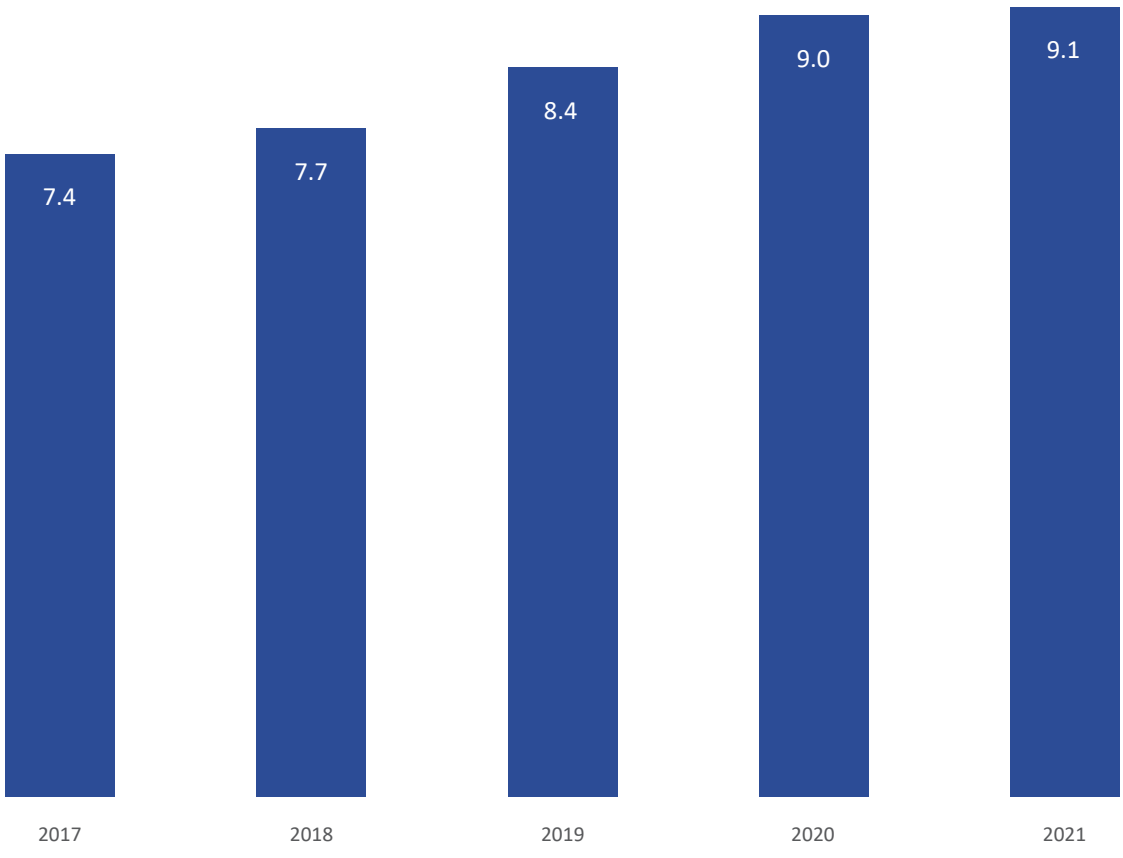


Source: UKE

1.2.3. USERS

Mobile internet users serviced through dedicated devices such as modems, cards or keys accounted for 51% of all internet users in 2021[12]. Their number has been on a steady upward trend, although in the last year the increase was small (1.1%), with 9.1 million users using dedicated internet access.

Chart 18. **Number of mobile internet access users (in millions)**

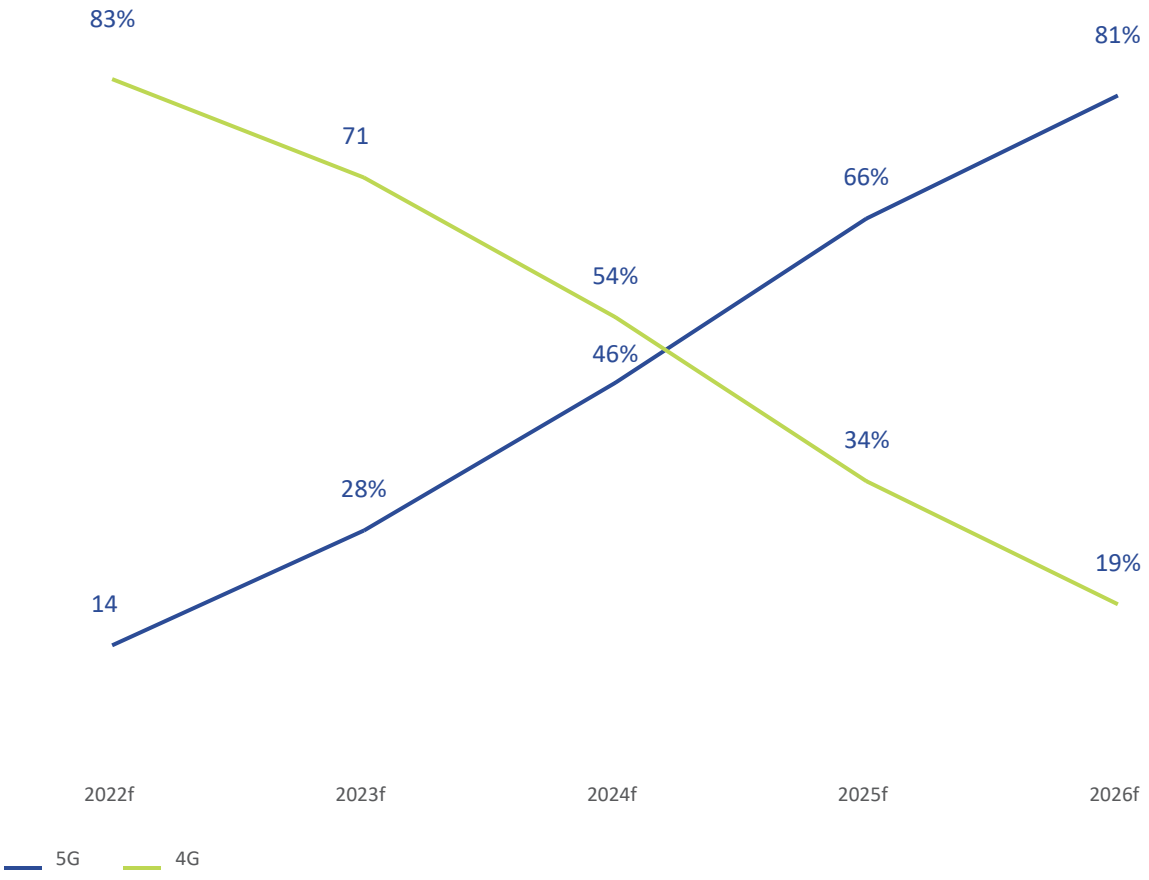


Source: UKE

[12] Fixed-line internet plus dedicated mobile access devices like modems, cards, keys.

Among users of dedicated internet access devices, users of 4G mobile devices are a growing proportion. Analysys Mason predicts that their share will reach 83% in 2022, and will decline rapidly in the following years in favour of 5G access, which will already be used by 81% of Poles in 2026.

Chart 19. **The share of 4G and 5G technologies in the total number of dedicated mobile access devices**

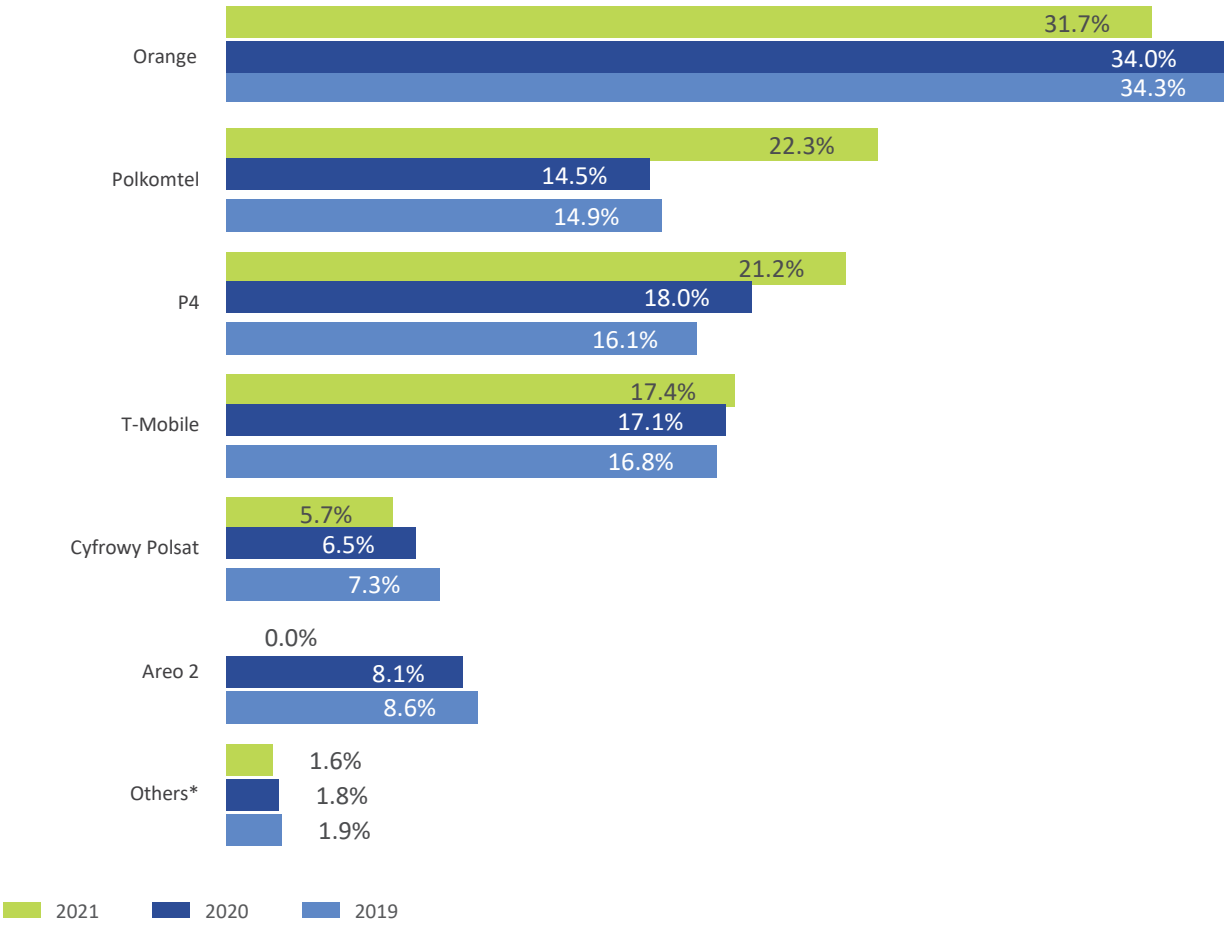


Source: Analysys Mason, DataHub

f-forecast

The leading company in the mobile access market was Orange Polska, which provided service to almost 32% of users in 2021. Polkomtel, whose share, mainly as a result of the Aero2 acquisition, increased by 7.8 p.p., moved into second place. Thus, the operator provided services to 22.3% of customers. P4 dropped to third place, providing 21.2% of users with the service, up 3.2 p.p. from a year earlier. Fourth on the list, T-Mobile, served 17.4% of mobile access customers.

Chart 20. **Shares of operators in terms of mobile internet users**



Source: UKE

* Others – enterprises with individual share not exceeding 1%

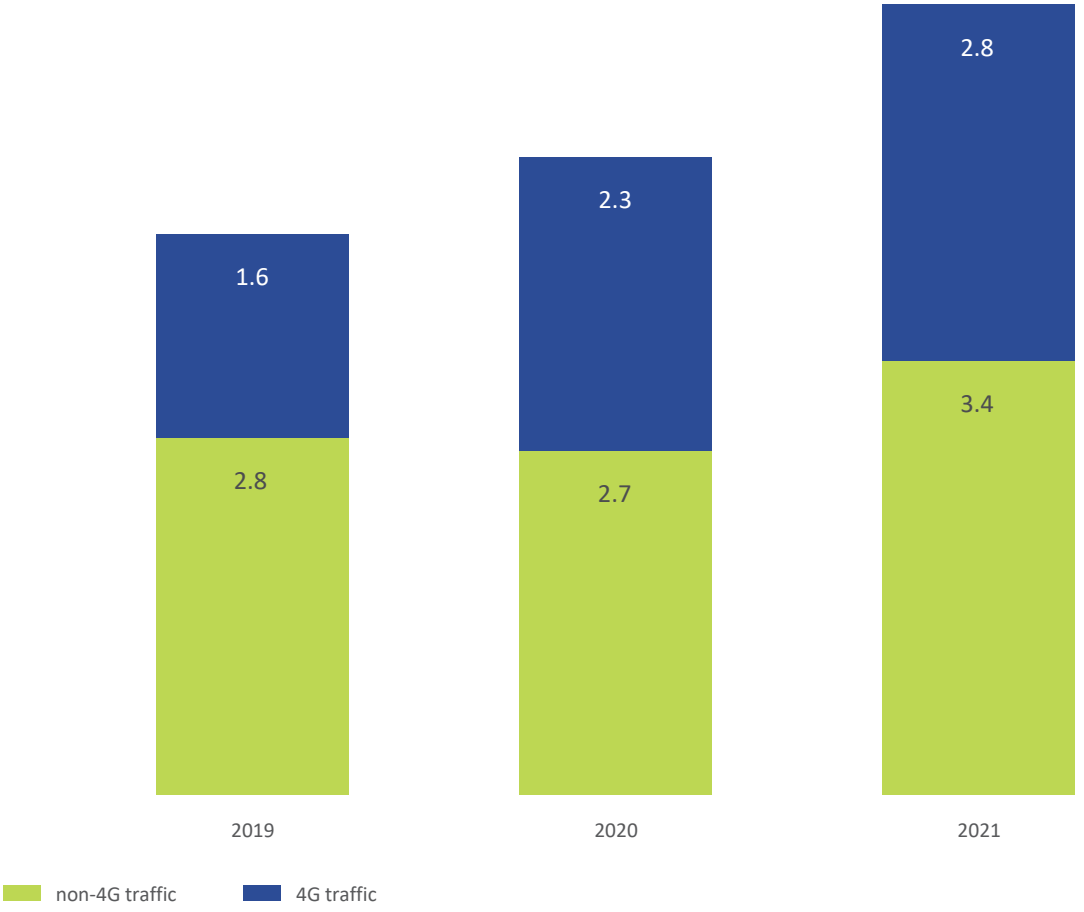
1.2.4. SERVICE VOLUME

In 2021, all forms of mobile access[13] were used to send 6.2 million TB of data. This meant an increase of 23% compared to 2020. Three-quarters of mobile traffic was consumed by residential customers. 4G traffic volumes increased by 21% year-on-year. It accounted for 45.2% of all traffic transmitted in mobile networks (2.8 million TB). 4G traffic was mostly operated by business customers.

45.2%

4G share of total data traffic in mobile networks

Chart 21. **Amount of data transferred over mobile networks in internet access service (million TB)**



Source: UKE

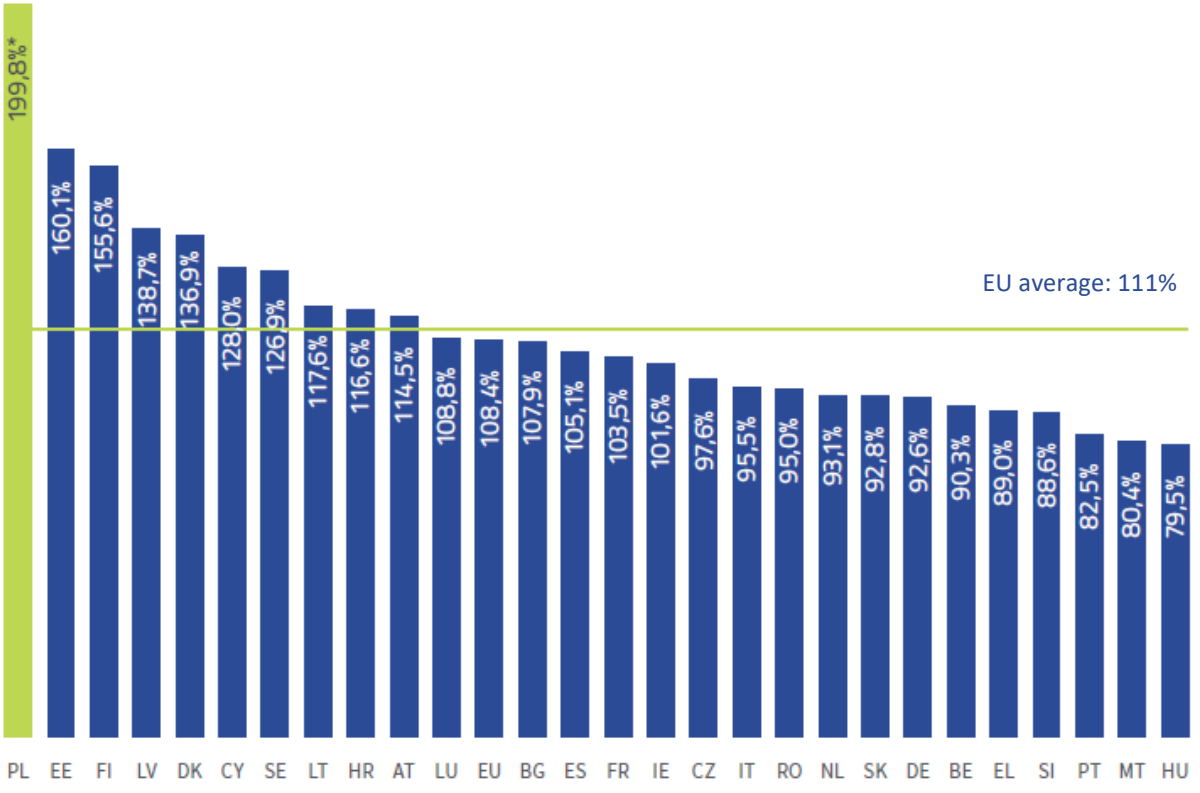
[13] All forms of mobile access mean: actually used active SIM cards in mobile networks, dedicated data transmission offers for additional voice service bundles that require an extra fee, and dedicated data transmission offers for services sold separately and provided solely via cards/modems/keys (e.g. USB modems, PCMCIA cards, ExpressCard).

1.2.5. COMPARISON WITH EUROPEAN COUNTRIES

In terms of mobile internet access,[14] our country can boast the best performance among European Union countries. In July 2021, the service penetration ratio was equal to 200%, higher than the EU average by as much as 88.8 p. p.

Apart from Poland, 9 other countries had ratios higher than the average. The second highest penetration, after our country, as in the previous year, was in Estonia (160.1%), the third in Finland (155.6%). The lowest result was recorded by Hungary (79.5%), Malta (80.4%) and Portugal (82.5%).

Chart 22. **Mobile internet service penetration (per 100 inhabitants)**



Source: Digital Agenda Scoreboard, July 2021

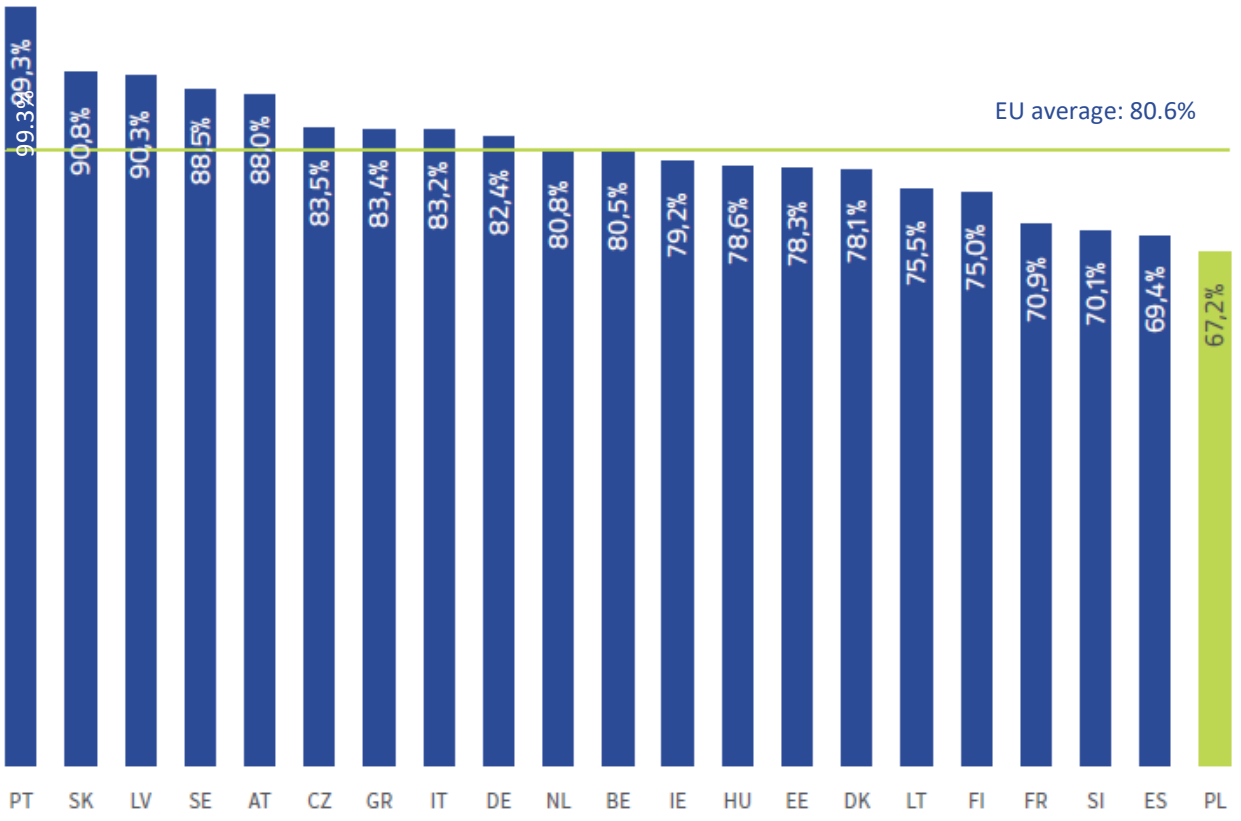
* The difference in penetration compared to UKE data may be due to the assumption of a different population.

Highest mobile internet access penetration in the EU

[14] All forms of mobile internet access were considered: actually used active SIM cards in mobile networks, dedicated data transmission offers for additional voice service bundles that require an extra fee, and dedicated data transmission offers for services sold separately and provided solely via cards/modems/keys (e.g. USB modems, PCMCIA cards, ExpressCard).

According to Analysys Mason, 67.2% of mobile access in Poland in 2021 was 4G technology. Poland came last in the ranking of EU Member States. Our result was 13.4 p.p. lower than the EU average of 80.6%.

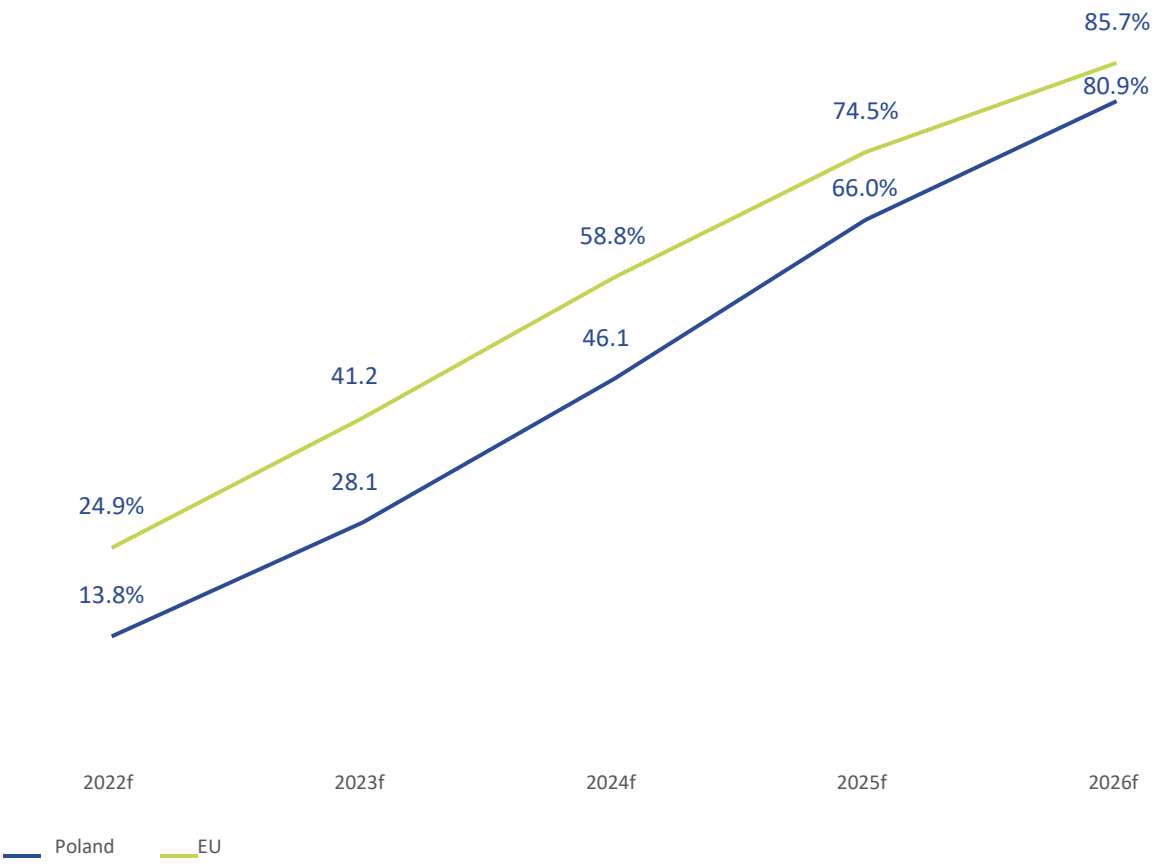
Chart 23. **Share of 4G in mobile access in EU countries in 2021**



Source: Analysys Mason, DataHub

Analysys Mason further predicts that the share of 5G technology in mobile access will increase in EU countries. In 2026, 5G connections will account for 85.7% of all connections used for mobile access. The forecast for Poland is equally optimistic. The company estimates that in 2026 nearly 81% of the Polish population will be using 5G mobile access.

Chart 24. **Comparison of the share of 5G technology in the number of mobile connections in Poland and the EU average – forecast**



Source: Analysys Mason, DataHub

f-forecast

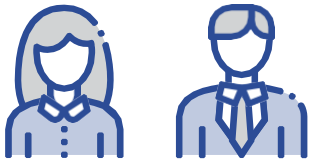
2 TELEPHONY SERVICES

PART I
THE TELECOMMUNICATIONS MARKET

2.1. FIXED-LINE TELEPHONY

2.1.1. GENERAL INFORMATION

Fixed-line telephony services are losing popularity among users in Poland. In 2021, just over 2.7 million subscribers used these services, 12.4% less than in the previous year. Revenues from the provision of telephony services amounted to just under PLN 1.2 billion, down 12% year-on-year.



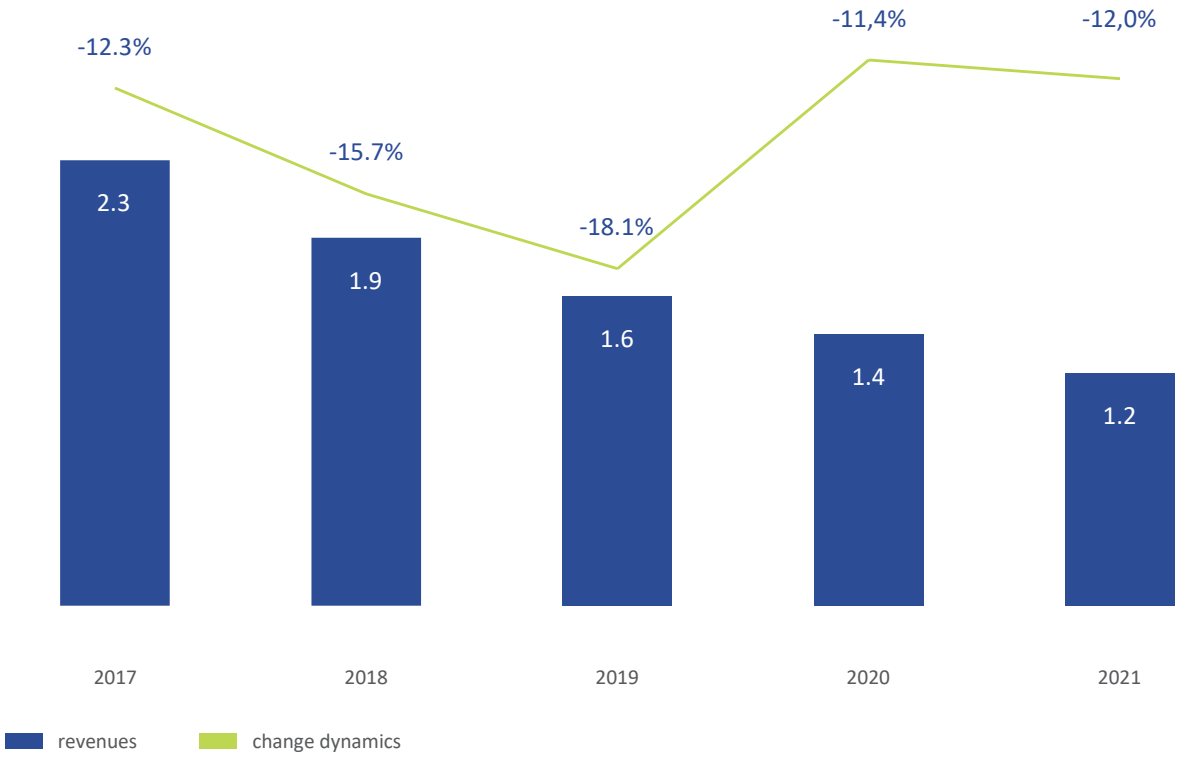
2.7 million

number of fixed-line telephony subscribers

PLN 1.2 billion

value of the market for fixed telephony services

Chart 25. **Value of the fixed-line telephony market (PLN billion) and change dynamics**

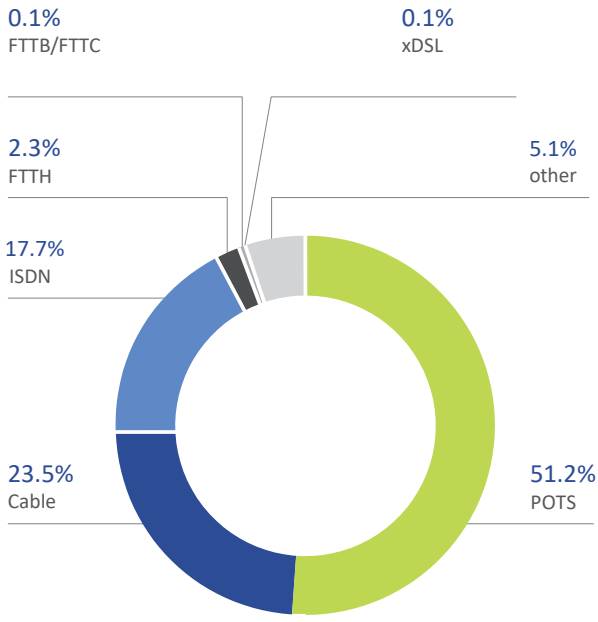


Source: UKE

Just over half of the total number of own subscriber connections are POTS connections (51.2%). The second largest share (23.5%) of the technology used to provide fixed-line services was cable TV modem. Technology came third.

ISDN (17.7%). The share falling to the remaining types was 7.6%.

Chart 26. **Percentage share of connection types in the total share of subscriber connections by technology**



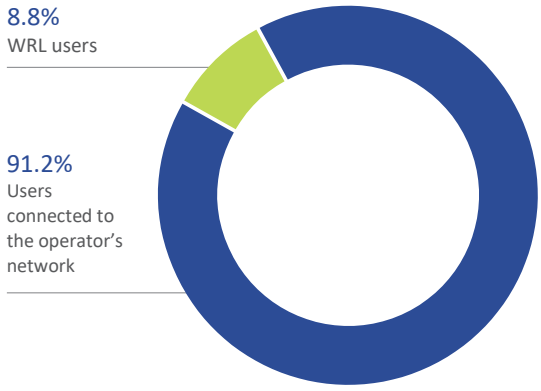
Source: UKE

2.1.2. REVENUES

In 2021, the value of the fixed-line market in Poland was more than PLN 1.2 billion, down 12% from the previous year. For several years, the main source of revenues of telecommunications enterprises providing fixed-line telephony services has been derived from subscribers connected to the operator's network (91.2%). A modest 8.8% of revenues from the total market comes from subscribers using retail services provided based on wholesale line rental (WLR).

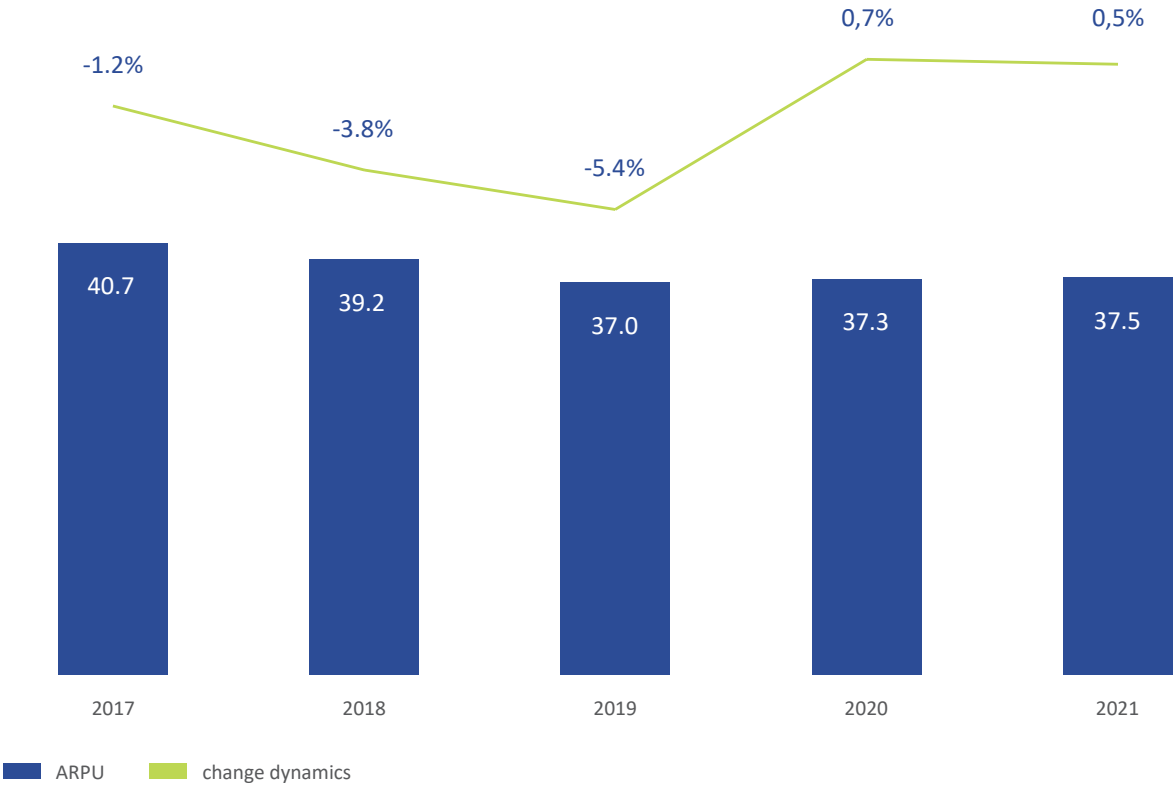
Since 2020, we have seen a slight increase in average monthly revenue per fixed-line subscriber. Compared to the previous year, the value increased by PLN 0.2 and amounted to PLN 37.5.
The relatively high level of monthly ARPU is most likely due to the maintenance of fixed subscription fees, which allow operators to maintain a level of profitability even with the apparent year-on-year decline in the subscriber base.

Chart 27. **Structure of revenues by the type of subscriber connections used**



Source: UKE

Chart 28. **Average monthly revenue per subscriber (PLN) and change dynamics**

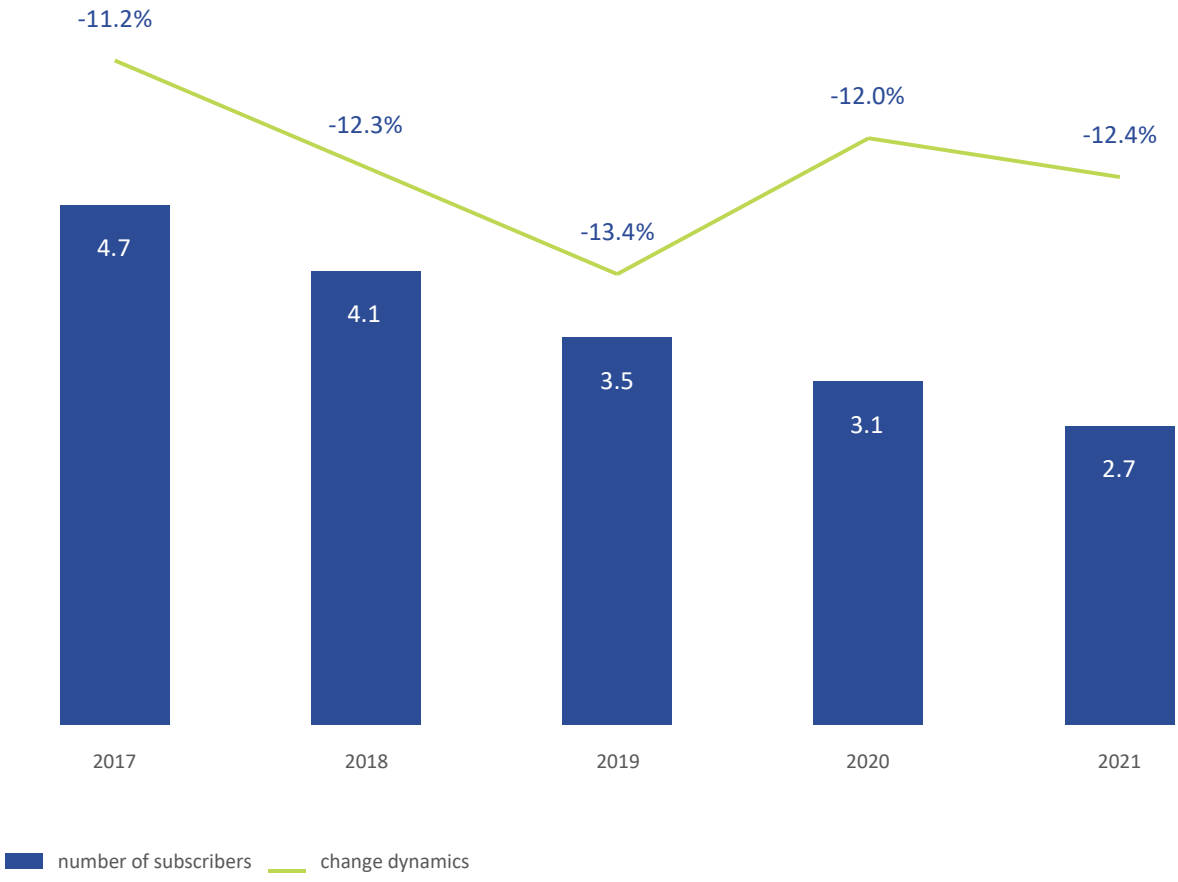


Source: UKE

2.1.3. USERS

The number of fixed-line telephony subscribers is declining year after year. In 2021, there were just over 2.7 million, 12.4% less than in 2020.

Chart 29. **Number of fixed-line telephony subscribers (in millions) and change dynamics**

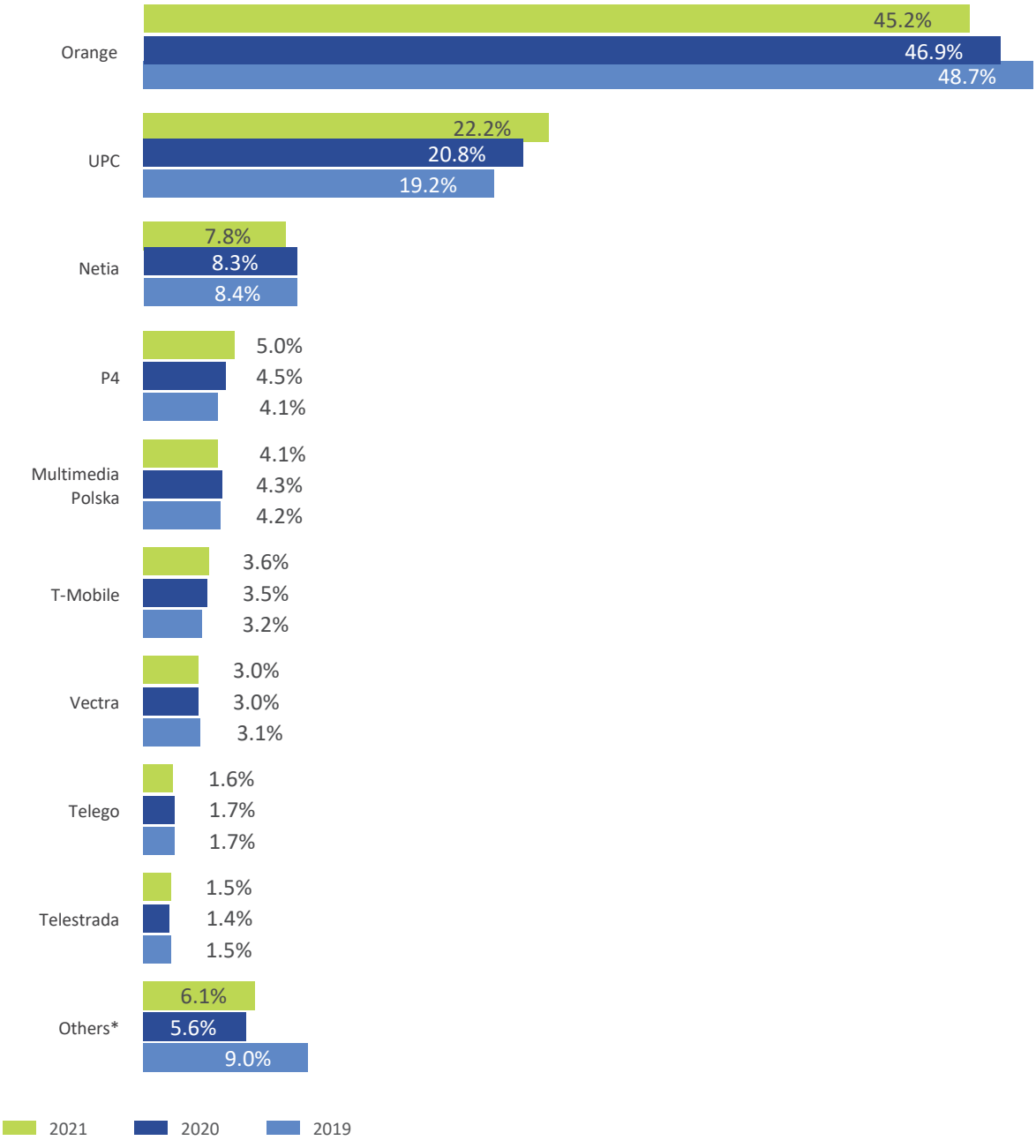


Source: UKE

In 2021, just under half of the fixed line market share in terms of users was held by Orange (45.2%). There has been a steady decline in the incumbent's share over the years. Only in comparison to 2020, it decreased by 1.7 p.p. By contrast, the shares of alternative operators are increasing with each year.

The second place was taken by UPC (22.2% – increase by 1.4 p.p. year-on-year), followed, respectively, by Netia (7.8%), P4 (5.0%), Multimedia (4.1%). The share falling to the remaining enterprises was 6.1%.

Chart 30. **Shares of operators in terms of numbers of subscribers**



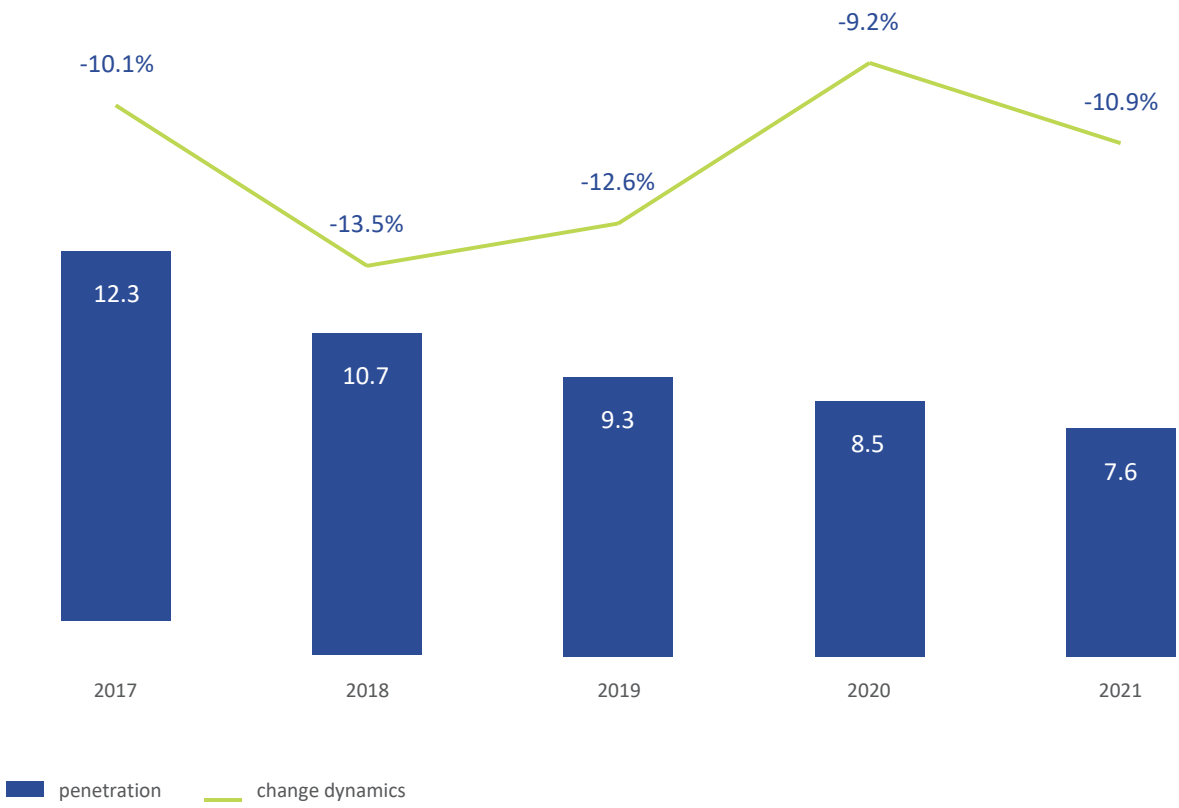
Source: UKE

* Others – enterprises with individual share not exceeding 1%

2.1.4. SUBSCRIBER CONNECTIONS

Fixed-line telephony service (connections) penetration has been steadily declining, but the previous downward trend is somewhat slowing down since the outbreak of the COVID-19 pandemic. Last year, the penetration ratio for the entire country was 7.6%, that is 10.9% less than in 2020.

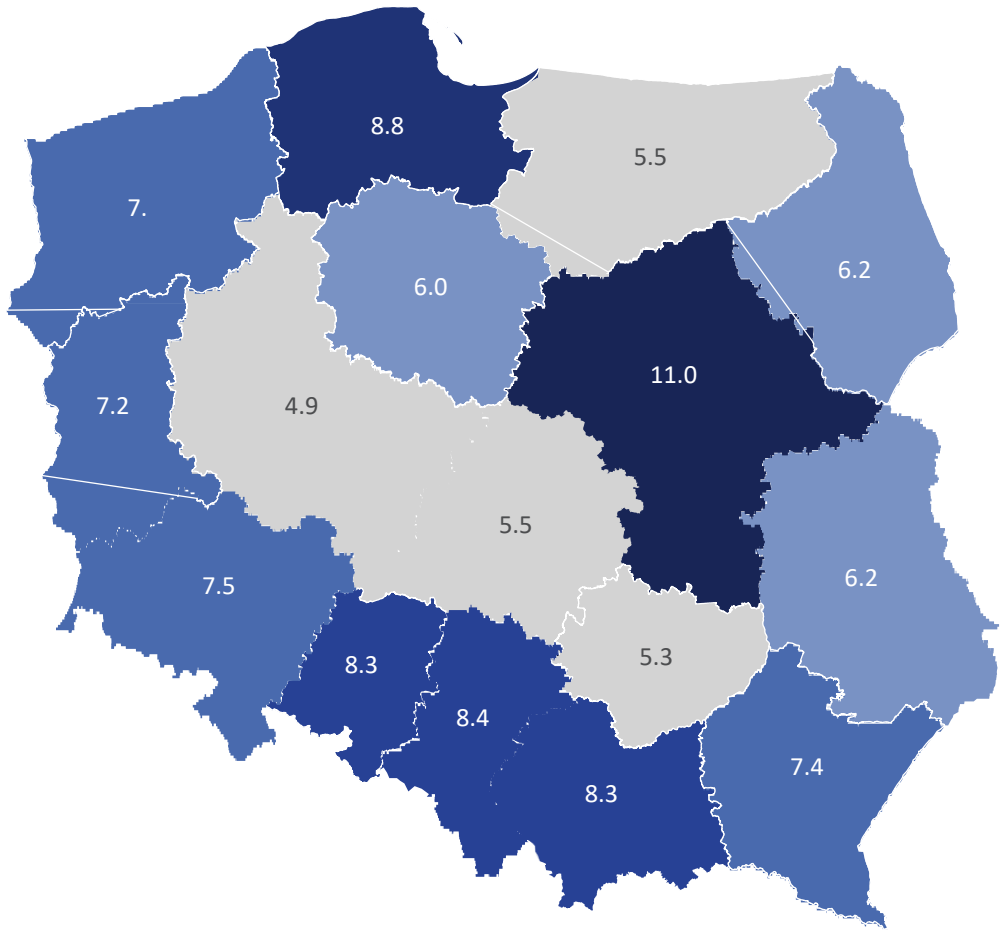
Chart 31. **Fixed-line telephony connections penetration (%) (number of subscriber connections per number of inhabitants) and change dynamics**



Source: UKE

As in the previous year, the highest number of own subscriber connections per capita was in the Mazowieckie Voivodeship (11.0%), and the lowest in the Wielkopolskie Voivodeship (4.9%).

Map 1. **Penetration (%) of fixed-line telephony connections broken down by voivodeship**



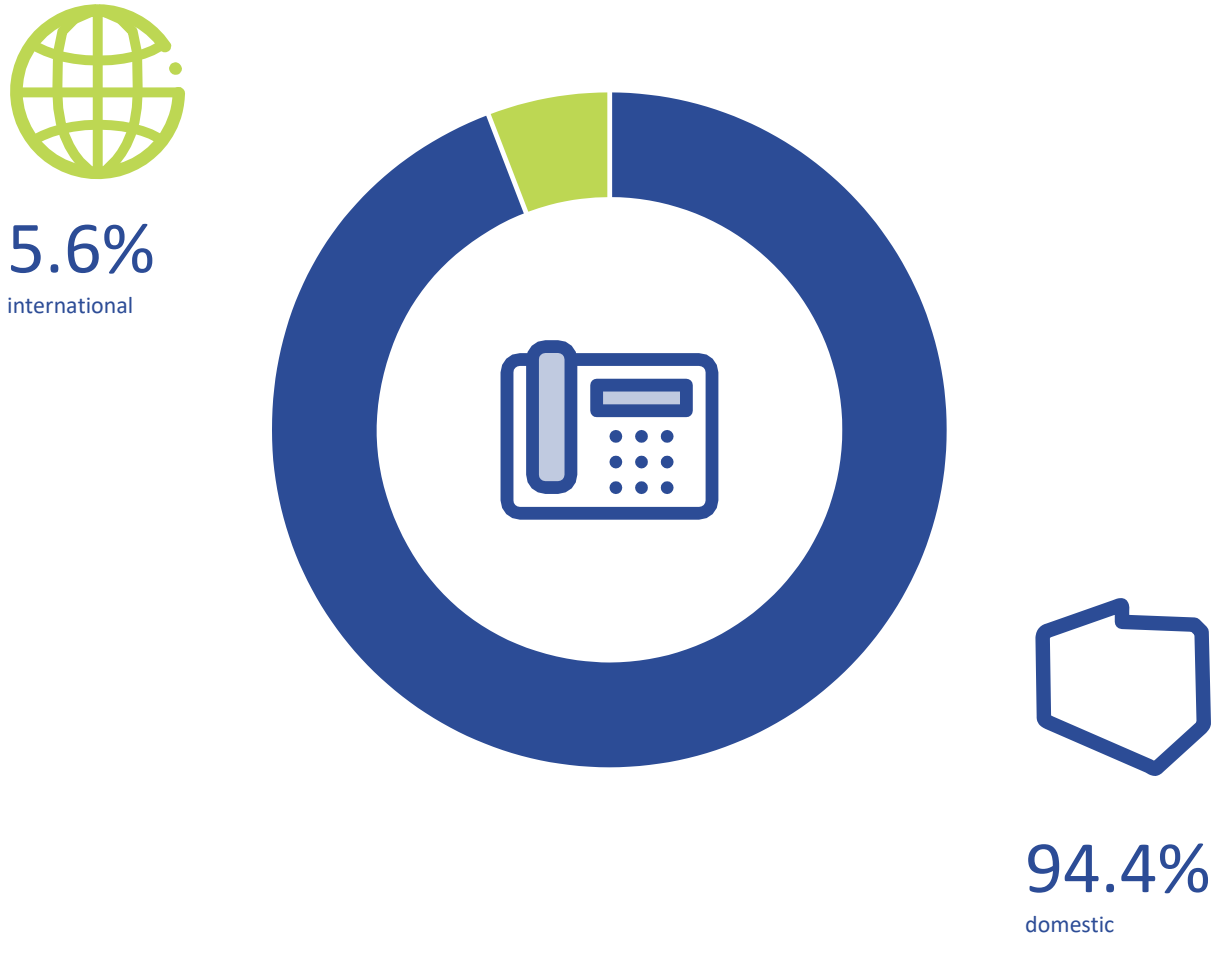
Source: UKE

2.1.5. TRAFFIC VOLUME

A continuation of the downward trend in call duration from previous years, briefly halted in 2020 by the COVID-19 pandemic, was evident in 2021.
Total call duration was about 3.9 billion minutes, down 12% from the previous year.

Domestic connections account for the largest share of traffic volume (94.4%). The continued decline in international calls confirms the previous trend of decreasing international telecommunications traffic in favour of other means of electronic communication, including mobile telephony and instant messaging.

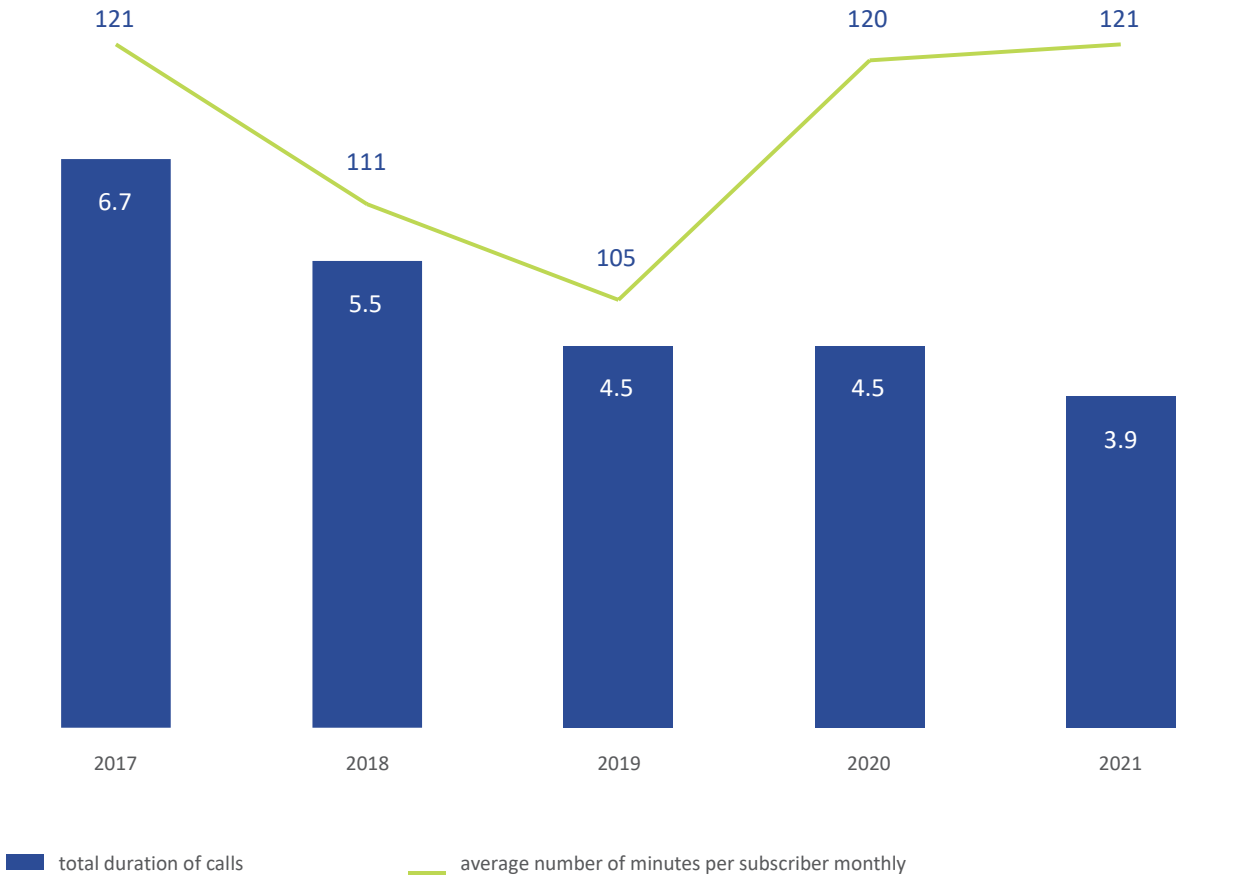
Chart 32. **Share of voice calls by direction**



Source: UKE

The average number of minutes per subscriber increased slightly compared to last year. This occurred despite a noticeably smaller subscriber base and shorter call duration. In 2021, the rate increased by about a minute compared to 2020 and amounted to almost 121 minutes per subscriber per month.

Chart 33. **Traffic volume (in billions of minutes) and the average number of minutes per subscriber monthly**



Source: UKE

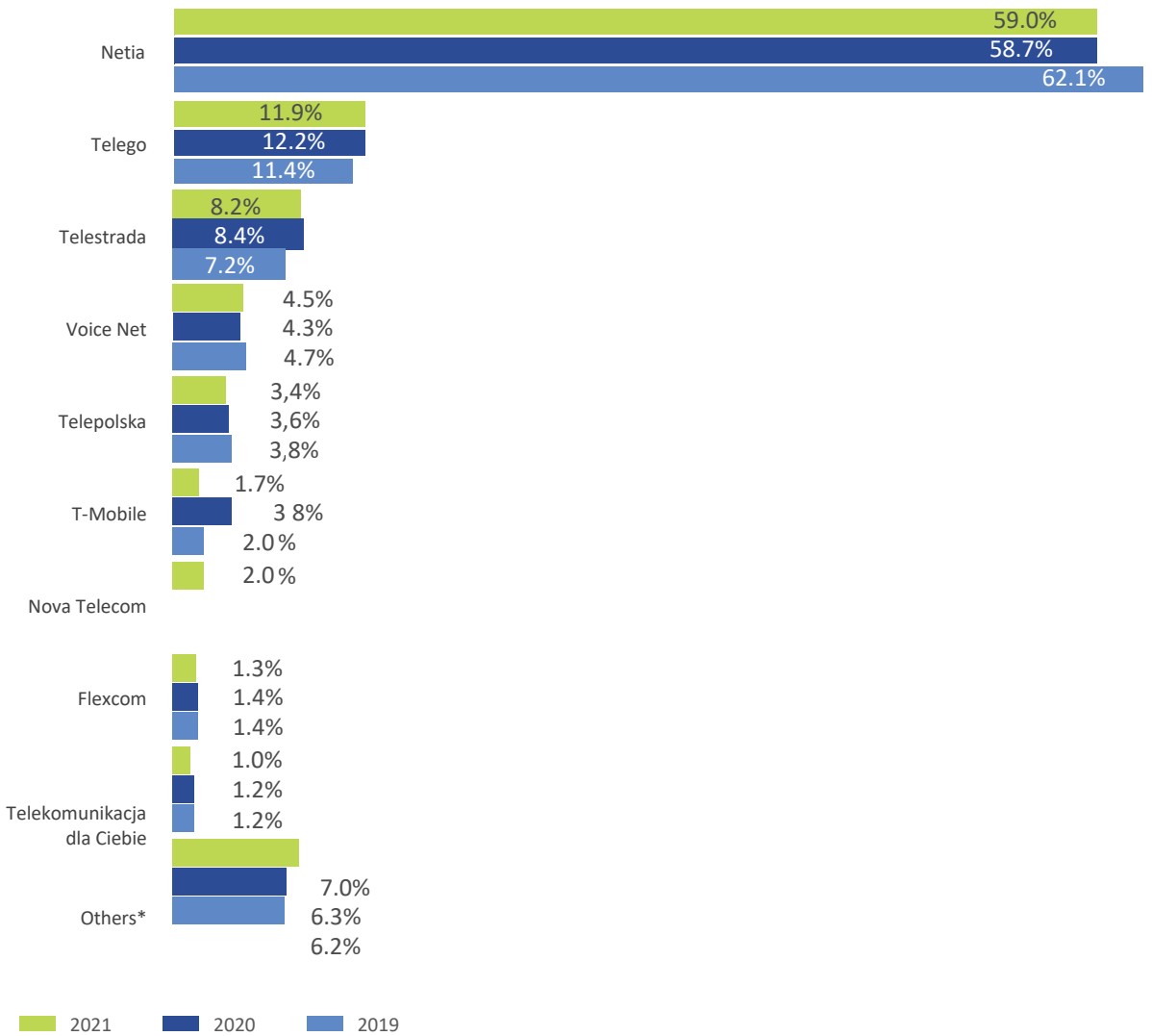
2.1.6. RETAIL SERVICES BASED ON WLR

In 2021, the total number of WLR subscriber connections was 177,500, which means it was down by half (50.5%) compared to the previous year. The number of subscribers using WLR services was 103,000, that is 165,800 less, which means a decrease by 61.6% year-on-year.

Retail revenues provided on the basis of wholesale network access – WLR – amounted to PLN 49.9 million in 2021.
Compared to the previous year, their value decreased nearly by 2/3 (65.6%).

Among operators active on the WLR market, for several years, the largest share in revenues has been held by Netia, and its share increased by 0.3 p.p. compared to 2020 (to 59.0%). Significantly smaller shares were recorded by Telego (11.9%), Telestrada (8.2%), Voice Net (4.5%), Telepolska (3.4%), T-Mobile (1.7%), Nova Telecom (2.0%), Flexcom (1.3%) and Telekomunikacja dla Ciebie (1%), respectively . The remaining operators covered 7% of the market, 0.7 p.p. more than last year.

Chart 34. **Shares of operators in revenues provided through WLR-based retail services**



Source: UKE

* Others – enterprises with individual share not exceeding 1%

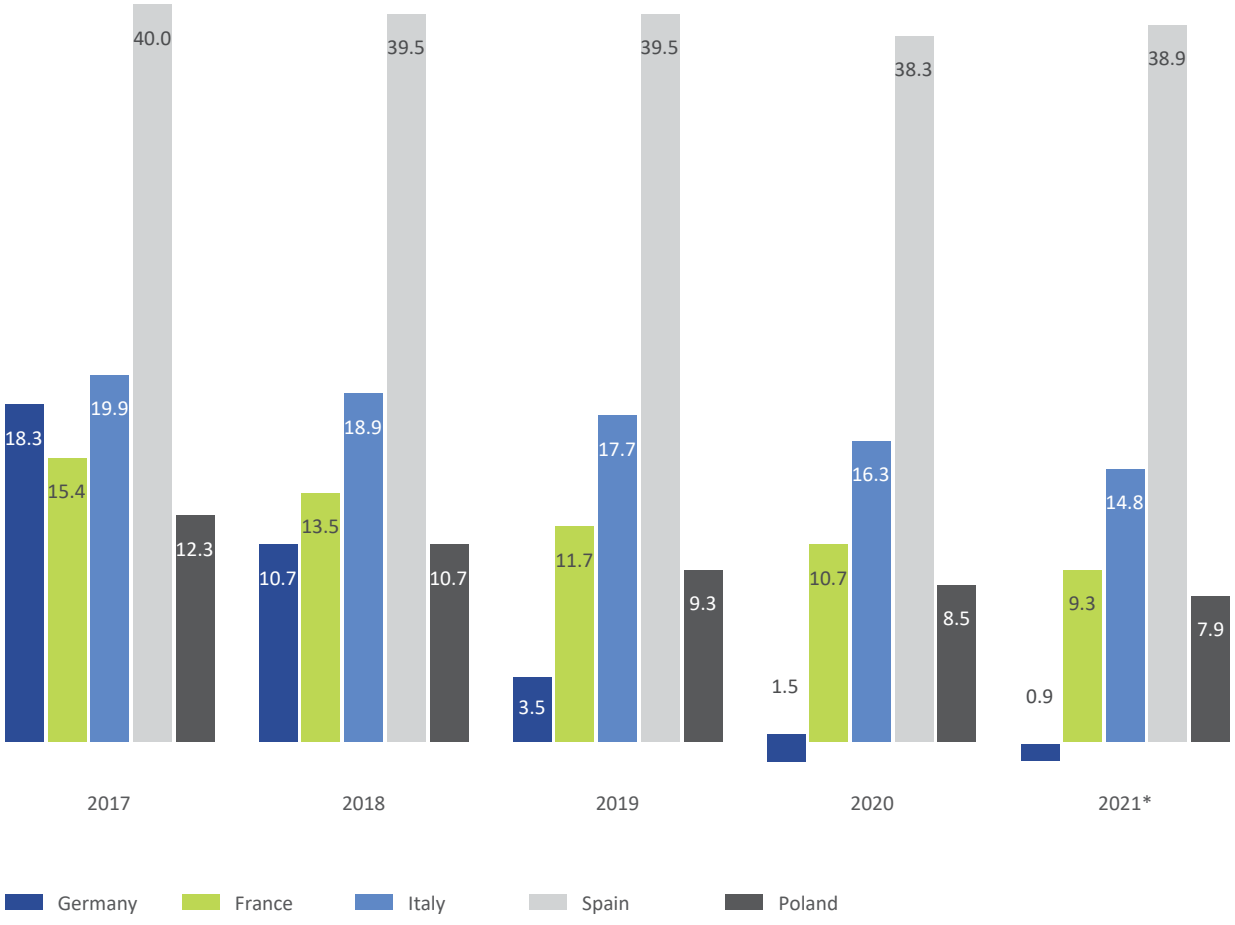
2.1.7. COMPARISON WITH EUROPEAN COUNTRIES

When comparing fixed-line telephony penetration[15] in the EU countries, the four largest countries in the European Union in terms of population were considered, apart from Poland: Germany, France, Italy and Spain.

Of the countries in question, Spain (38.9%) had the highest penetration, as in previous years, with Poland (7.9%) in penultimate place just behind Italy (14.8%) and France (9.3%).

Year after year, we see a downward trend in most European Union countries, which has gained the most momentum in Germany.

Chart 35. **Penetration of fixed-line telephony connections (%) in selected European Union countries in 2017–2021**



Source: IDATE

* Projected values for 2021 for the 4 EU countries

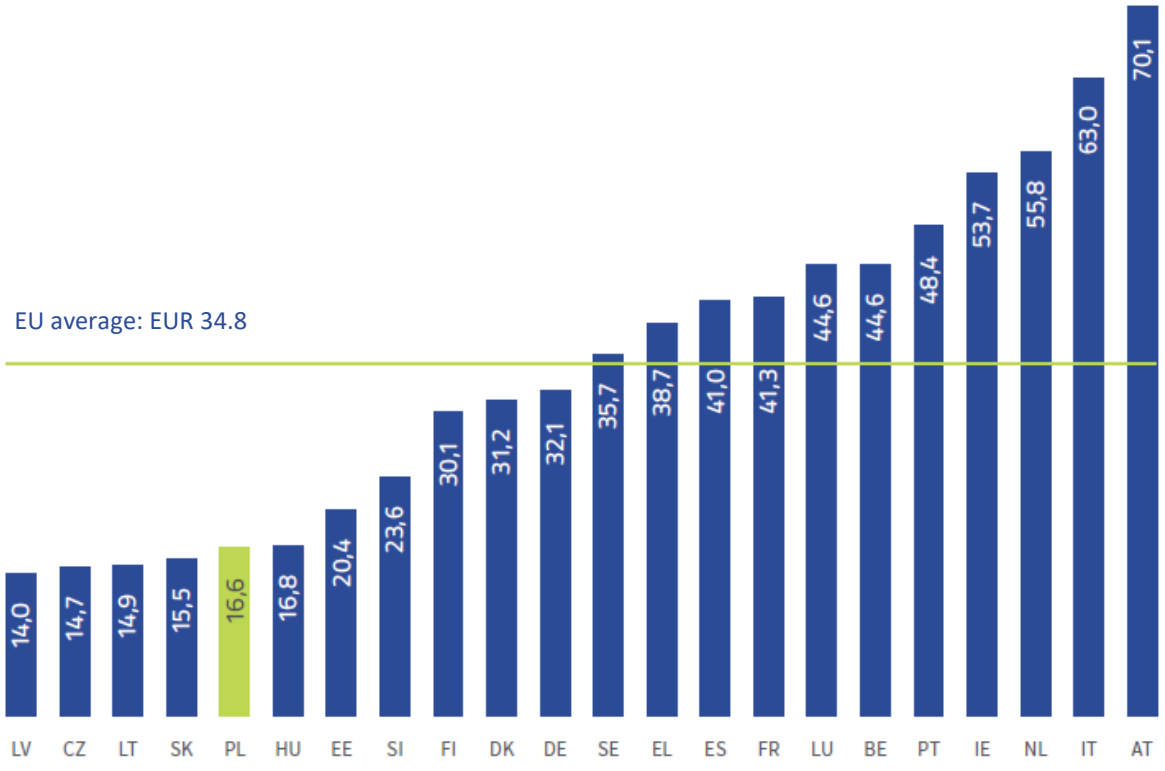
[15] Subscriber connections (PSTN/ISDN connections without VoIP) divided by the country's population.

The price analysis was conducted based on the *OECD Fixed Voice Price Benchmarking* database. The ranking employed the medium usage basket.

In Q1 2021, the average price of fixed-line services in the selected 22 EU countries was EUR 34.8, EUR 0.1 less than in the previous year. The lowest costs were paid by users from Latvia (EUR 14.0) and the highest by the Austrians (EUR 70.1). Thus, the price spread in selected EU countries was as high as EUR 56.1.

The cost the fixed-line telephony user in Poland had to bear was EUR 16.6, EUR 18.3 lower than the average price in selected EU countries.
Compared to last year's price ranking of selected EU countries, the prices of fixed-line telephony in Poland increased slightly by EUR 0.4. In this list of prices, Poland ranked fifth, as it did last year, behind Latvia, the Czech Republic, Lithuania and Slovakia.

Chart 36. **Monthly basket values for average usage* in selected EU countries (EUR including VAT)**



Source: UKE based on Fixed Voice Price Benchmarking, Strategy Analytics

*According to the methodology adopted by the OECD, the medium usage basket consists of an average of 100 calls/month for a total of 385 minutes, of which 59% are local, 16% national, 23% for calls to mobile networks (F2M) and 2% to international.

** The prices do not take into account the purchasing power parity (PPP).

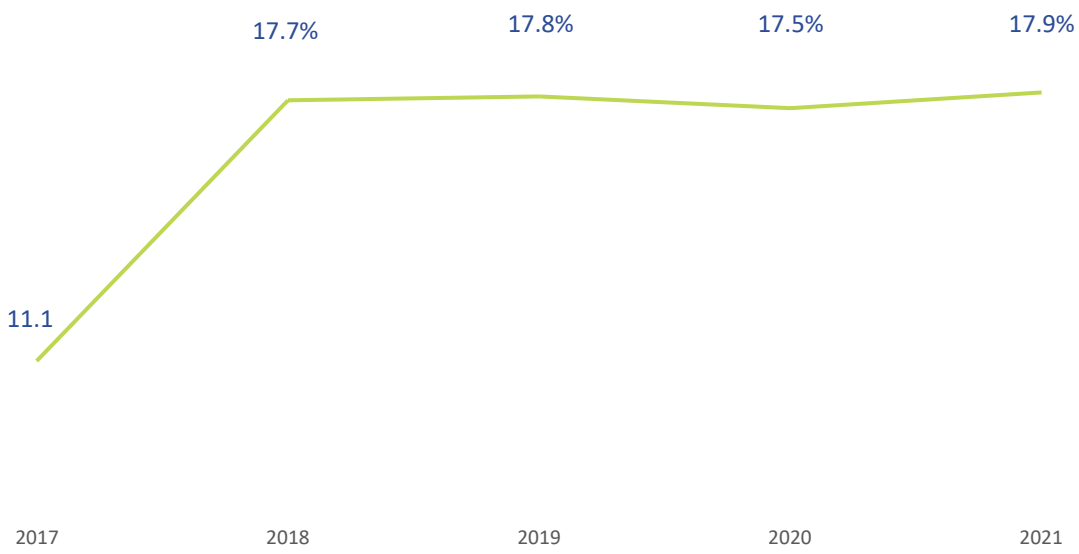
2.2. VoIP TELEPHONY

2.2.1. GENERAL INFORMATION

VoIP services, previously used mostly for international calls as a cheaper alternative to fixed-line telephony calls, are now increasingly displacing traditional telephone services. In 2021, services were provided via VoIP to nearly 49% of total fixed-line telephony users,[16] an increase of nearly 8 p.p. as compared to 2020. Considering the total value of the fixed-line telephony market, VoIP accounted for 21% of this market segment's revenue.

Penetration of the service, calculated by the number of users per total number of households in Poland, increased by 0.4 p.p. to 17.9%, after a slight decline in 2020.

Chart 37. **Penetration of the VoIP telephony market**



Source: UKE

[16] Total fixed-line telephony includes traditional fixed-line telephony and VoIP telephony.

2.2.2. REVENUES

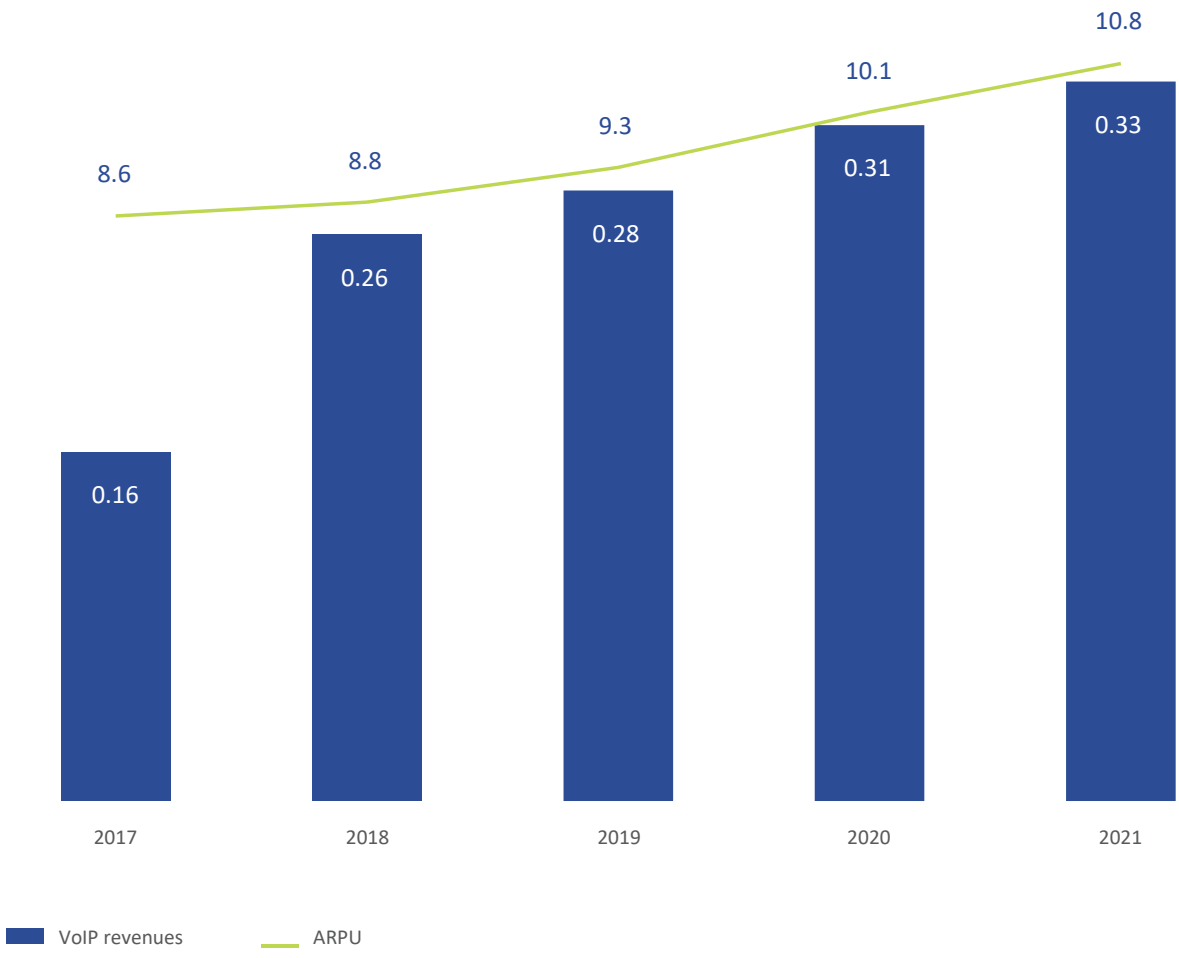
Revenues from VoIP telephony are growing slowly but steadily. The value of this market in 2021 was PLN 0.3 billion, that is 8.6% higher than in the previous year.

The monthly revenue per user has also been increasing. In 2017–2021, it was PLN 9.5 on average. In 2021, ARPU stood at PLN 10.8 and was PLN 0.7 higher than in the previous year.

PLN 0.3 billion

the value of the VoIP telephony market

Chart 38. **The value of the VoIP telephony market (PLN billion) and average monthly revenue per user (ARPU in PLN)**

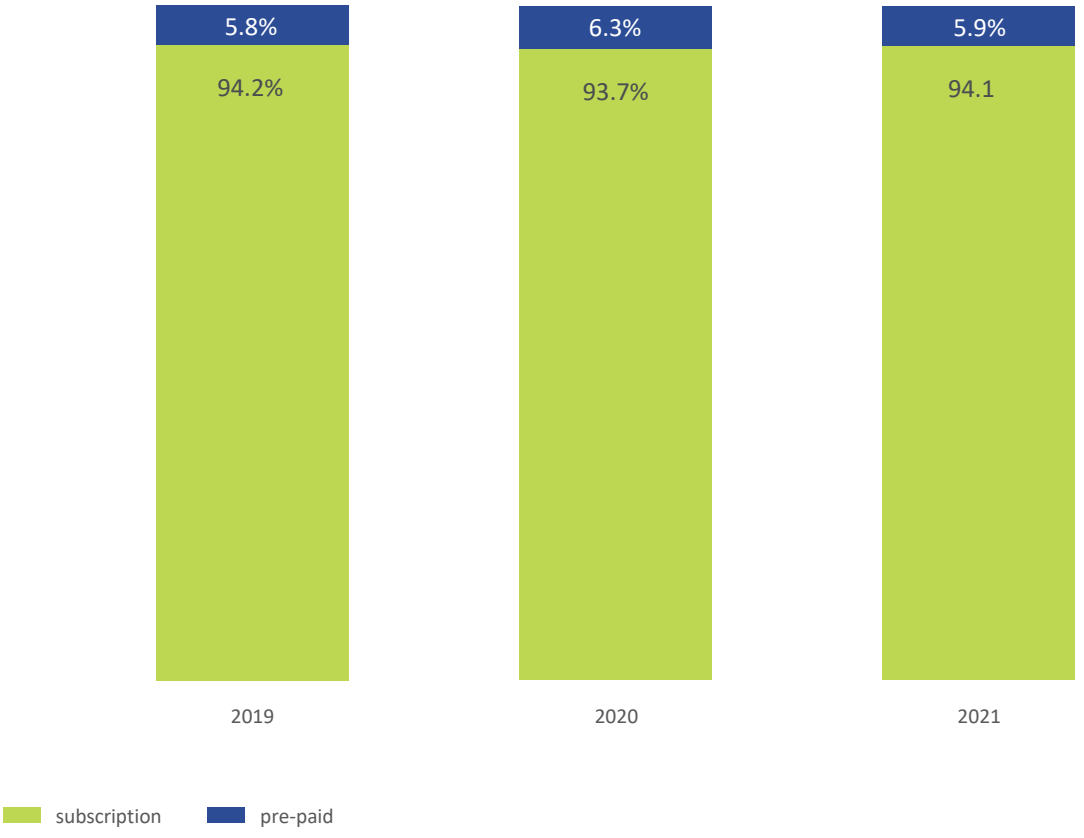


Source: UKE

VoIP telephony revenues were derived mainly from subscription offers that in 2021 accounted for 94.1% of total VoIP services revenue. Pre-paid revenue accounts for only 5.9% of total VoIP revenue.

94.1% revenues
from VoIP subscription services

Chart 39. **Share of subscription and pre-paid services in revenues from VoIP telephony services**



Source: UKE

2.2.3. USERS

Over the past four years, the number of VoIP users has not changed significantly, a slight upward trend was evident. In 2021, just under 2.6 million users were using VoIP, representing a 2.2% increase as compared to 2020.

By 2026, the number of users of this type of technology is projected to grow by an average of 1.2% year-on-year. In 2026, the number of users could be between 2.7 million and 2.8 million.

Chart 40. **Number of VoIP telephony users with forecast (millions)**

Source: UKE

UKE forecast based on historical data collected under Article 7 of the Telecommunications Law. The forecast predicts future values based on existing data using a forecasting function, i.e. using the AAA version of the exponential smoothing algorithm (ETS). The forecast also includes a confidence interval that helps establish the accuracy of the predicted forecast at 95%.

2.6 million VoIP users

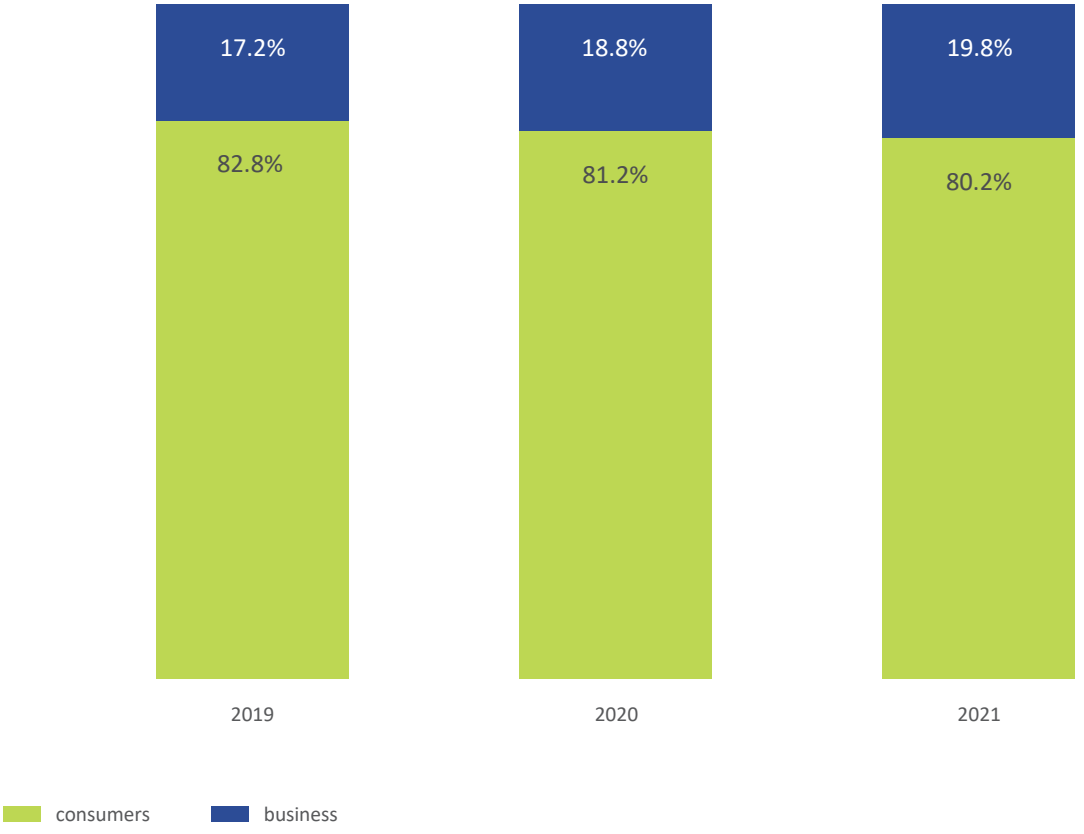
VoIP services in 2021 were predominantly provided to residential customers (80.2%). However, it was the business segment that saw a much larger increase in the number of users compared to 2020 (by 7.7%) than in the case of residential customers, where the number of users increased by only 0.9%.

The share of business customers in the total number of VoIP users is growing slightly with each year. In 2021, they accounted for 19.8% of the total number of VoIP users.

80.2%

share of VoIP residential customers

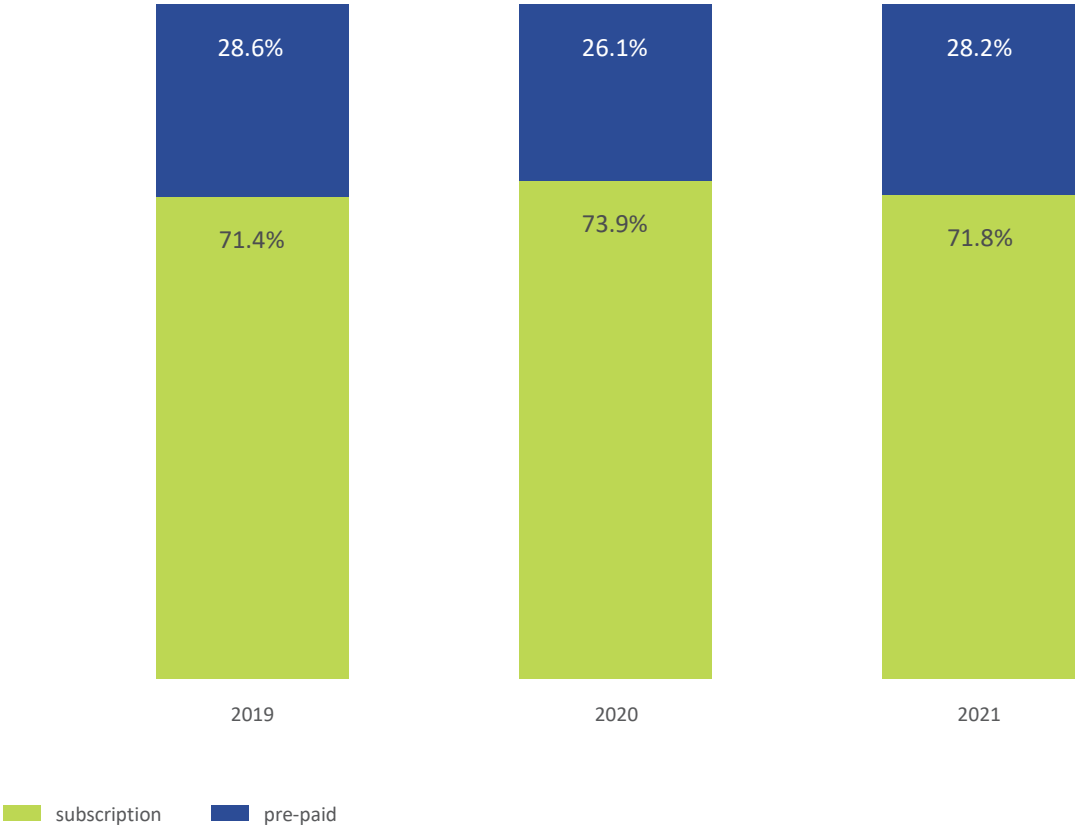
Chart 41. **Share of consumers and business in the number of VoIP telephony users**



Source: UKE

The subscription form of VoIP service was used more often. By 2021, only 28.2% of users were using pre-paid VoIP.

Chart 42. **Share of subscription and pre-paid services in the number of VoIP telephony users**



Source: UKE

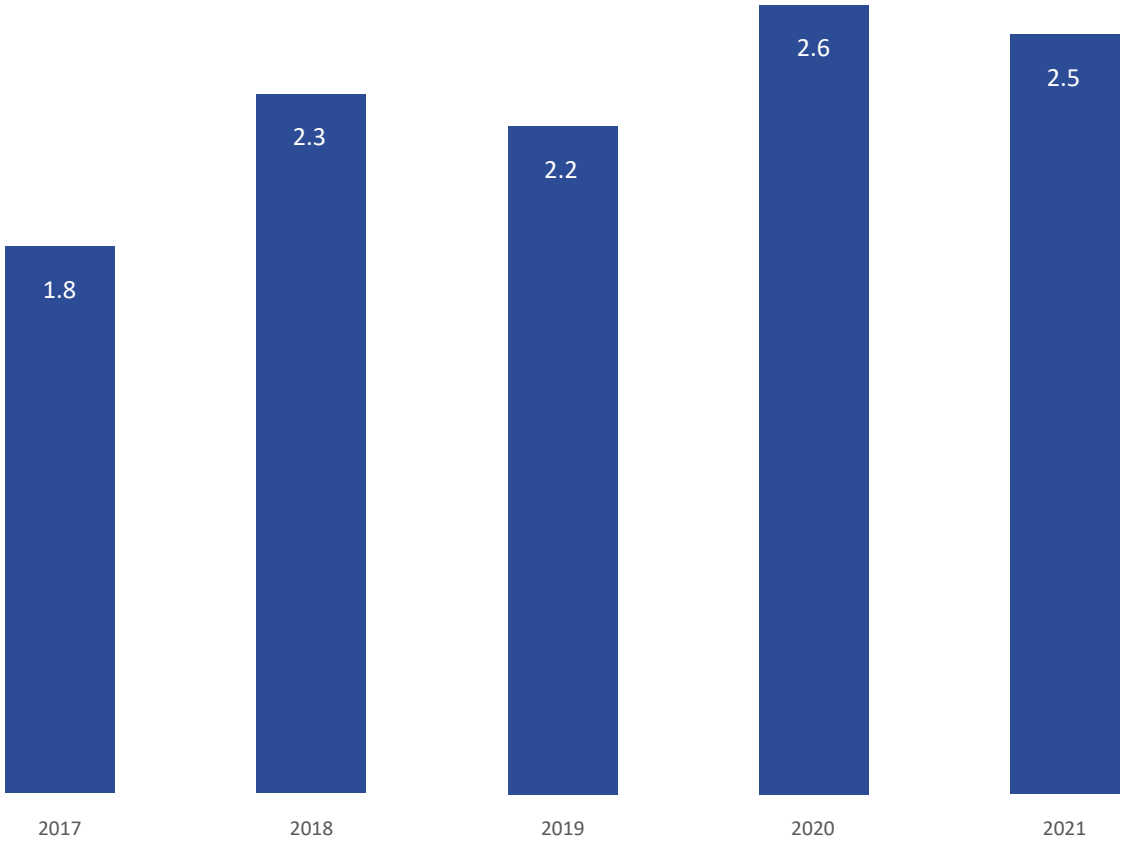
2.2.4. TRAFFIC VOLUME

After a fairly significant increase in VoIP traffic volume during the COVID-19 pandemic in 2020, the following year brought a slight decline in traffic volume. The number of minutes called fell by 0.2% and amounted to 2.5 billion.

2.5 billion

VoIP call minutes

Chart 43. **VoIP traffic volume (in billions of minutes)**

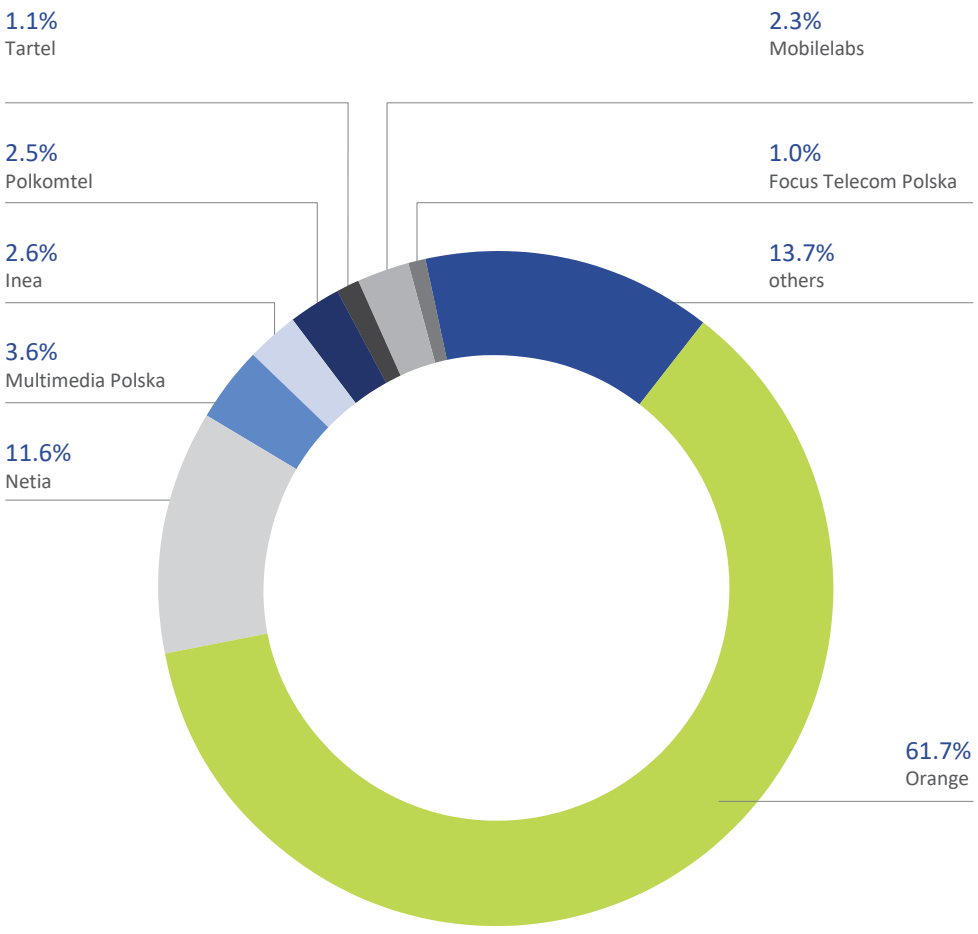


Source: UKE

2.2.5. ENTITY STRUCTURE

Orange Polska remained the market leader in VoIP subscription services, with its share rising from 60.8% in 2020 to 61.7% in 2021. The share of Netia, which provided VoIP subscription services to 11.6% of users, fell slightly. Multimedia's market share in this segment also declined. 3.6% of customers were provided with services by that operator.

Chart 44. **Shares of operators in the number of VoIP telephony users (subscription)**



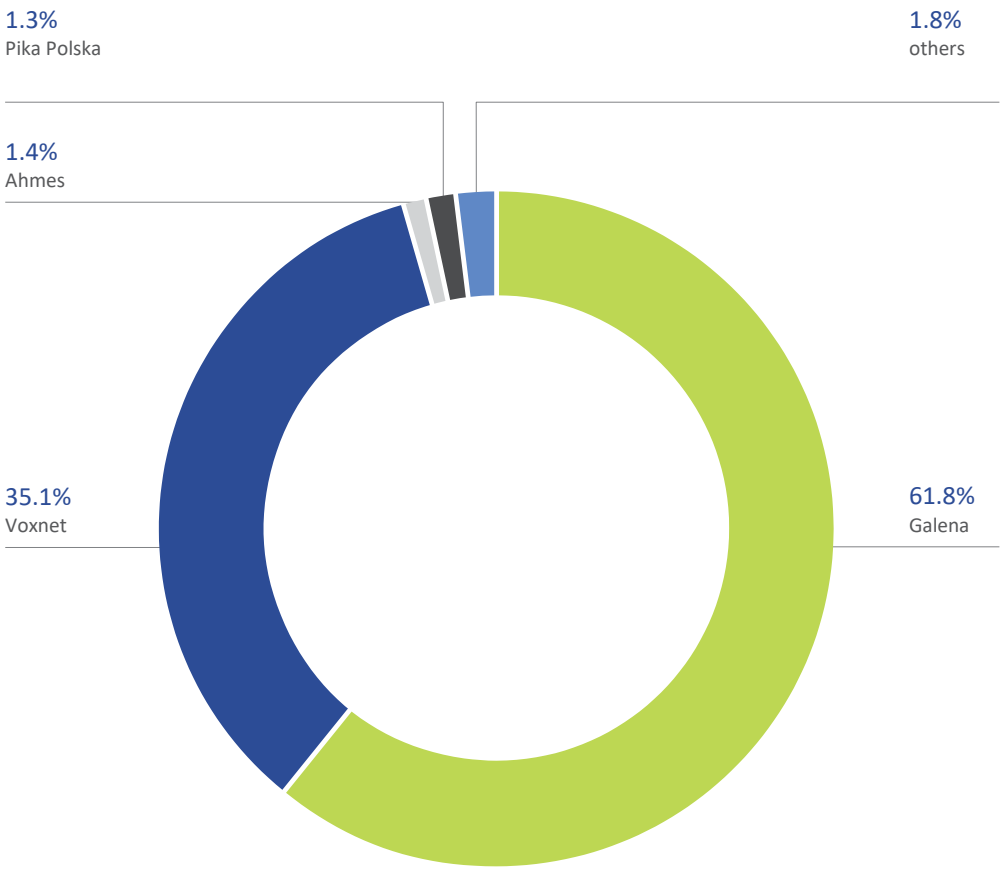
Source: UKE

* Others – enterprises with individual share not exceeding 1%

In the pre-paid VoIP market, however, the share structure has changed more. in 2021, the market leader's place was taken by Galena, which provided services to 61.8% of pre-paid VoIP users (up 15.6 p.p.).

Voxnet, which has been the market leader in recent years, fell to second place with a score of 35.1% (down 14.5 p.p.). In addition, services of this kind were provided by 8 other enterprises, of which only Ahmes and Pika Polska achieved a market share of more than 1%. The total share of the remaining eight operators was 1.8%.

Chart 45. **Shares of operators in the number of VoIP telephony users (pre-paid)**



Source: UKE

* Others – enterprises with individual share not exceeding 1%

2.3. MOBILE TELEPHONY

2.3.1. GENERAL INFORMATION

50.6 million
SIM cards (excluding M2M cards)

148.7% penetration
of mobile telephony services

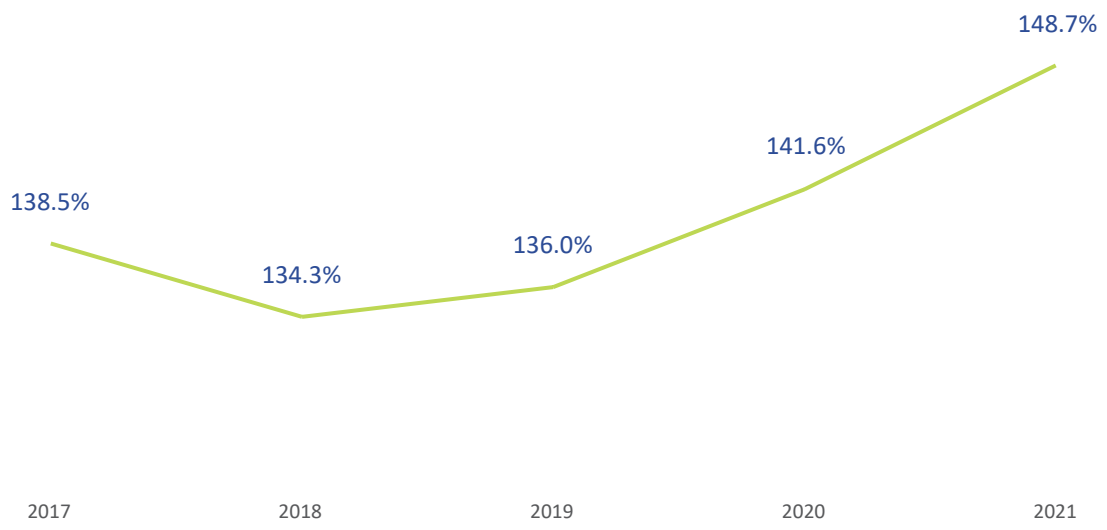
At the end of 2021, 124 telecommunications enterprises were active on the Polish mobile telephony market.

Of all mobile operators, four had their own infrastructure (MNOs), while 120 used the network of a selected technology partner (MVNOs). The following companies functioned as MNOs: Orange Polska S.A., Polkomtel Sp. z o.o., P4 Sp. z o.o. and T-Mobile Polska S.A. At the end of 2021, the takeover of the incumbent MNO Aero 2 Sp. z o.o. by Polkomtel Sp. z o.o. took place.

Penetration of mobile telephony services in Poland was about 148.7%[17] (up 7.1 p.p. from 2020).

The increase in penetration of mobile services is due to the growth of M2M cards, among other things. Their number increased by 1.2 p.p. and reached 6 million. These cards accounted for 10.6% of all cards.

Chart 46. **Penetration of mobile telephony services in Poland**



Source: UKE

[17] Penetration over 100% is the result of some users possessing more than one SIM card.

2.3.2. REVENUES

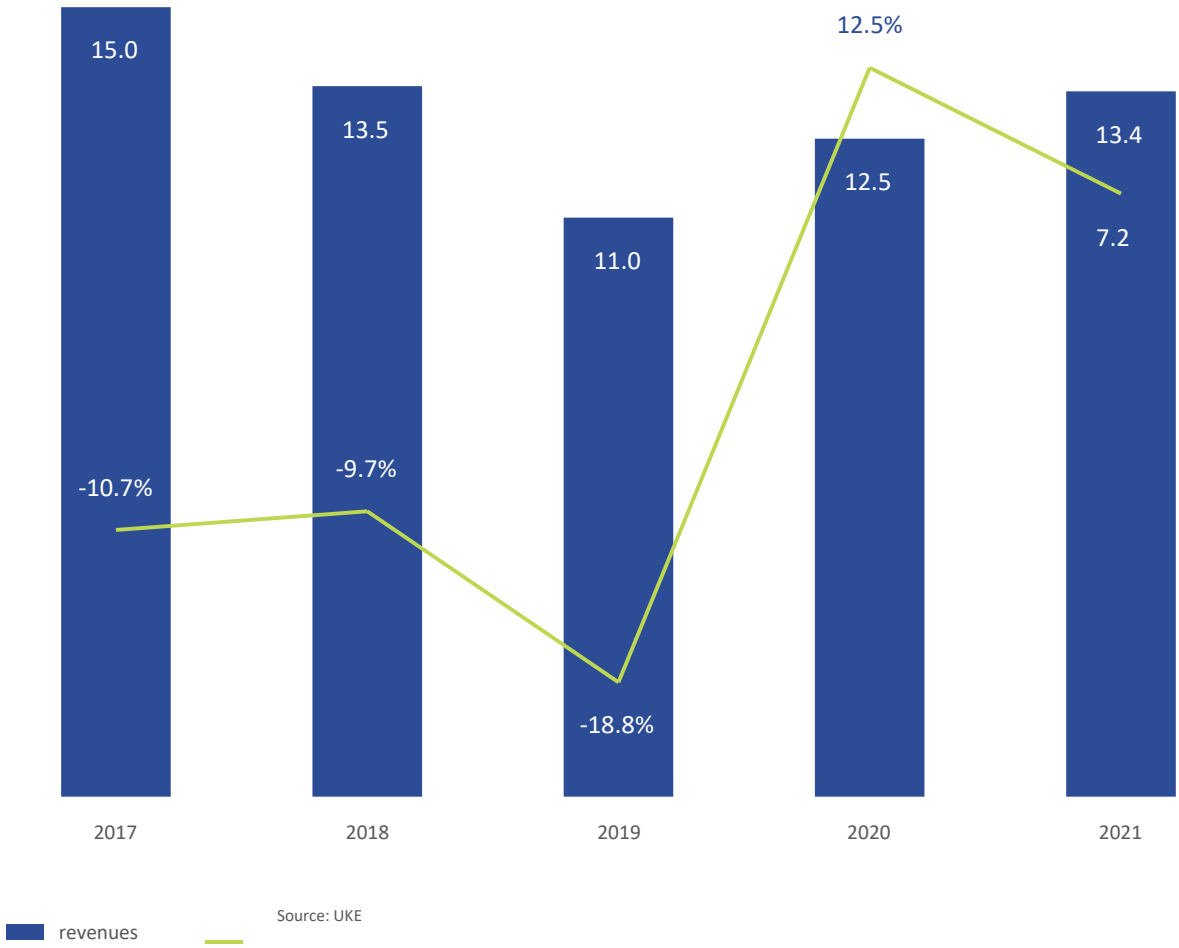
After the lowest 2019 revenue figures in years, the mobile market is going back to its pre-pandemic state. The total revenues of operators in 2021 amounted to PLN 13.4 billion and were 7.2% higher compared to the previous year.

More than 30% revenue growth was recorded in receipts from M2M services. Revenue through subscription fees increased by 8.5%.
The observed gradual decline in revenue from premium services reached 10.5% last year, generating revenue of PLN 0.3 billion, a 10.5% regression from 2020. Other types of mobile services saw increases.
Data transmission services generated growth of 7.4%, SMS services of 5.3%, and multimedia services of 0.1%.

The continued growth in the value of the mobile telephony market confirms the important position of this service in the telecommunications business area. It generated 32.8% of revenues of the total telecommunications market in Poland.

32.8% share of mobile telephony in revenues of the telecommunications market

Chart 47. **Revenues from mobile telephony service (PLN million) and change dynamics**

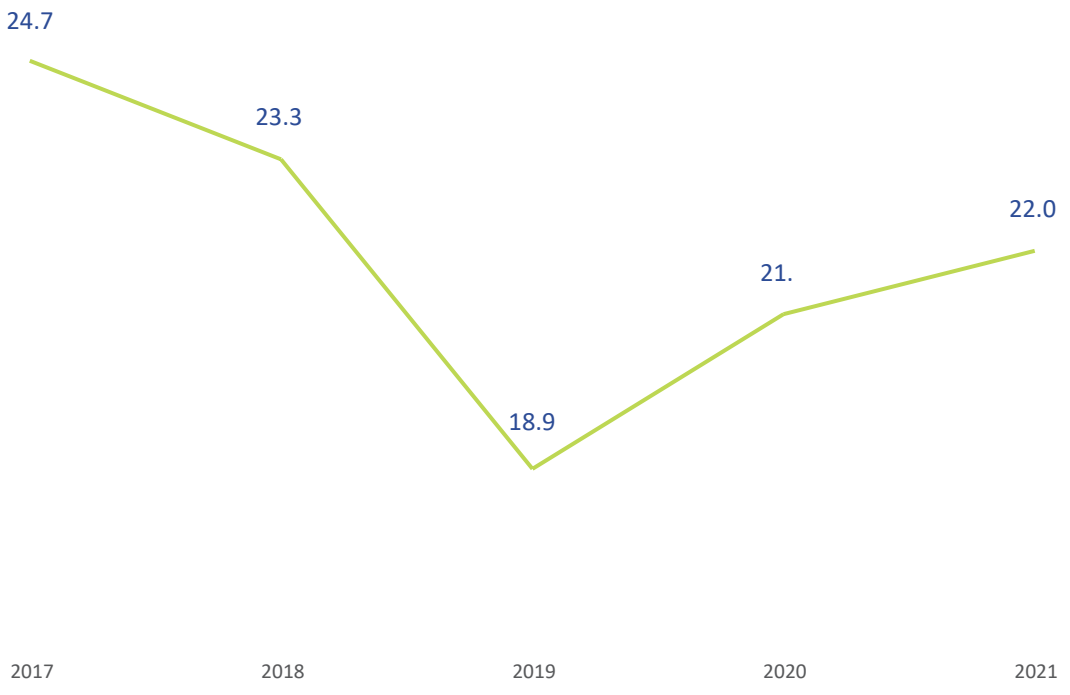


Source: UKE

change dynamics

Monthly revenue per user rose to PLN 22.0, but still has not reached pre-pandemic levels.

Chart 48. **Average monthly revenue per subscriber (ARPU, PLN)**



Source: UKE

The first place in terms of 2021 revenues was taken by Orange with a share of 28%. The second place was occupied by Polkomtel (26.8%), which increased its share by about 2%.

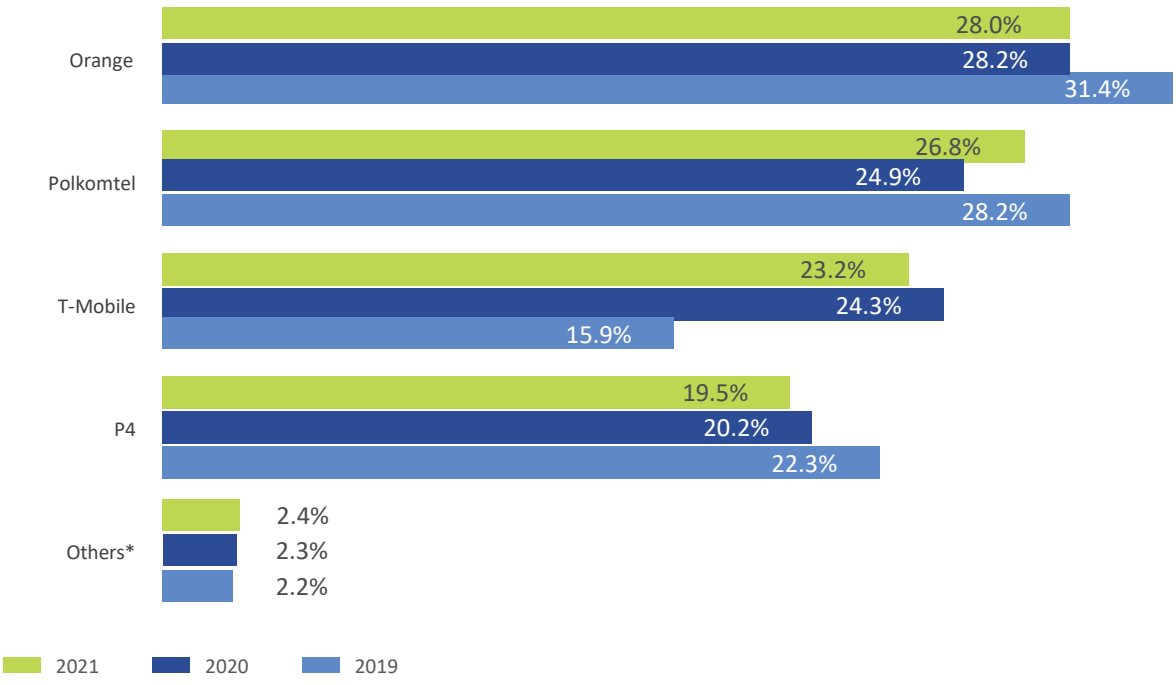
T-Mobile achieved 23.2% of all revenues from mobile telephony, while P4 came fourth with a market share of 19.5%.

As compared to 2020, share declines were recorded by: Orange (down 0.2%), T-Mobile (down 1.1%) and P4 (down 0.7%). Other providers scored at 2.4%, a slight increase as compared to the previous years.

In 2021, Orange had the largest percentage of mobile SMS revenue. This share accounted for 32.8% of the market, 0.4 p.p. more than in 2020. P4 came second with 24% of shares (down 1.7 p.p.), followed by T-Mobile (21.9%) and Polkomtel (20.6%). Other operators maintained a 0.7% revenue share in this service category.

In terms of revenues from sent multimedia messages, in 2021, Orange took the dominant position (share 38.9%). The lower positions were occupied by P4 (24.3%), Polkomtel (19.1%) and T-Mobile Polska (15.3%). Other enterprises obtained 2.4% of revenues from sent multimedia messages.

Chart 49. **Shares of operators in terms of revenues obtained**



Source: UKE

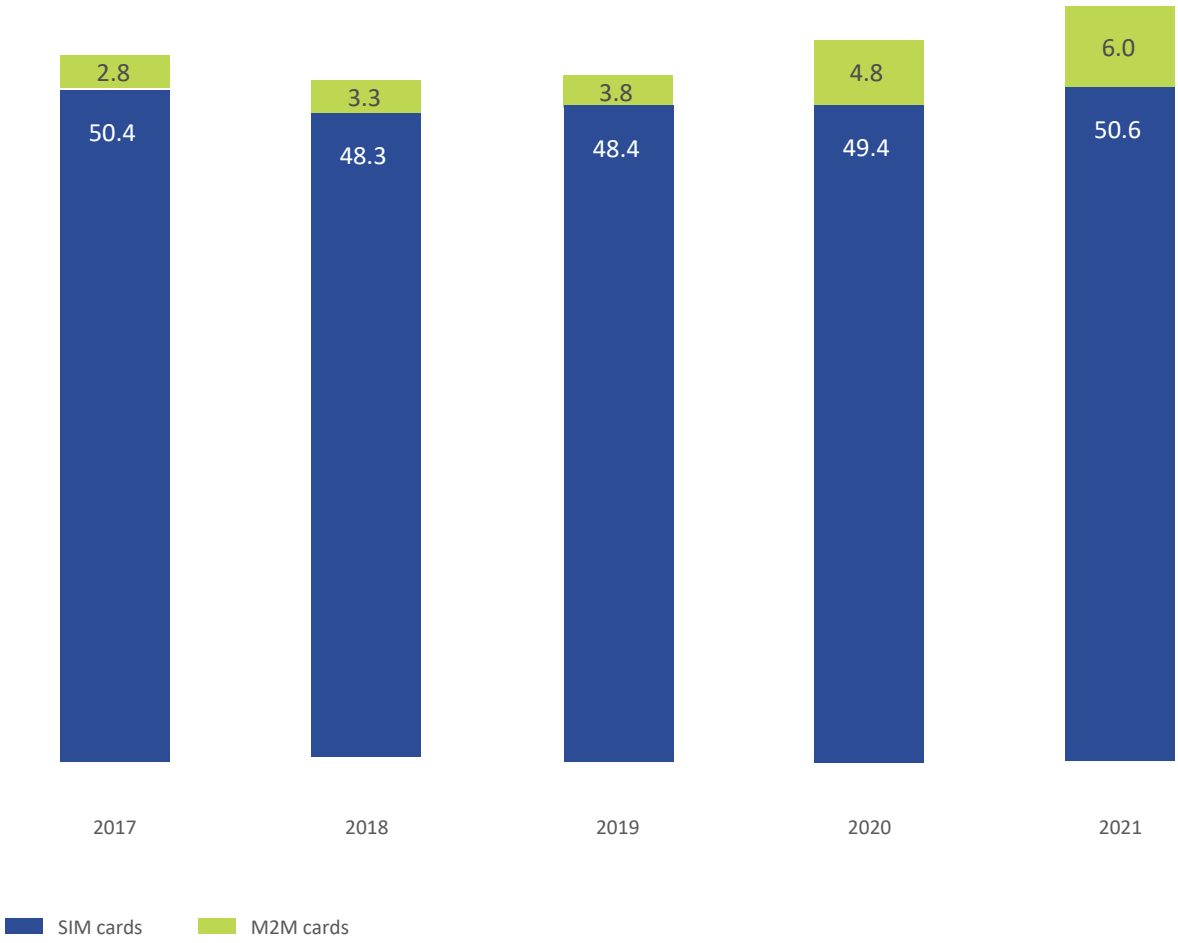
* Others – enterprises with individual share not exceeding 1%

2.3.3. USERS

The year 2021 proved to be a landmark in terms of the number of mobile telephony users. The total number of active SIM cards (including M2M) was 56.6 million. It is an increase of 4.4% compared to 2020.

56.6 mln SIM cards

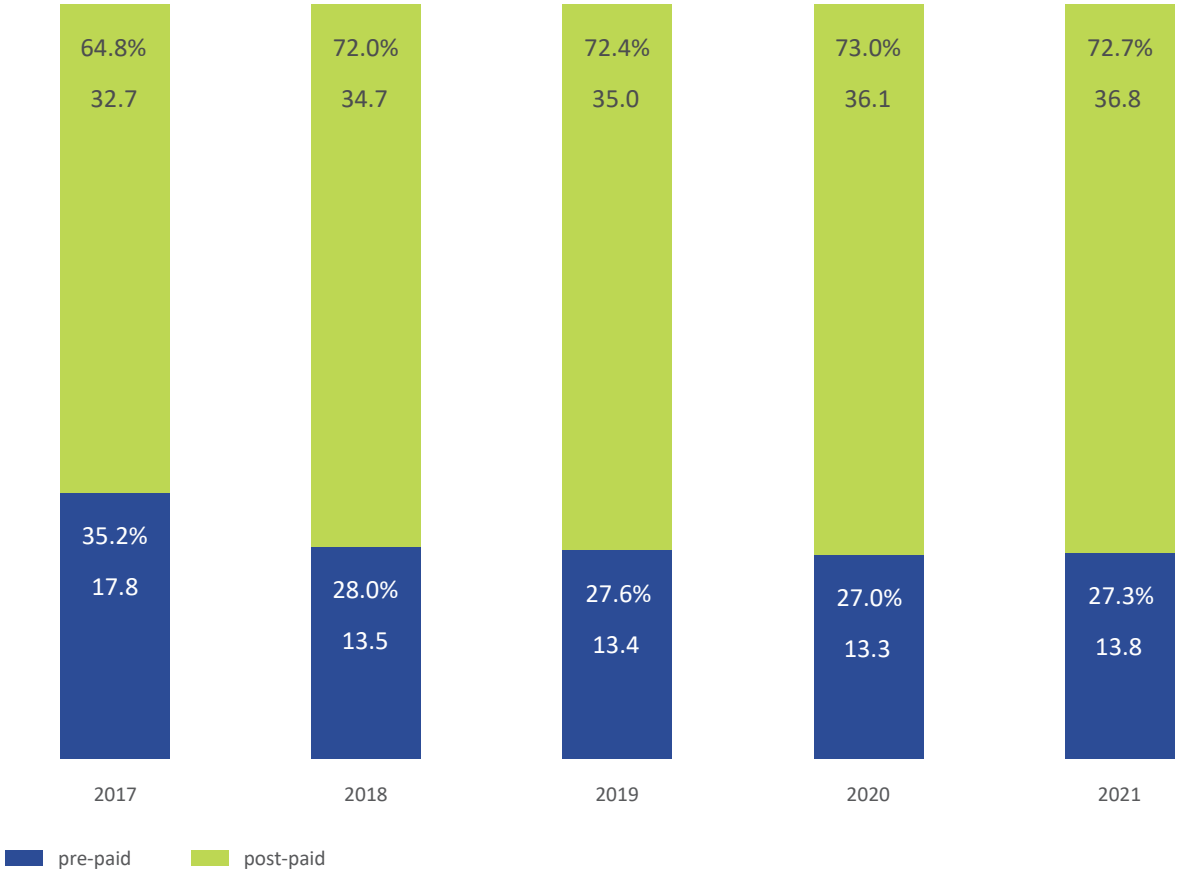
Chart 50. **Number of users (SIM cards in millions) of the mobile telephony market in Poland**



Source: UKE

Since 2016, there has been a steady decline in the number of users of pre-paid services due to the mandatory registration of prepaid cards to date.
In 2021, a slight migration of users from subscription services to prepaid services could be observed. There was a slight increase to 13.8 million pre-paid users, which is 0.3 p.p. more than in 2020, and exactly 0.3 p.p. fewer post-paid subscribers compared to 2020.

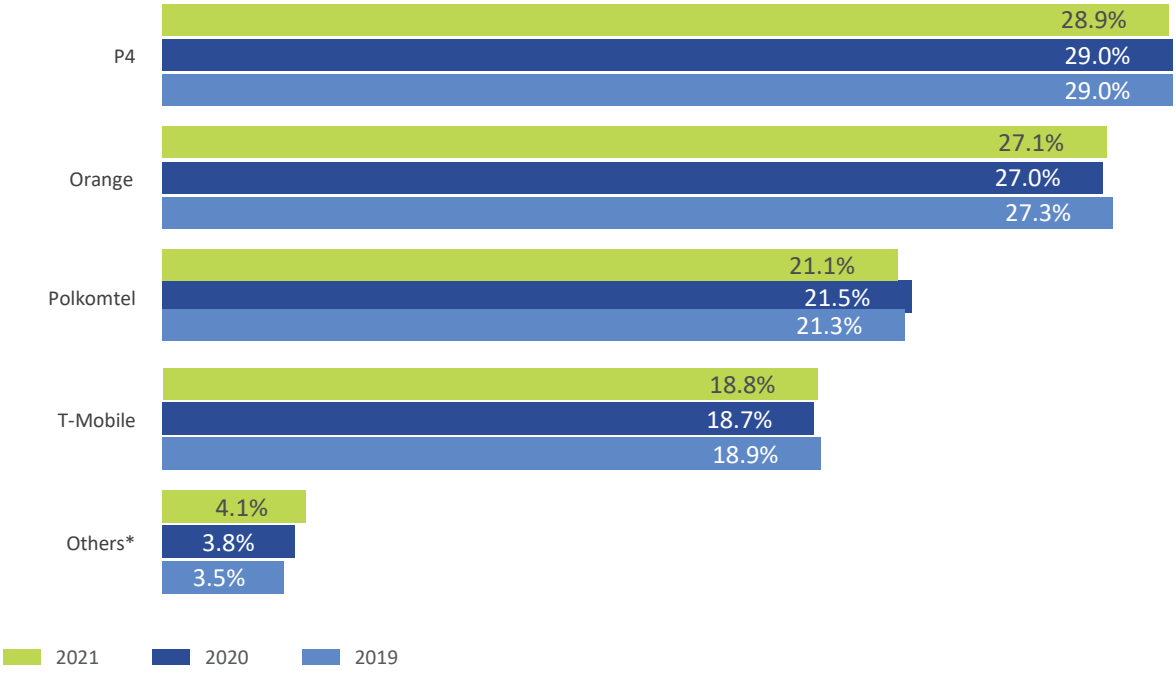
Chart 51. **Share and number of customers (in millions) of pre-paid and post-paid services**



Source: UKE

The year 2021 did not bring any changes to the share of operators in terms of the number of mobile users. Invariably, P4 came first in the ranking, with a 28.9% share. Orange Polska came second (27.1%). Polkomtel held the third place (21.1%). The fourth place was taken by T-Mobile with a share of 18.8%. It is noteworthy that the share of other operators increased by 0.3 p.p.

Chart 52. **Shares of operators in terms of numbers of users**



Source: UKE

* Others – enterprises with individual share not exceeding 1%

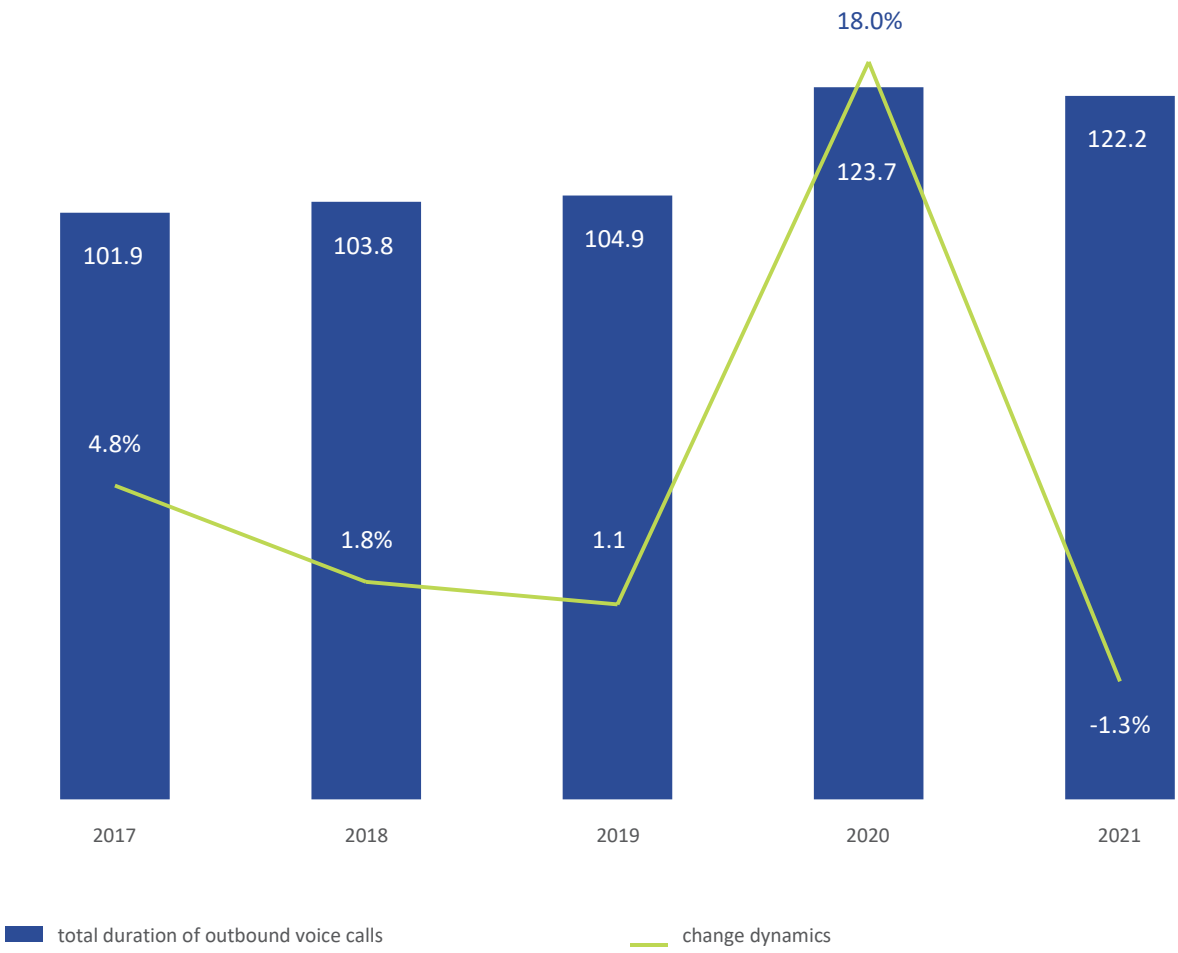
2.3.4. TRAFFIC VOLUME

After a huge increase in total outbound call duration in 2020, the trend decreased by 1.3% in 2021.
Users of mobile telephony made calls whose total duration was 122.2 billion minutes. Statistically, there were 3210 minutes per Polish resident per year, which was 24 minutes less than in 2020. The average Pole spends an average of 53.5 hours per month on phone calls.

3210 minutes

average duration of calls throughout the year

Chart 53. **Total duration of outbound voice calls (in billions of minutes) and change dynamics**

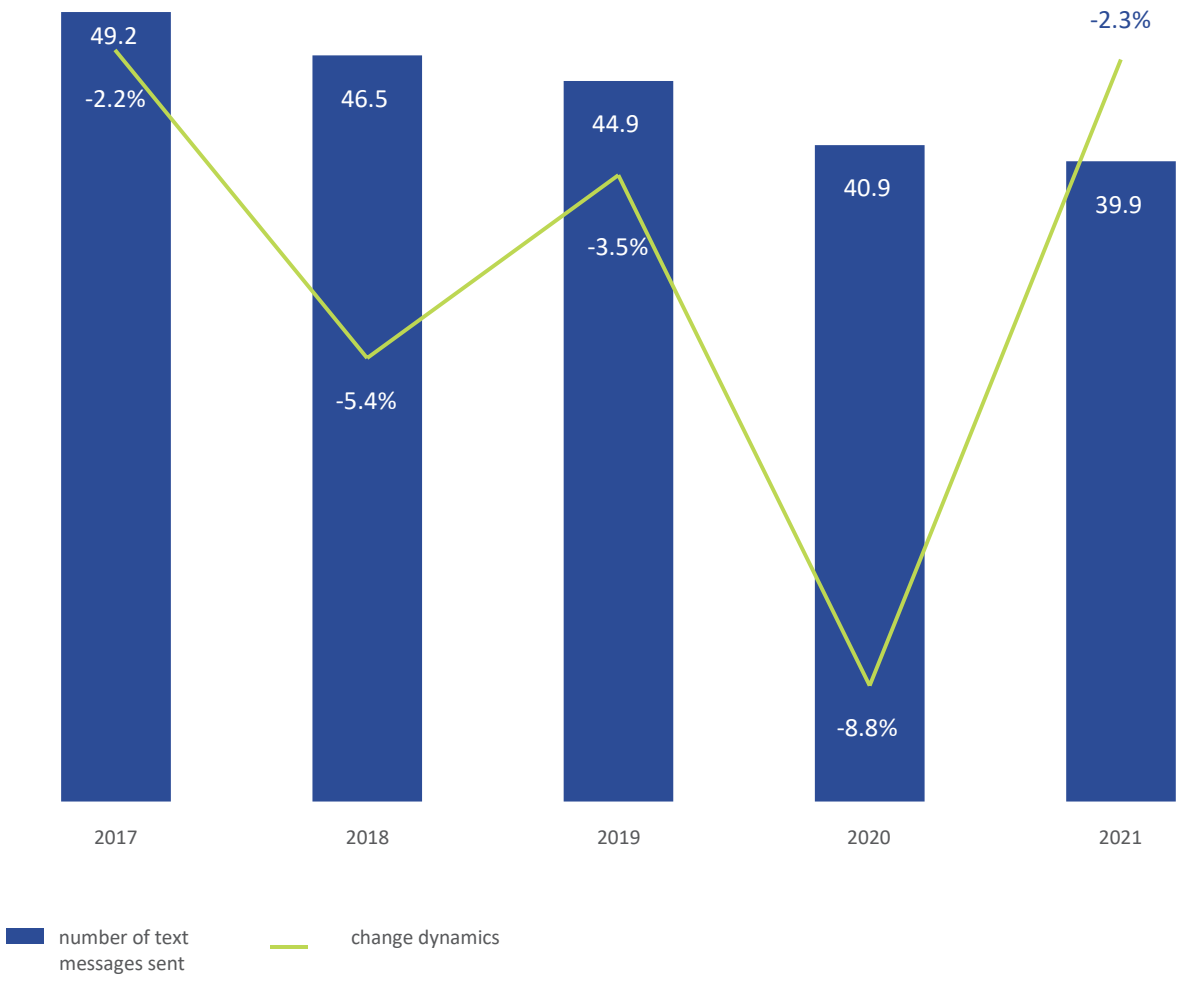


Source: UKE

For several years, a decreased interest in the SMS messaging service has been noticeable. In 2021, around 40 billion text messages were sent, a decrease of 2.3% compared to the previous year. Last year, statistically, each Pole sent 87 text messages per month, 2 fewer than in 2020.

Gradually, the service of traditional SMS messages is being replaced by messages sent using instant messaging or internet services.

Chart 54. **Total number of text messages sent (in billions) and change dynamics**



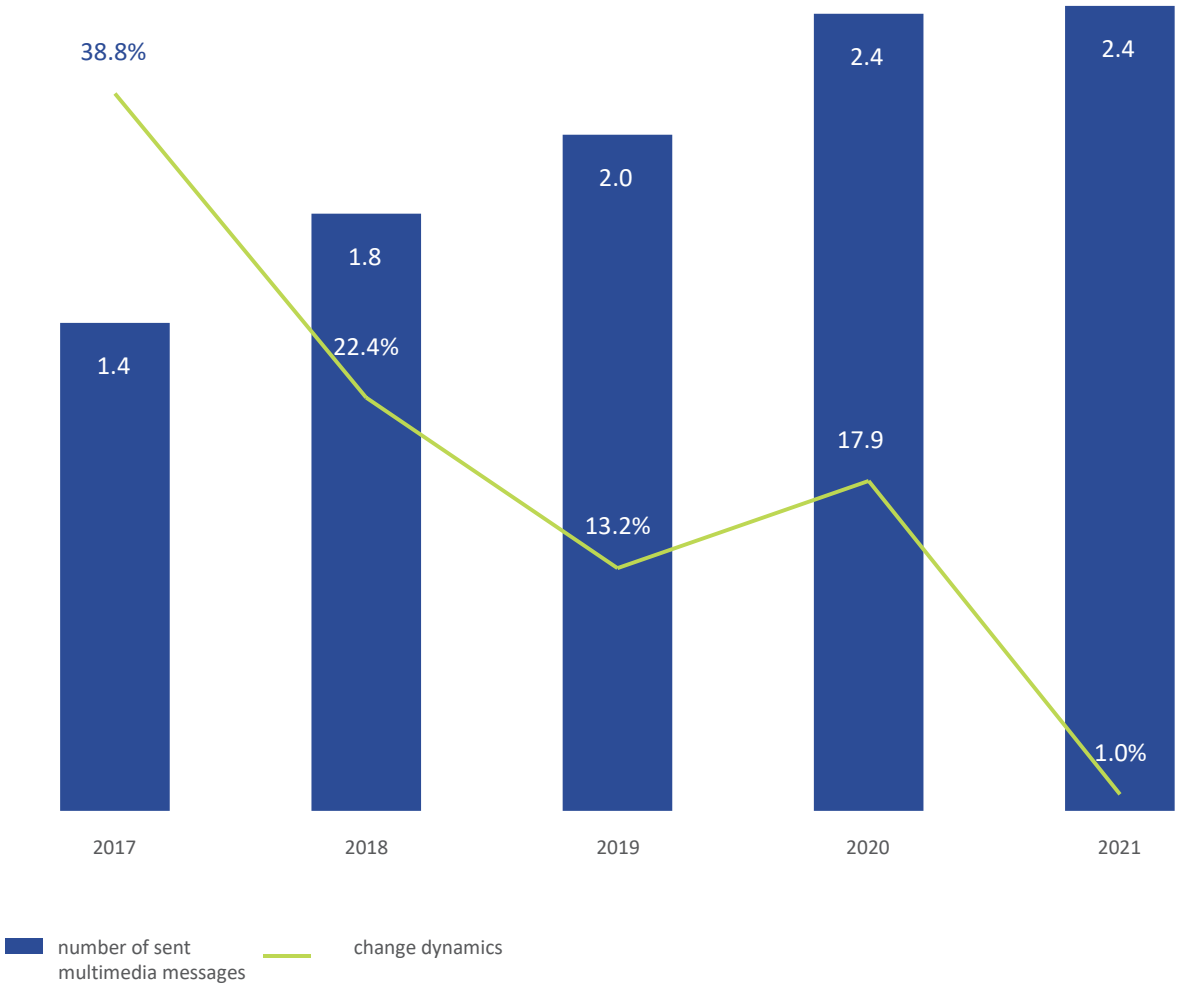
Source: UKE

A2P (application-to-person or application-to-peer) SMS, also known as corporate or professional SMS, is taking an increasing share of the telecommunications market. These are usually marketing or informational notifications sent by companies for service delivery or improvement. The total number of A2P SMS sent by MNOs in the country in 2021 amounted to 7.97 billion

units, accounting for about one-fifth of all SMS sent in the country.

The popularity of MMS messaging was maintained at around 2.4 billion messages sent, a 1% increase compared to 2020. Thus, the average of 5 MMS messages per month per Polish resident has been maintained.

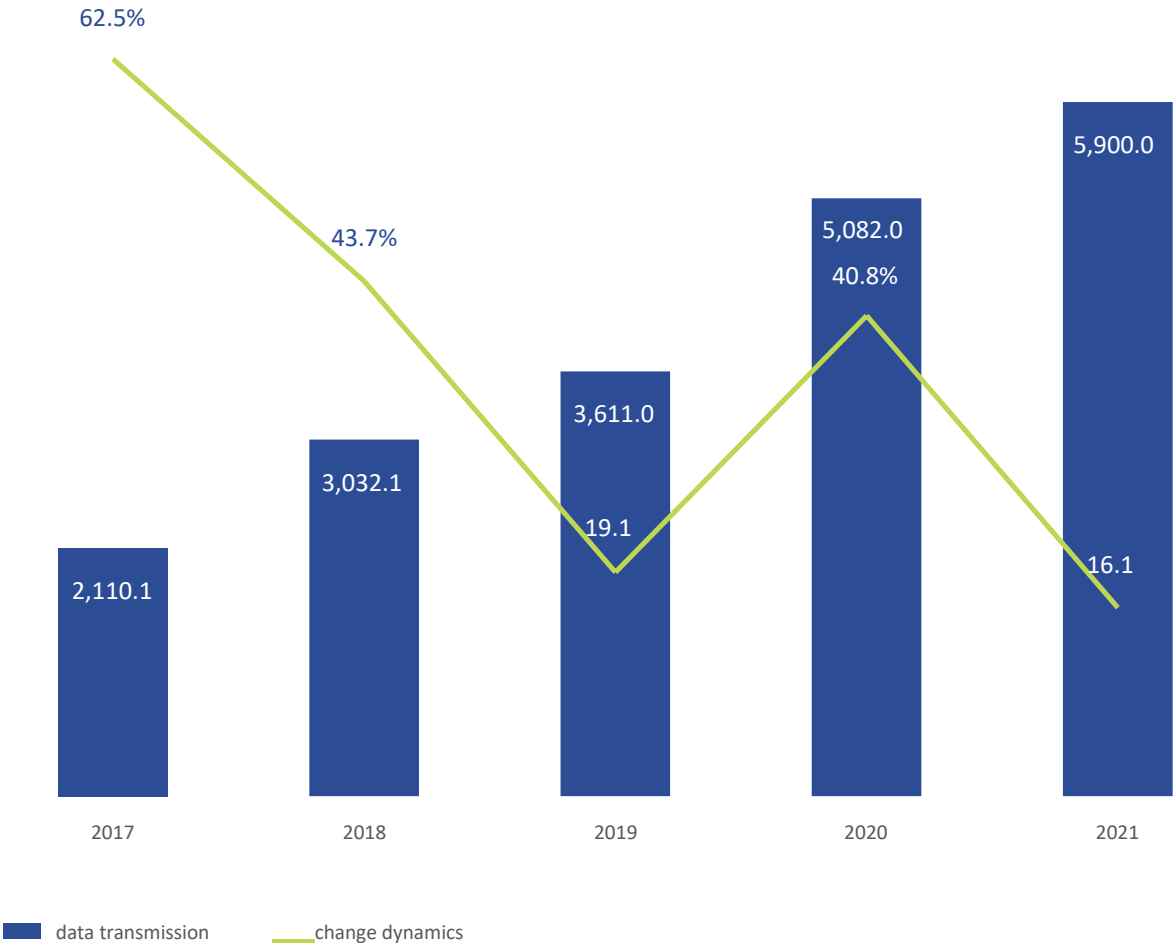
Chart 55. **Number of multimedia messages sent (in billions) and change dynamics**



Source: UKE

Mobile data transmission increased by 16% in 2021, just over 5900 PB of data were transmitted.
Statistically, there was an average of 159 GB per Pole per year, about 23 GB more than in 2020.

Chart 56. **Data transmission volume (PB)* and change dynamics**



Source: UKE

* Data transmission details provided as part of form F04 *Retail services provided to end users in the mobile public telecommunication network*

There is a growing interest in the new type of service that is RCS[18] messaging. Data available to the UKE shows a 1280% increase from 2020. Prior to 2020, this type of communication was not popular. In 2021, operators have dynamically expanded this service by sending 221 million RCS messages.

Chart 57. **Number of RCS messages sent (in millions)**

Source: UKE

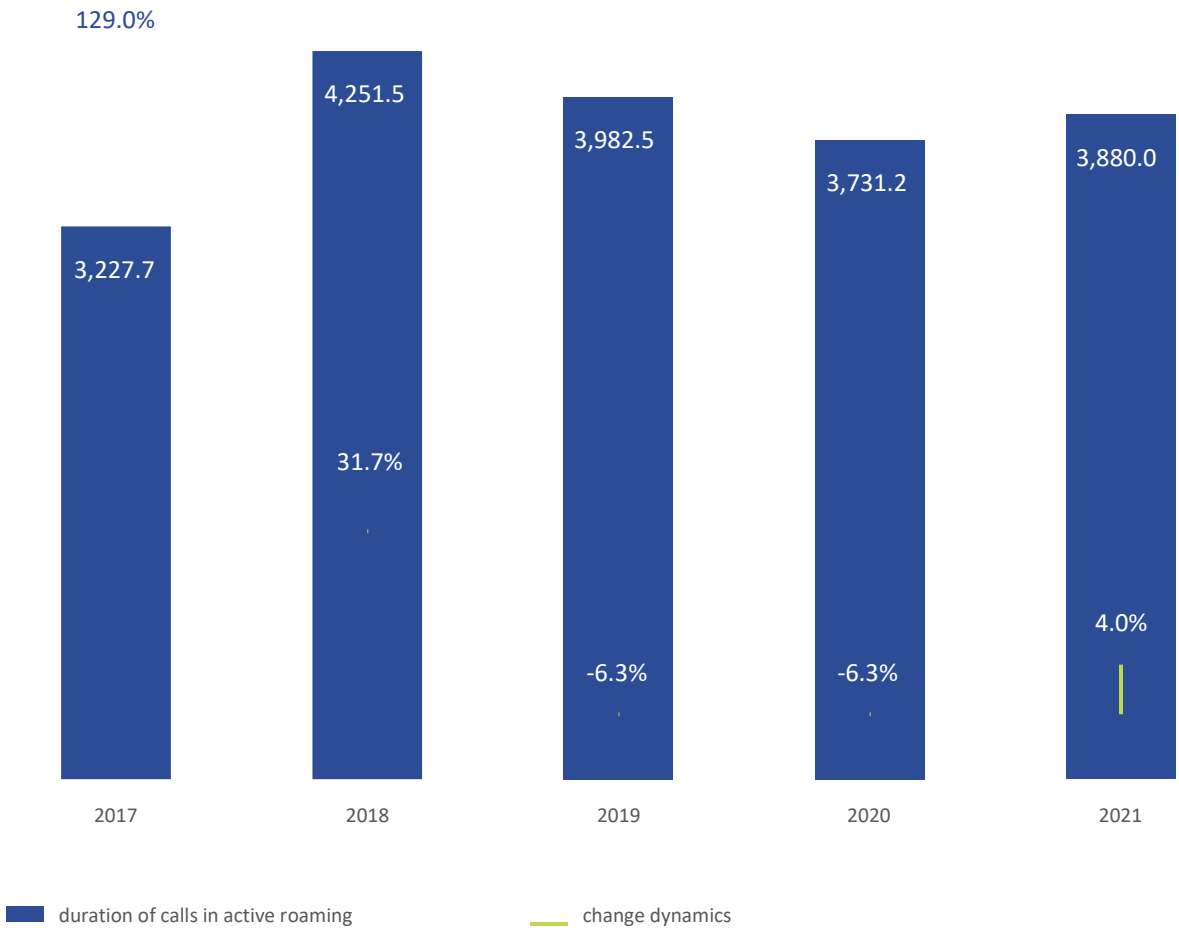
[18] Rich Communication Services (RCS) text messaging allows you to send messages up to 100 MB, add good quality attachments in the form of video files, photos, voice messages, among others, as well as tracking current message status and location sharing.

2.3.5. ROAMING

In 2021, roaming services seem to be slowly returning to their pre-pandemic state. As a result of the loosening of restrictions and the gradual return to private and business travels, the duration of outgoing voice calls in active roaming increased by 4% to 3.9 billion minutes. It is 2.6% short of the pre-pandemic level (here 2019), and about 9% short of the 2018 peak in roaming usage.

4% increase in duration of roaming voice calls

Chart 58. **Total duration of outbound voice calls in active roaming (in millions of minutes) change dynamics**

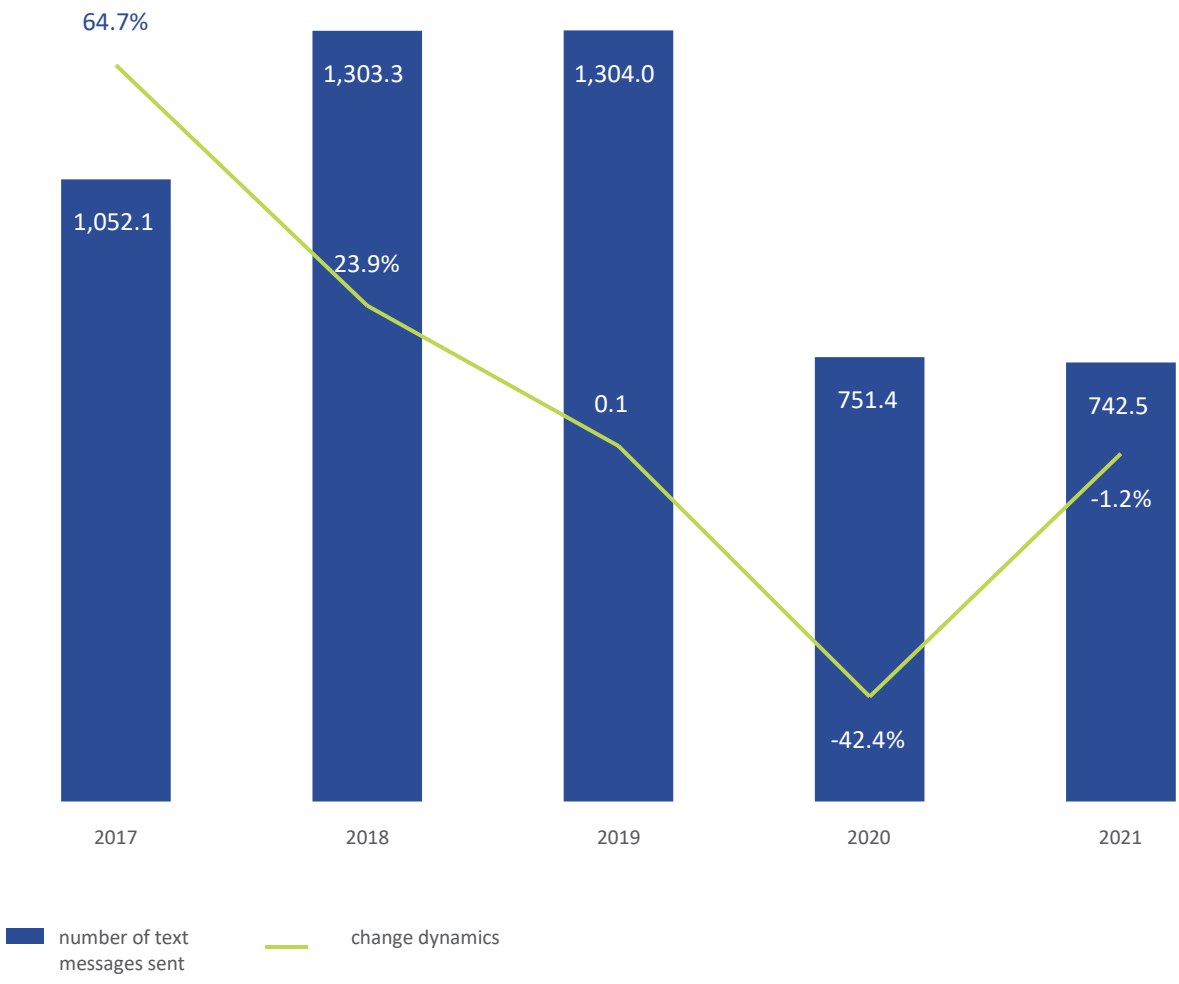


Source: UKE

Subscribers to Polish mobile networks using roaming service sent 0.7 billion SMS messages, down just over 1% from last year.

0.7 billion
text messages
sent using the roaming service

Chart 59. **Total number of sent text messages in active roaming (in millions) change dynamics**

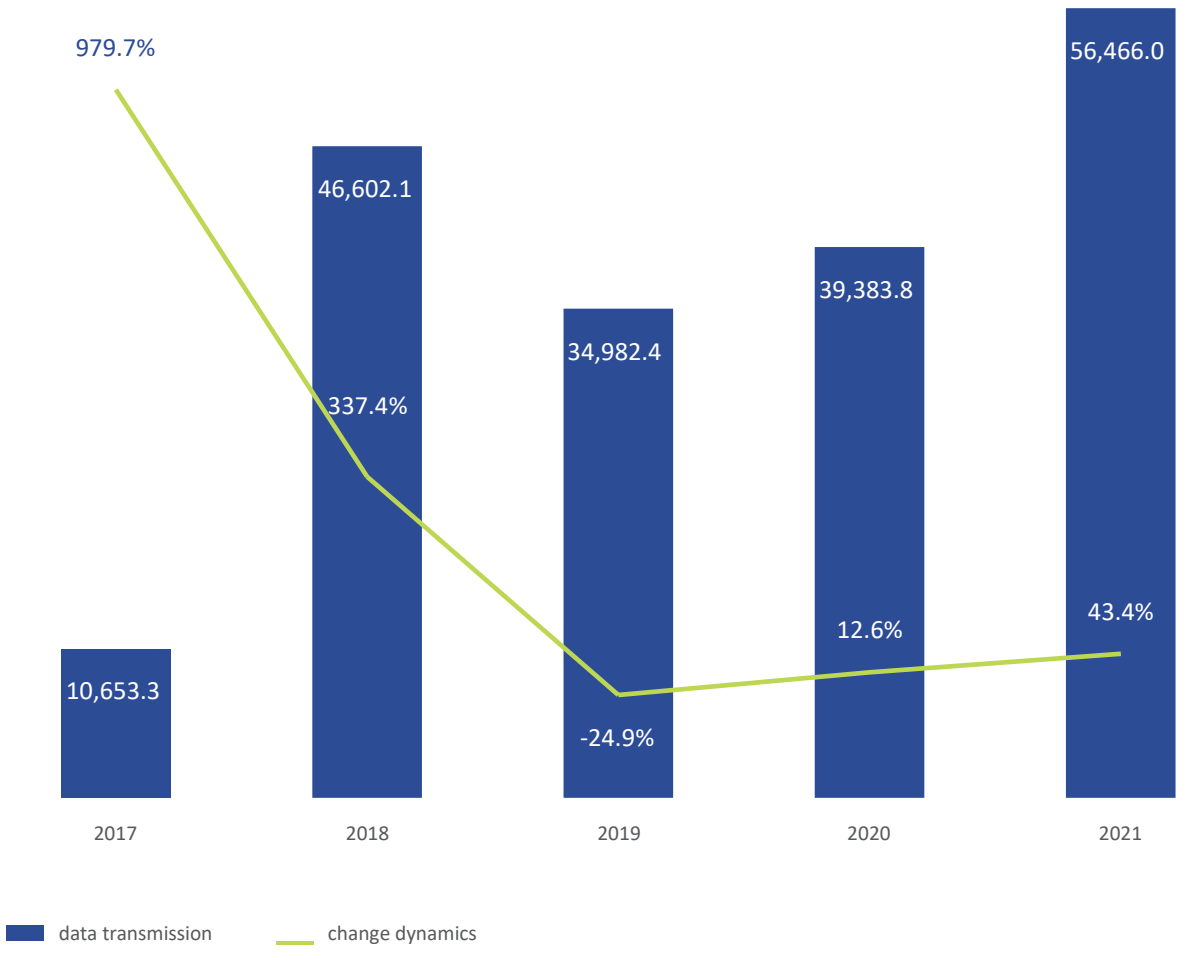


Source: UKE

The only roaming service that improved pre-pandemic performance was data transmission. In this regard, there was an increase of just over 43%. Users transferred some 56,500 TB of data in 2021. A similar trend was observed for passive roaming[19]. In this case, data growth was just over 50%, reaching 26,232.2 TB.

43.4% increase in data roaming

Chart 60. **Total data transmission volume using active roaming services (TB)**



Source: UKE

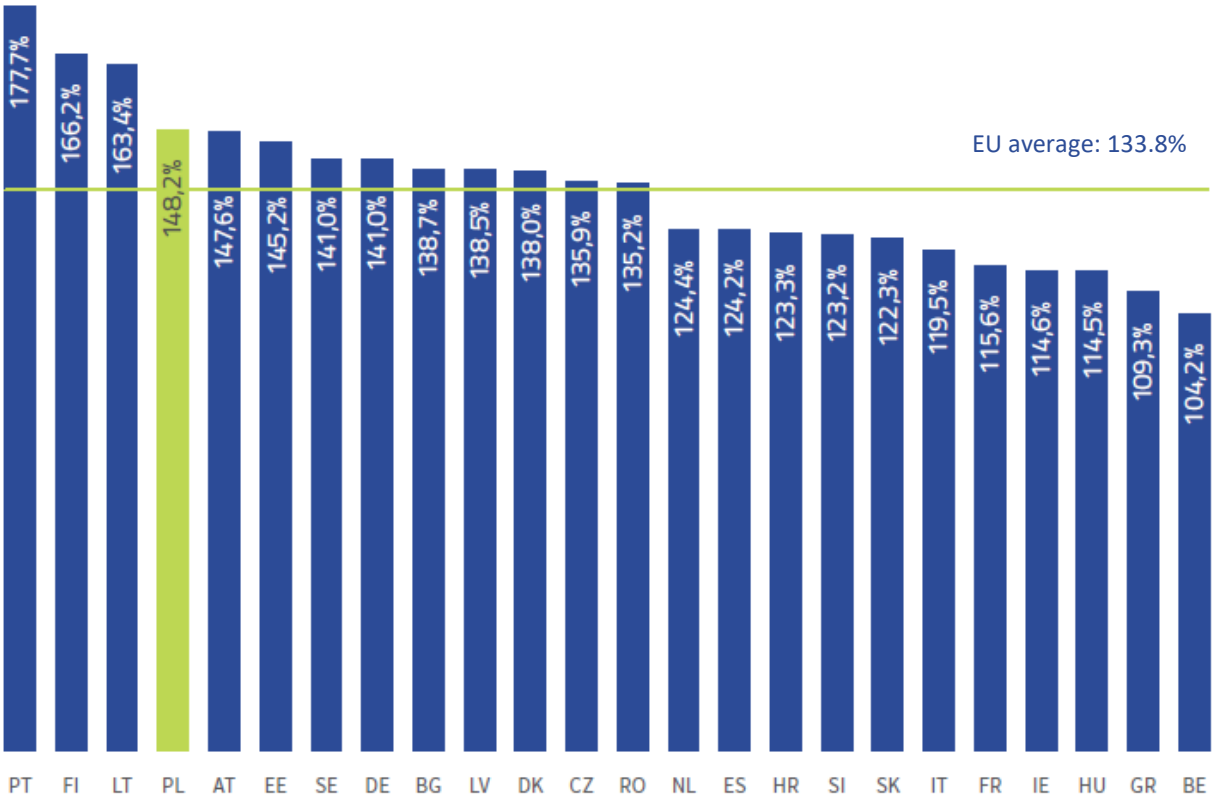
[19] Passive roaming entails services initiated on the mobile public telecommunications network of a telecommunications company by users of foreign mobile networks.

2.3.6. COMPARISON WITH EUROPEAN COUNTRIES

According to Analysys Mason data, the average penetration of mobile telephony services in European Union countries in 2021 reached 133.8%. Despite the exclusion of the UK data from the compilation, this is a 3.4 p.p. increase as compared to the 2020 data. For Poland, the penetration rate of mobile services was above the EU average at 148.2%.

There was no change last year in the EU countries with the highest penetration rates. The highest service penetration was shown for Portugal (177.7%), which swapped places with Finland (166.2%).
Lithuania came third (163.4%).

Chart 61. **Penetration of mobile telephony services in selected European countries**



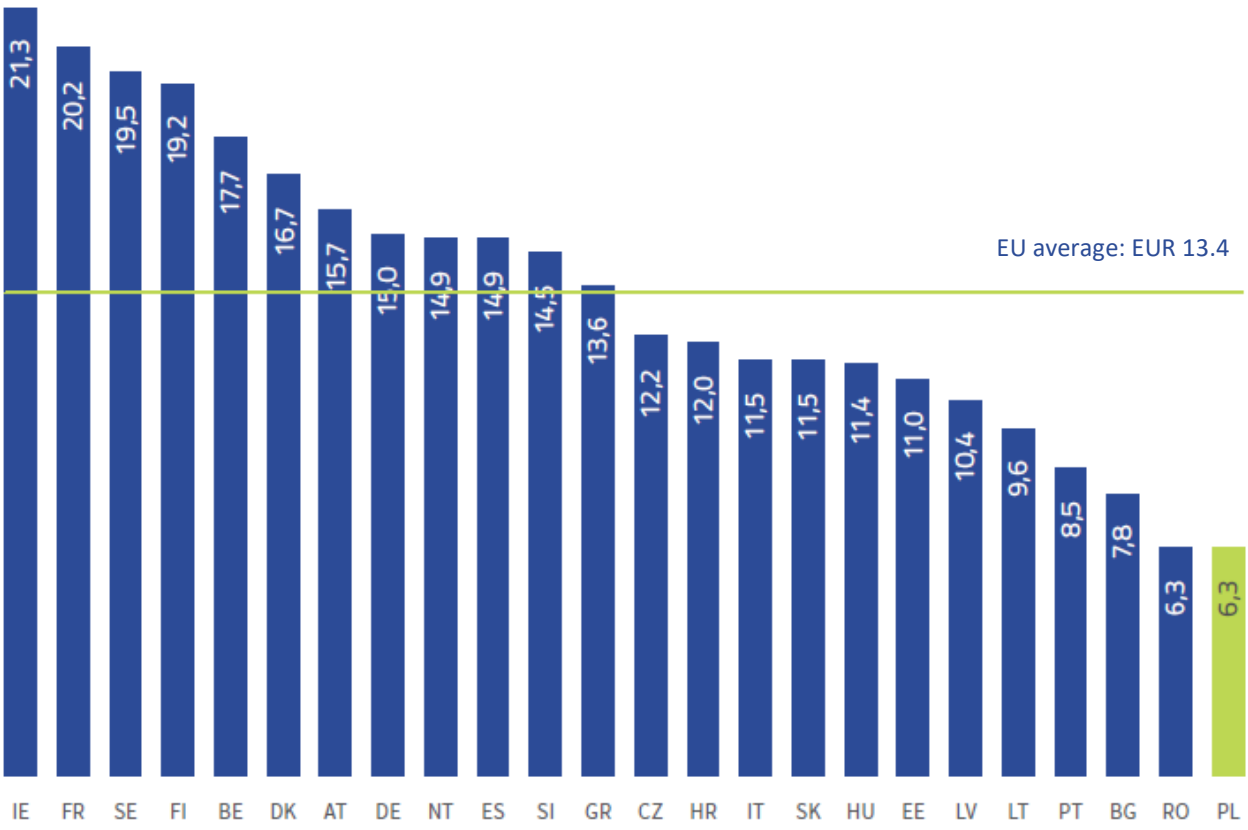
Source: Telecom Market Matrix, Analysys Mason

The methodology adopted by Analysys Mason differs from the UKE methodology, hence the numerical variations.

A breakdown of the average revenue per user of mobile services shows an average of EUR 13.4 per month for selected European Union countries.

Poland is, according to the statement, one of the countries with the lowest average monthly revenue per user, just over EUR 7 below the EU average. Ireland (EUR 21.3), France (EUR 20.2) and Sweden (EUR 19.5) have the highest ARPU.

Chart 62. **Average monthly revenue per subscriber in selected European countries (EUR with Vat)**

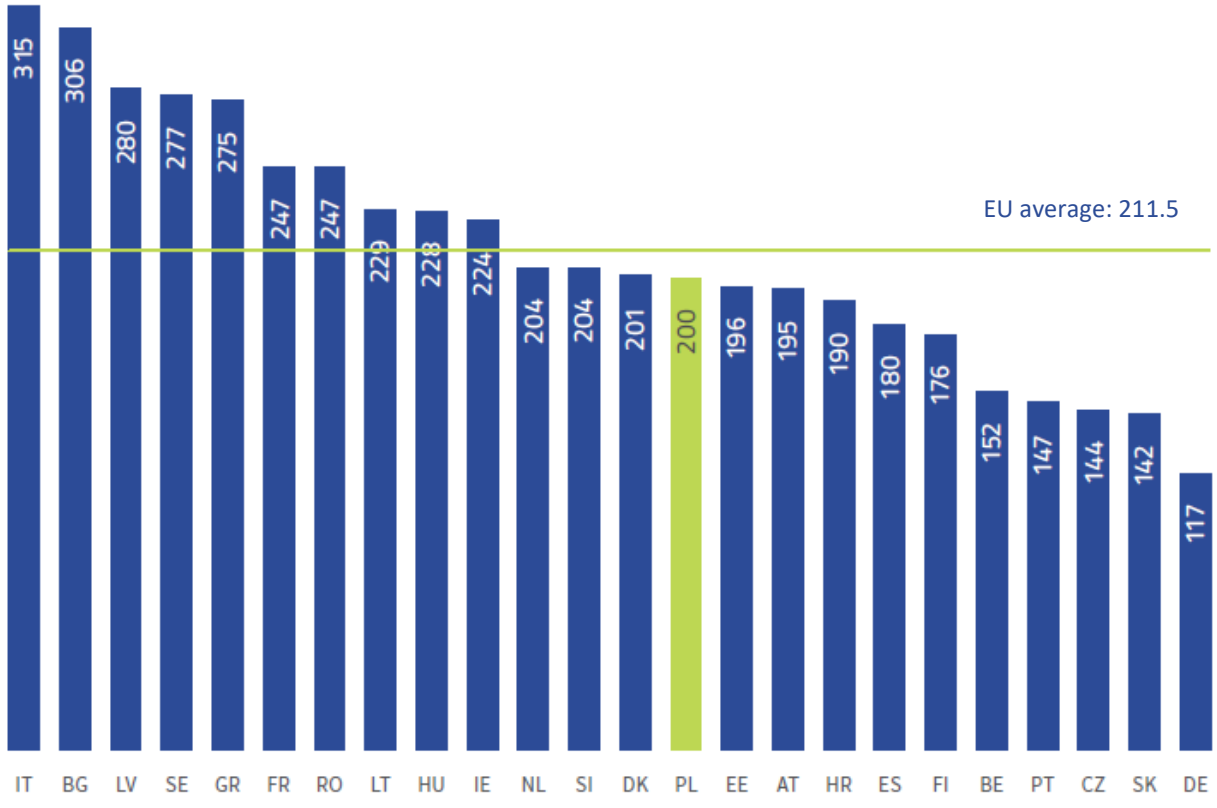


Source: Telecom Market Matrix, Analysys Mason

The methodology adopted by Analysys Mason differs from the UKE methodology, hence the numerical variations. The above figures do not include IoT cards.

The average duration of voice calls per active user per month in 2021 in Poland was 200 minutes, which positions our country slightly below the value for the European Union. According to data presented by Analysys Mason, the most active subscribers are from Italy (315 minutes), Bulgaria (306 minutes) and Latvia (280 minutes).

Chart 63. **Average duration of voice calls per one active user per month in selected EU countries (in minutes)**



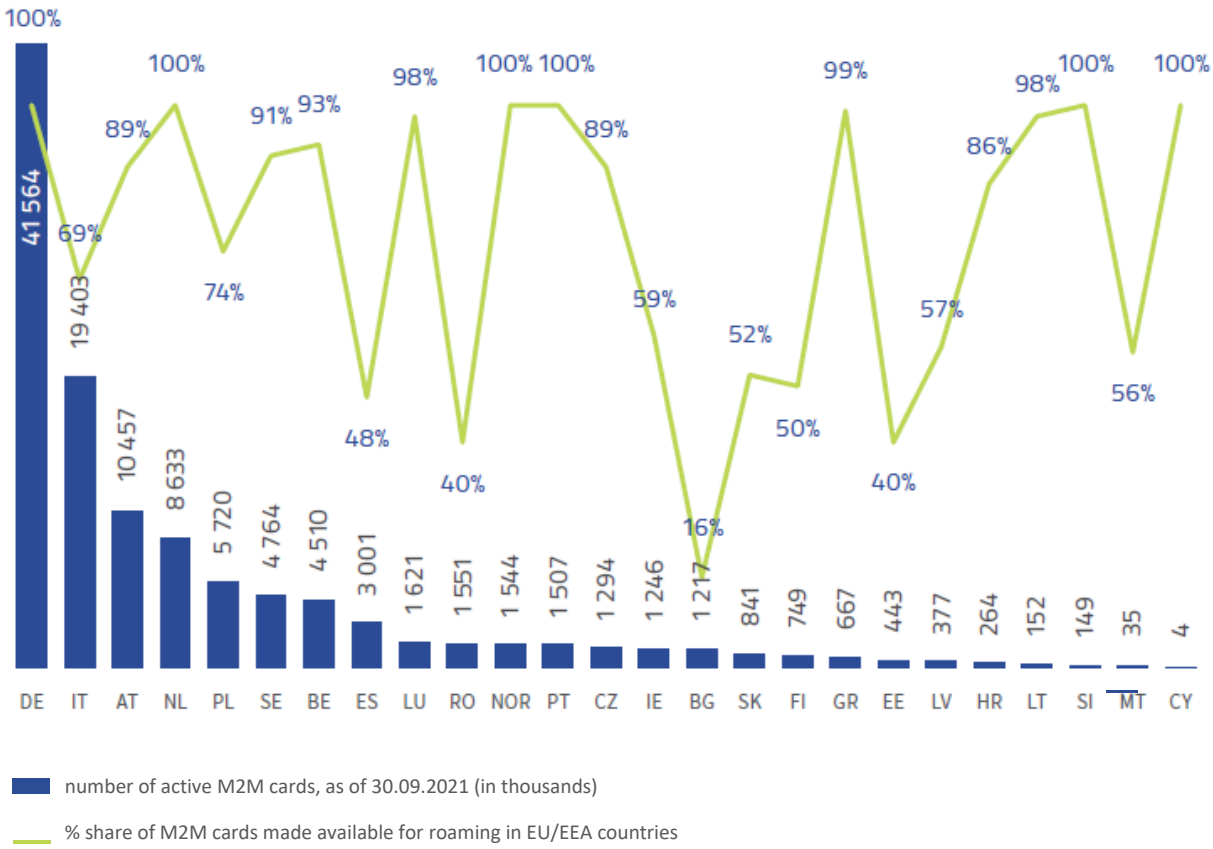
Source: Telecom Market Matrix, Analysys Mason

The methodology adopted by Analysys Mason differs from the UKE methodology, hence the numerical variations.

According to BEREC[20] data, the share of active M2M[21] cards made available for roaming in countries in the European Union and the European Economic Area[22] is by far the most prevalent in Europe. In Germany, the Netherlands, Norway, Portugal, Slovenia and Cyprus, 100% of the reported active M2M cards are those made available for roaming in EU/EEA countries.

Bulgaria, on the other hand, has the highest percentage of active M2M cards where EU/EEA roaming access needs to be activated (this access is not automatically activated). Among the total number of active M2M cards, those requiring active roaming services in EU/EEA countries account for 84%. In Poland, more than ¾ of M2M cards are operating in the EU/EEA area.

Chart 64. **Number of active roaming M2M cards (in thousands) and share of M2M cards made available for roaming in EU/EEA countries**[22]



Source: 28th BEREC report on international roaming

[20] Data taken from the 28th International Roaming Report, prepared by BEREC (Body of European Regulators for Electronic Communications) based on information provided by member countries.

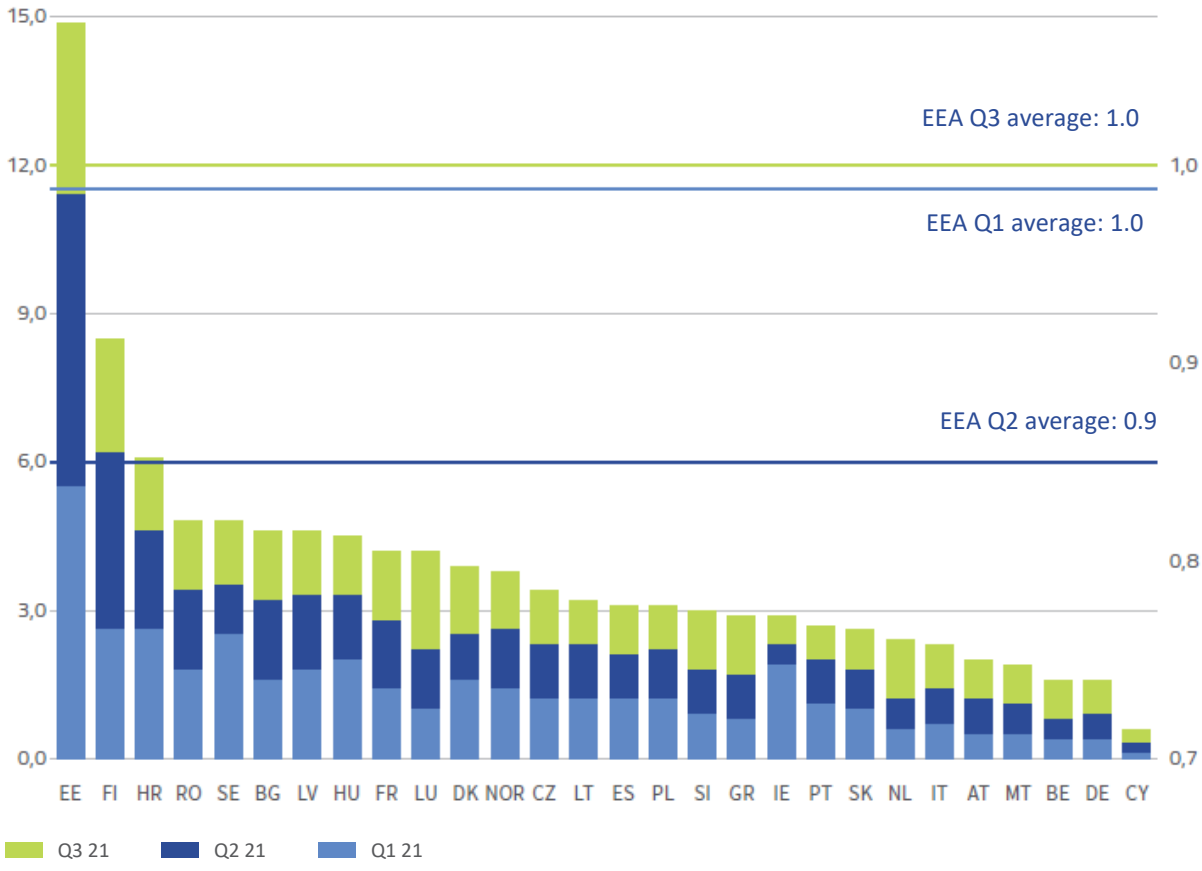
[21] According to the methodology adopted by BEREC, an active M2M card is one, in which the mobile services assigned to the card were consumed at least once in a certain period of time (quarter) or if the M2M card was connected to the network and ready to perform the tasks assigned to it. The definition takes into account GPS navigation, data transfer between two devices, etc.
SIM cards with voice-only or data-only bundle services that are not sold as M2M services are excluded from the definition.

[22] SIM cards made available for roaming in EU/EEA countries are those that are able to use roaming services in EU/EEA countries (while in these countries) without having to intentionally activate this service.

Average data roaming per user per month was highest in Estonia. Users there transferred an average of 5 GB of data per month (per user). A subscriber from Poland sent an average of 1 GB of data per month while roaming.

The cross-section of data by country and the EEA average is fairly evenly distributed for each of the quarters surveyed in 2021. The most data was transferred in the first and third quarters of the year (EEA average of 1 GB).

Chart 65. **Data roaming – average amount of data transferred (GB) per month / number of users**



Source: 28th BEREC report on international roaming

3 BUNDLED SERVICES

PART I
THE TELECOMMUNICATIONS MARKET

3.1. GENERAL INFORMATION

In 2021, the telecommunications bundled services market in Poland will be worth PLN 11.0 billion. The number of subscribers remained slightly lower than last year, at 13.4 million, down 2.2%.

About 76% of all bundled service users opted for a package of 2 services, the so-called double play. The popularity of individual packages has not changed significantly. The operator with the largest number of bundled service users was P4 (38.8% of the bundled services market), but its shares, compared to last year, dropped significantly.

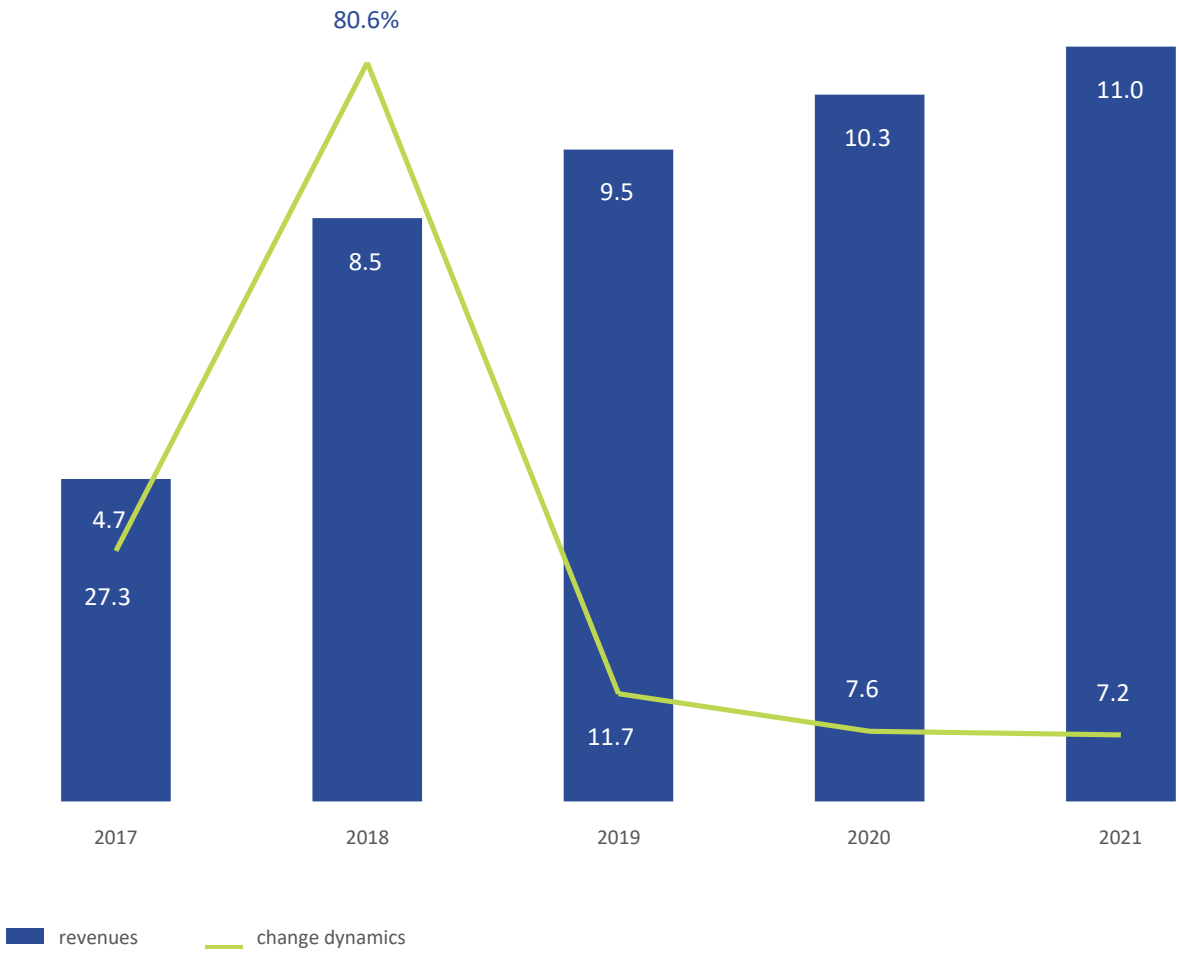
3.2. REVENUES

PLN 11 billion

the value of the bundled services market in Poland

Compared to 2020, total revenue from the bundled services market increased by 7.2% and amounted to about PLN 11 billion.
We are seeing a further trend of weakening of the previously dynamic growth rate of this indicator. This is the smallest increase in revenue from bundled services in the past five years. This situation may be due to the saturation of the market with bundled services, the increased use by users of services in the OTT model, particularly streaming services, and the prevalence of instant messaging successfully replacing some of the "traditional" telecommunications services.

Chart 66. **Revenues from the market (PLN billion) and change dynamics[23]**

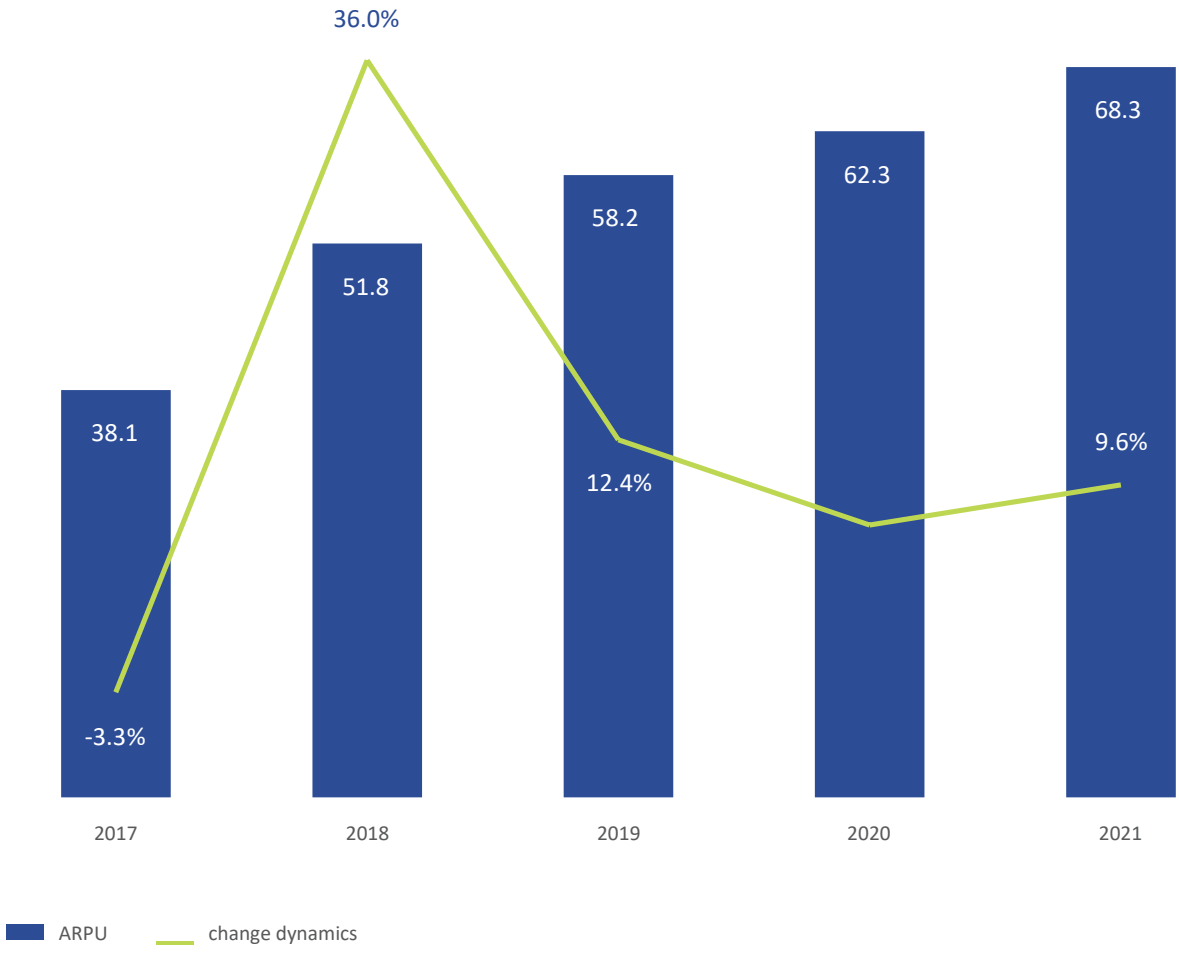


Source: UKE

[23] The significant increase in revenues between 2017 and 2018 is due to the introduction of Article 7 of the TL reporting obligations in electronic form for all telecommunications companies starting in 2019.

In line with the year-on-year increase in revenue, the average monthly revenue per subscriber of bundled services also increases (ARPU). In total, for the entire bundled services market, monthly ARPU in 2021 amounted to approximately PLN 68.3, that is 9.6% more than in 2020.

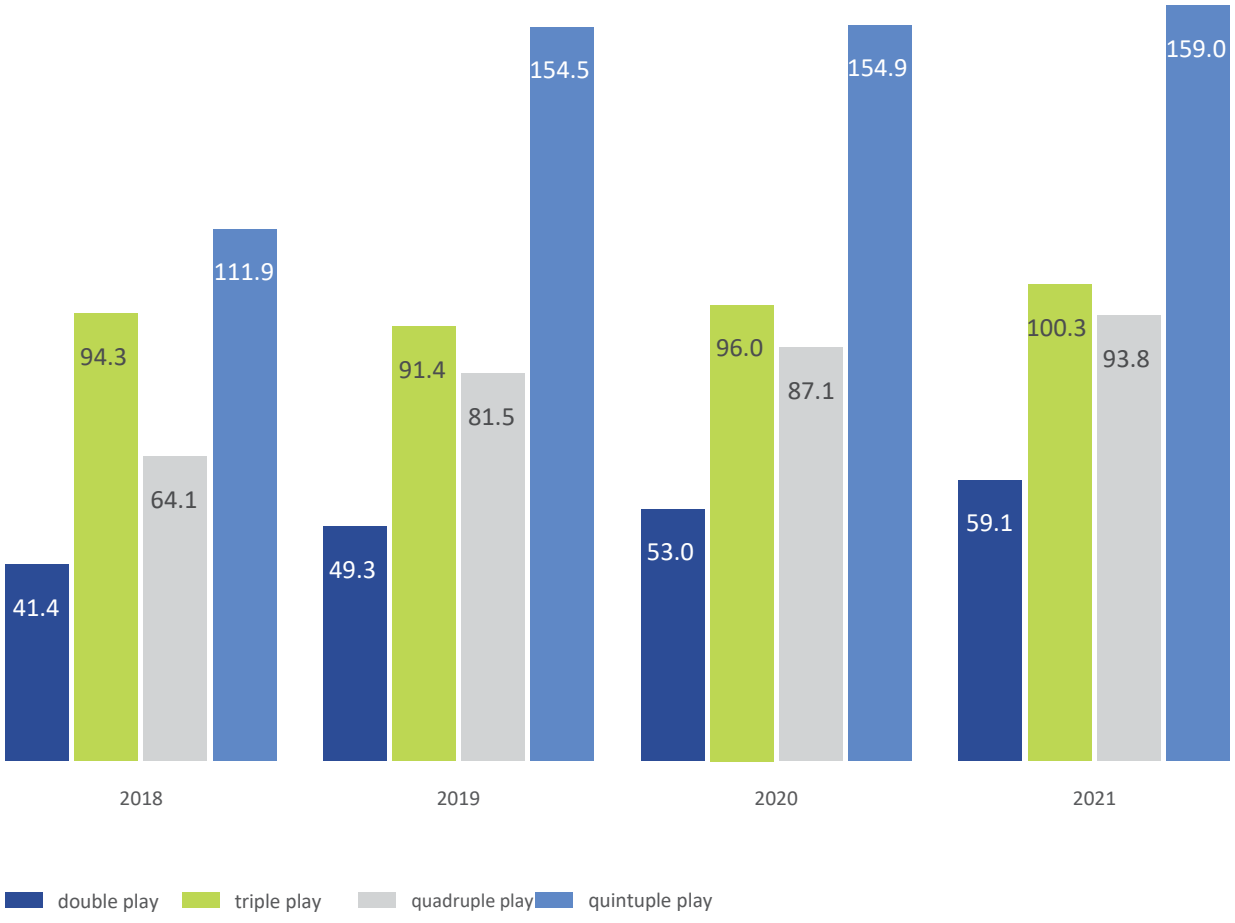
Chart 67. **Average monthly revenue per subscriber (PLN) and change dynamics**



Source: UKE

Year-on-year increases in average monthly revenue per subscriber (ARPU) can be observed for all packages, 11.5% (double play), 4.5% (triple play), 7.7% (quadruple play) and 2.6% (quintuple play), respectively.

Chart 68. **Average monthly revenue per subscriber of bundled services by service package (PLN)**



Source: UKE

PLN 68.3 average monthly revenue per subscriber of bundled services

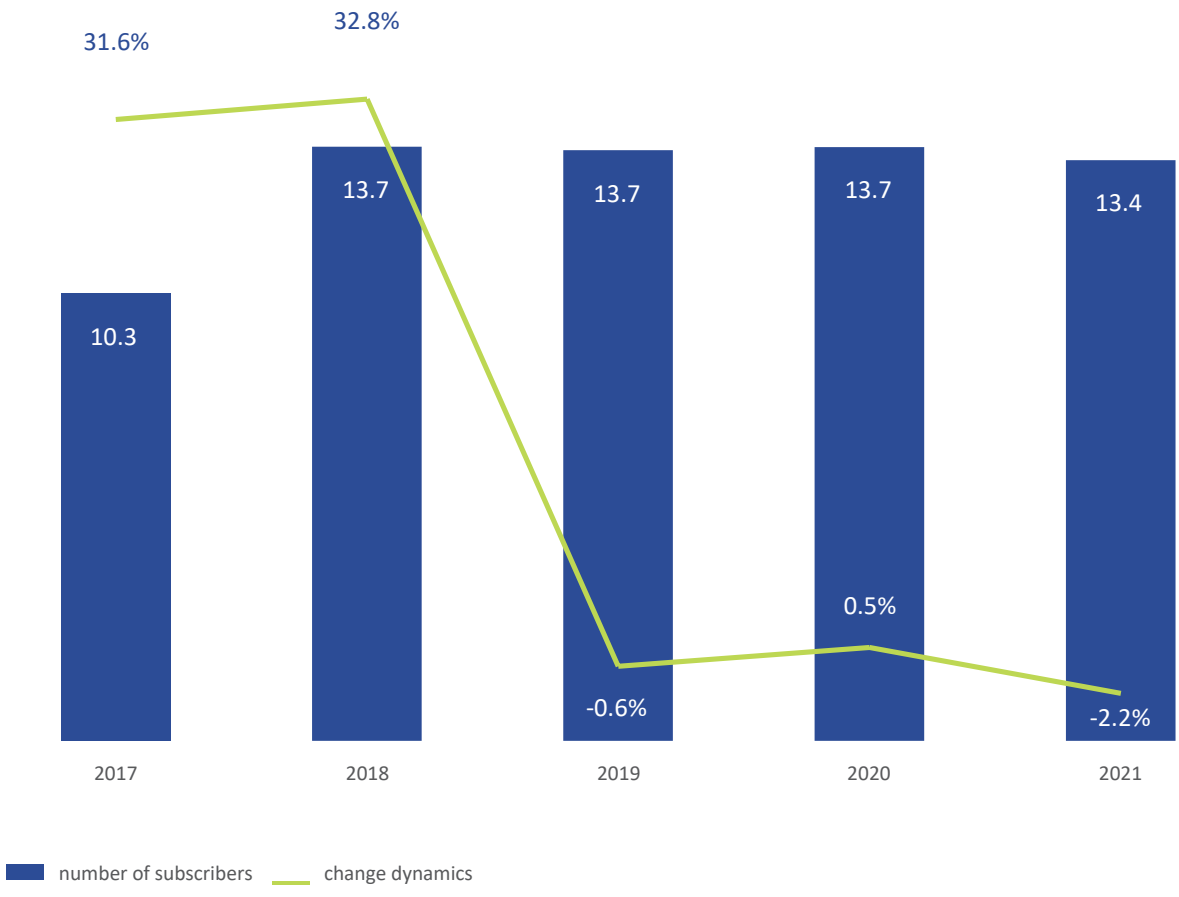
3.3. USERS

The number of bundled service subscribers in Poland has fluctuated slightly over the past four years. We are even seeing a slight downward trend. In 2021, total of nearly 13.4 million subscribers used bundled services, 2.2% less than in 2020.

13.4 million

subscribers of bundled services in Poland

Chart 69. **Number of bundled services users (in millions) and change dynamics**

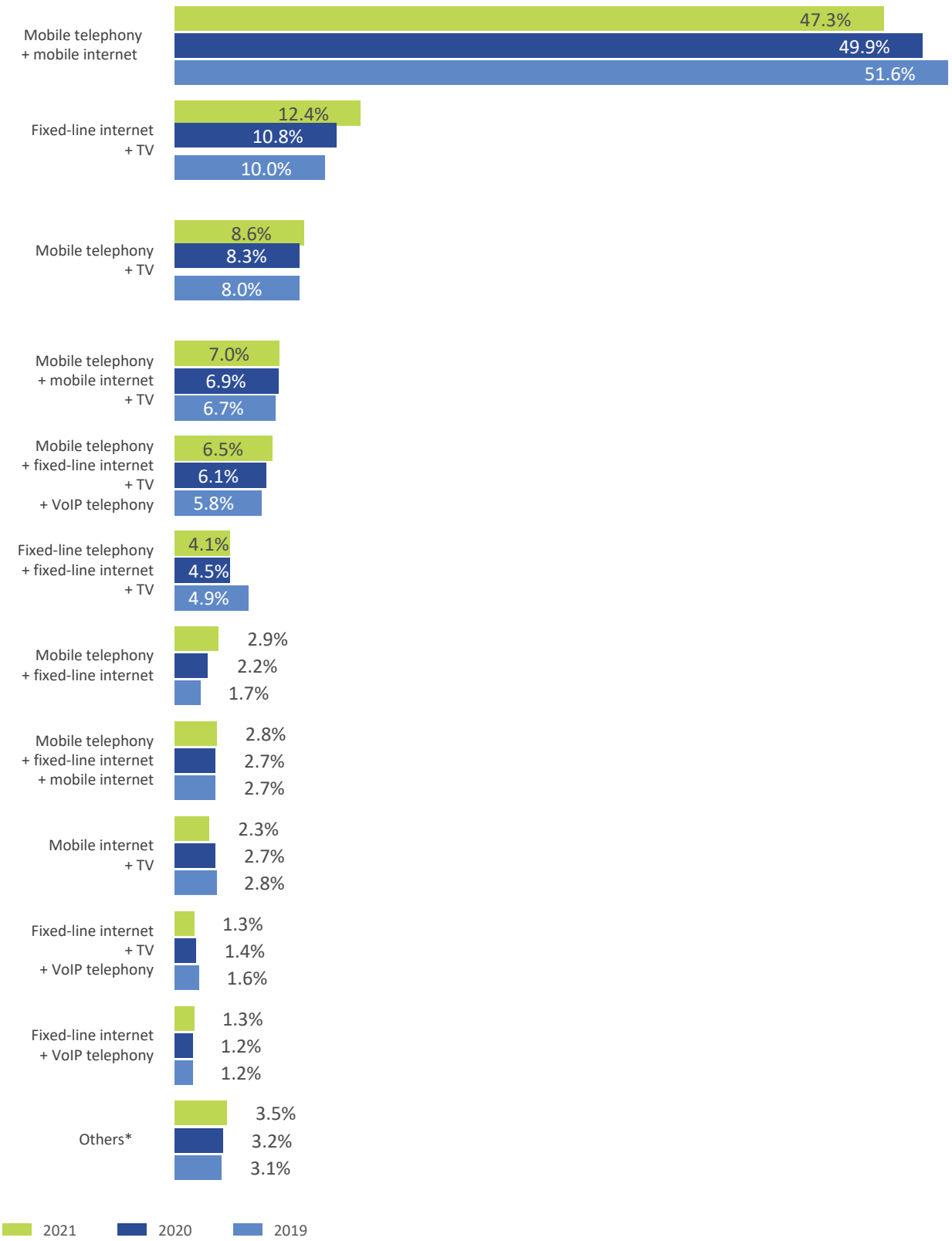


Source: UKE

As was the case last year, the most popular service bundles were “Mobile telephony + Mobile internet” (47.3%) and “Fixed-line internet + TV” (12.4%). The first package saw a 2.6 p.p. year-on-year decline in shares. There was an increase in interest in the second most popular double play package, up 1.5 p.p. compared to 2020. The "Mobile Telephony + TV" package (8.6%) ranked third. This was followed by “Mobile telephony + Mobile internet + TV” (7%) and “Mobile telephony + Fixed-line internet + TV + VoIP telephony” (6.5%), bundles.

Compared to 2020, the number of users of the aforementioned packages increased slightly, by 0.3, 0.1 and 0.4 p.p., respectively. There is a steady decline in interest with regards to the "Fixed Telephony + Fixed-line internet + TV" package (4.1% – down 0.4 p.p.). Compared to the previous year, the share of the "Mobile telephony + Fixed-line internet" (2.9%, 0.7 p.p. year-on-year). For several years, a decline in interest in the "Mobile internet + TV" package (down 0.1 p.p.) has been noticeable. The remaining bundles accounted for 3.5% of all subscribers of bundled services, 0.3 p.p. more than in 2020.

Chart 70. **Share of bundles in terms of the number of subscribers**



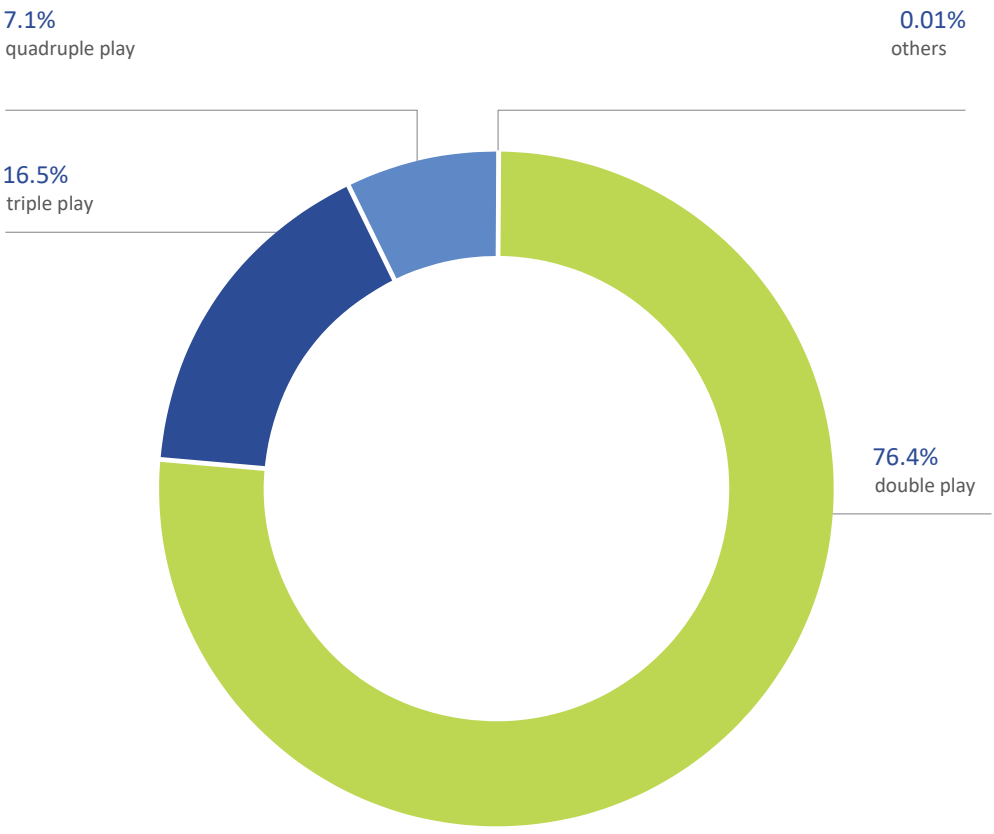
Source: UKE

* Others – bundles with individual share not exceeding 1%

The subscriber structure in terms of the type of bundled service package has not changed much. The overwhelming majority (76.4%) of the bundled services market users chose a double play package. This was followed by triple play (16.5%) and quadruple play (7.1%) bundles. Other packages are rarely offered by service providers and are marginally popular. In 2021, they were used by about 0.01% of bundled service subscribers.

76.4% subscribers chose double play packages

Chart 71. **Share of bundles in terms of the number of subscribers**



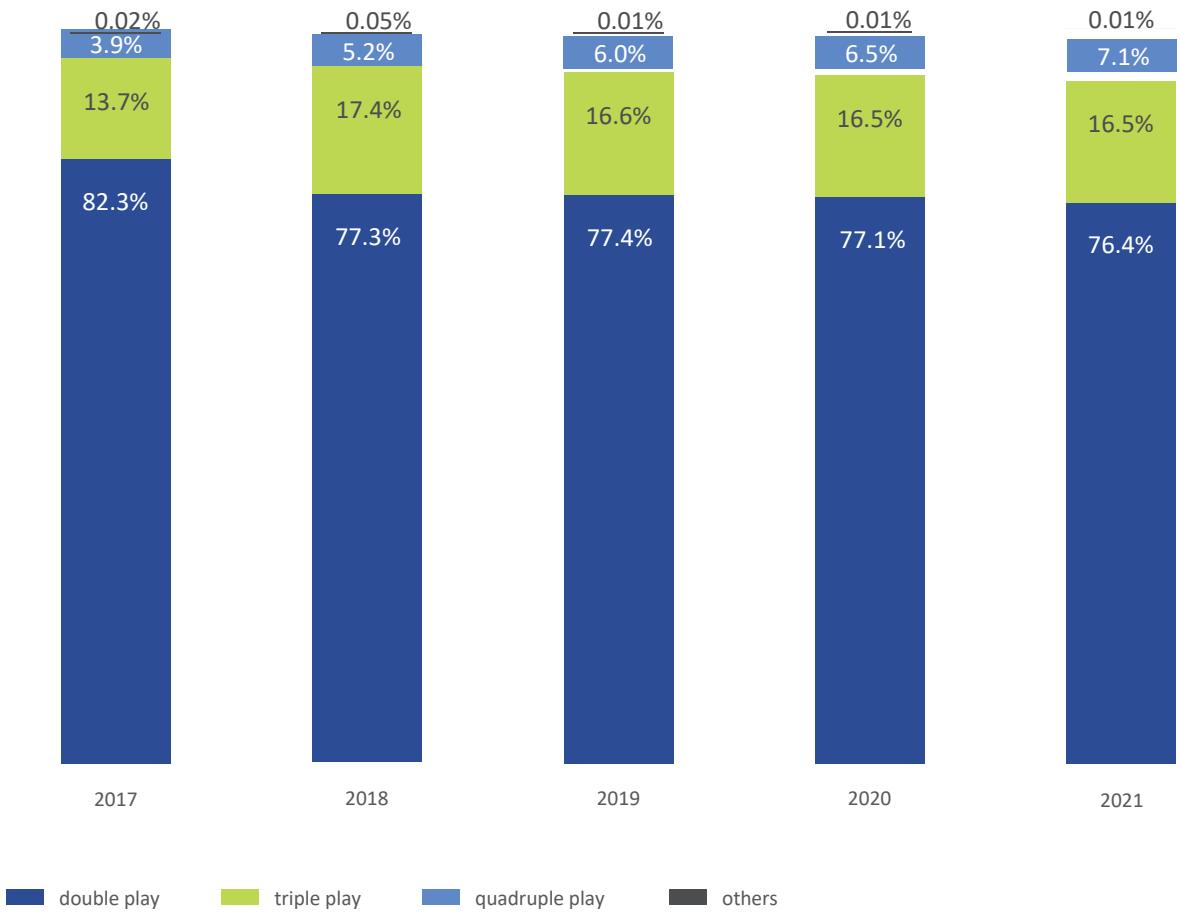
Source: UKE

* Other – quintuple and sextuple play bundled service packages

For many years, the dominant bundled service package has been a two-service package. As of 2018, the shares of these services in the overall bundled services market have reached levels of around 77–76%.
In years 2017–2021, it can be seen that the popularity of the four-service package was increasing (from 3.9% in 2017 to 7.1% in 2021).

The share of triple play services has remained stable for several years (about 16.5% as of 2019). However, the market share of packages of 5 or more services is declining. As of 2019, the popularity of these services has reached about 0.01%.

Chart 72. **Changes in shares of bundled service packages by number of subscribers**



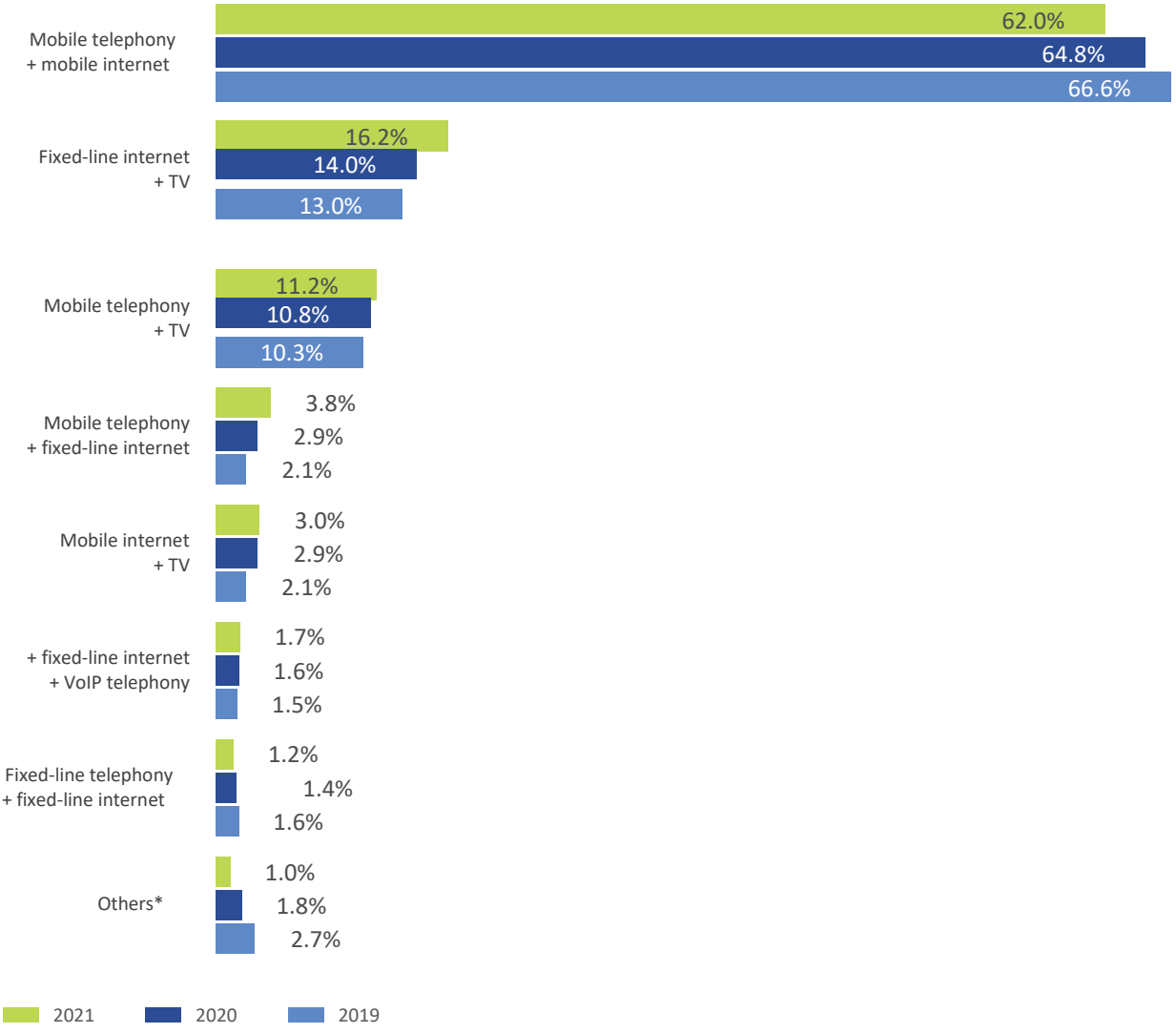
Source: UKE

*Other – quintuple and sextuple play bundled service packages

Compared to the previous year, the shares of individual packages did not change much.

Among bundled offers of two services, the vast majority of users chose the "Mobile Telephony + Mobile internet" package, but this one is now chosen less frequently. In comparison with 2020. its popularity fell by 2.8 p.p. The second most popular package was "Fixed-line internet + TV" (16.2%), whose popularity increased by 2.2 p.p. year-on-year. Among double play services, the "Mobile Telephony + TV" package (11.2%), which also gained in popularity among subscribers (up 0.4 p.p.), ranked third.

Chart 73. **Shares of individual double play packages in terms of the number of subscribers**



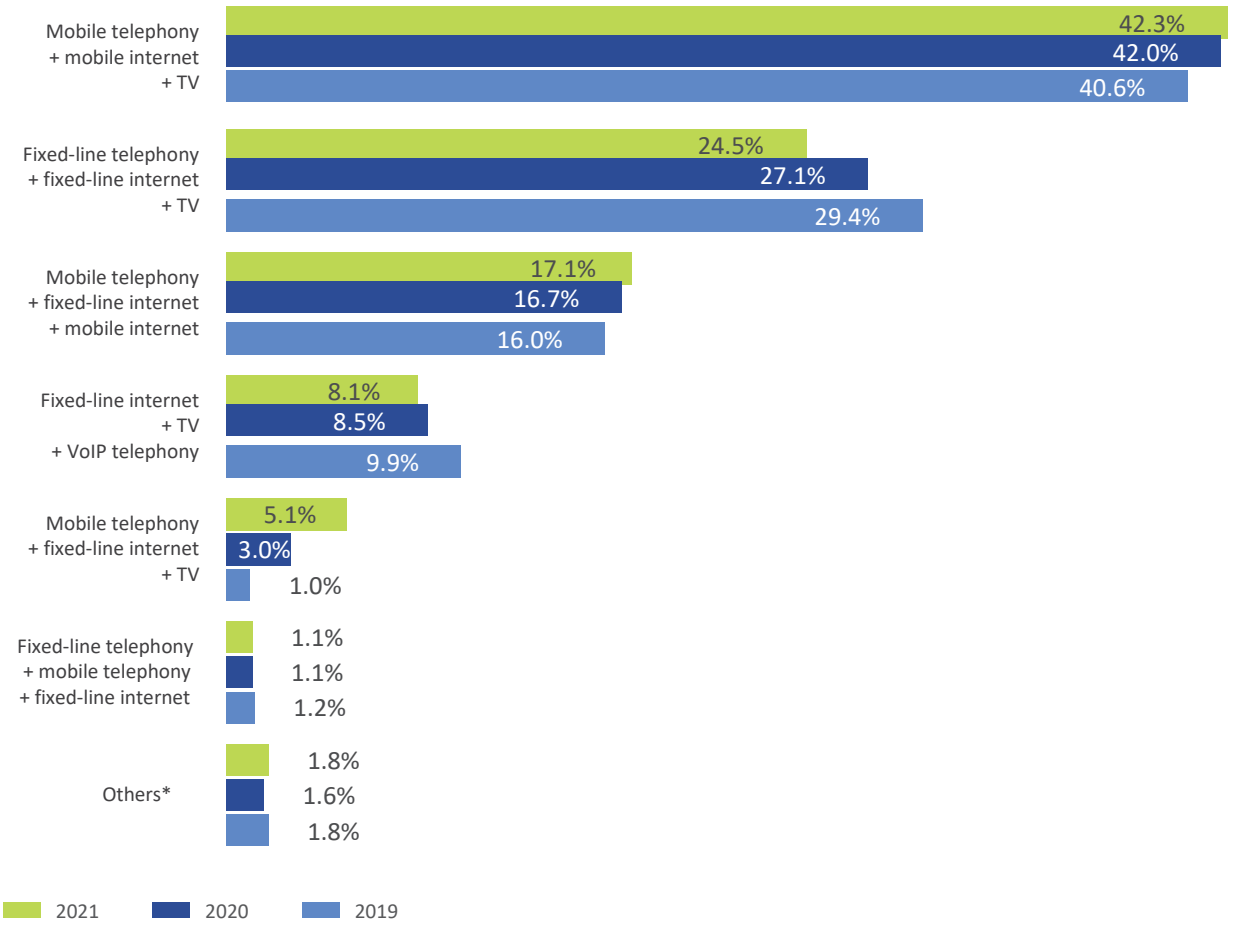
Source: UKE

* Others – bundles with individual share not exceeding 1%

Among the three-service bundles (triple play), the "Mobile Telephony + Mobile internet + TV" bundle ranked first with a score of 42.3% (up 0.3 p.p. year-on-year). It was followed by “Fixed-line telephony + Fixed-line internet + TV” with a share of 24.5%.

The following places are occupied by the "Mobile Telephony + Fixed-line internet + Mobile internet" (17.1%) and "Fixed-line internet + TV + VOIP telephony" (8.1%) packages. Once again, a relatively large increase compared to last year's ranking was achieved with the “Mobile Telephony + Fixed Internet + TV” package (up 2.1 p.p. to 5.1%).

Chart 74. **Shares of individual triple play packages in terms of the number of subscribers**



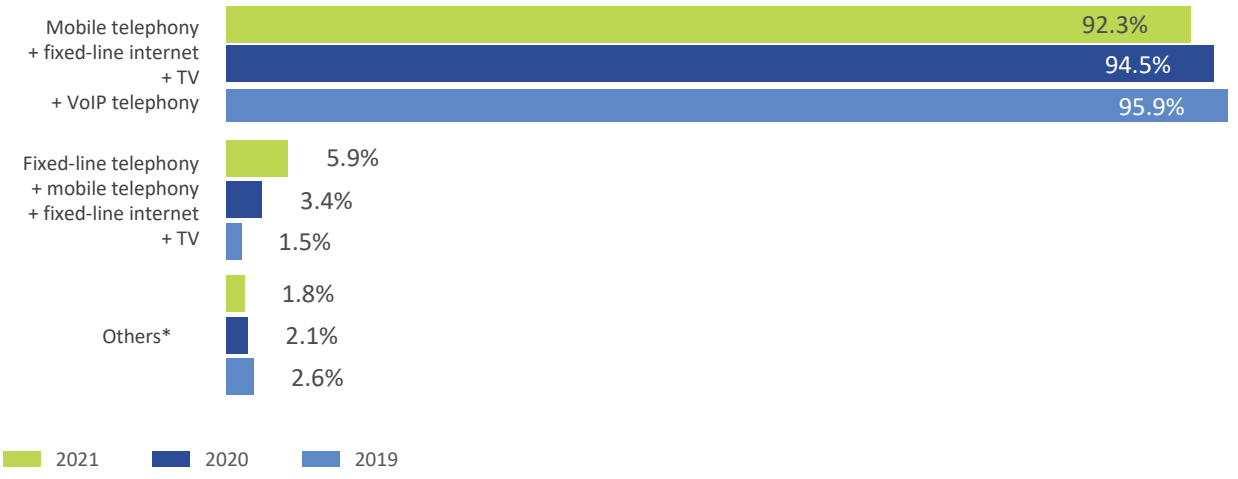
Source: UKE

* Others – bundles with individual share not exceeding 1%

Once again, a relatively large increase compared to last year's ranking was achieved with the “Mobile Telephony + Fixed Internet + TV” package. It was decided by 92.3% of quadruple play service users. However, this is a decrease of 2.2 p.p. compared to 2020.

The “Fixed-line telephony + Mobile telephony + Fixed-line internet + TV” bundle came second (5.9%), attracting double the number of subscribers in 2021 in a year-on-year comparison.

Chart 75. **Shares of individual quadruple play packages in terms of the number of subscribers**

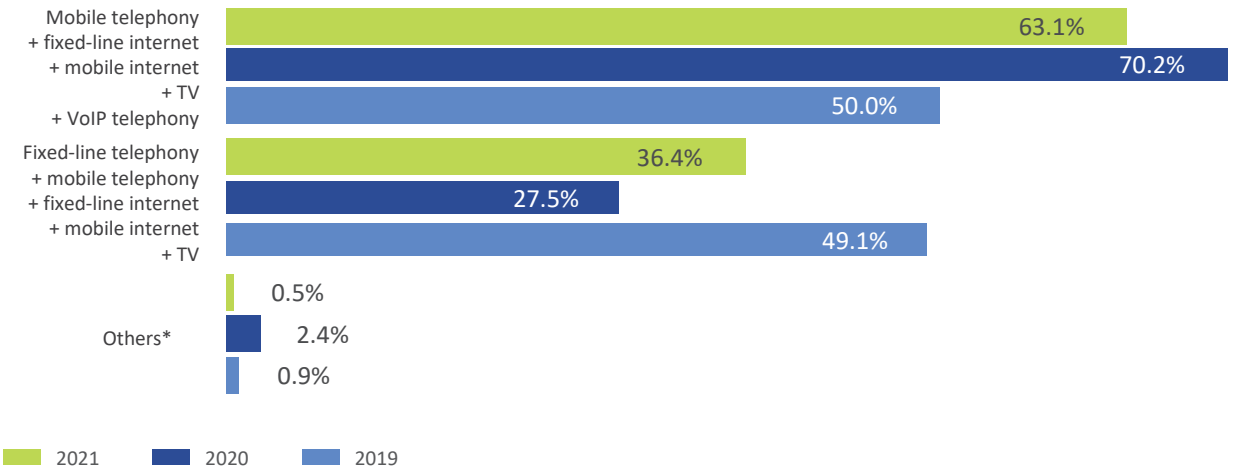


Source: UKE

* Others – bundles with individual share not exceeding 1%

Changes can be observed in the shares of quintuple play bundles. A migration of subscribers took place from the "Mobile telephony + Fixed-line internet + Mobile internet + TV+ VoIP telephony" bundle (7.1 p.p. share loss) in favour of the "Fixed-line telephony + mobile telephony + fixed-line internet + mobile internet + TV" bundle (up 8.9 p.p.).

Chart 76. **Shares of individual quintuple play packages in terms of the number of users**

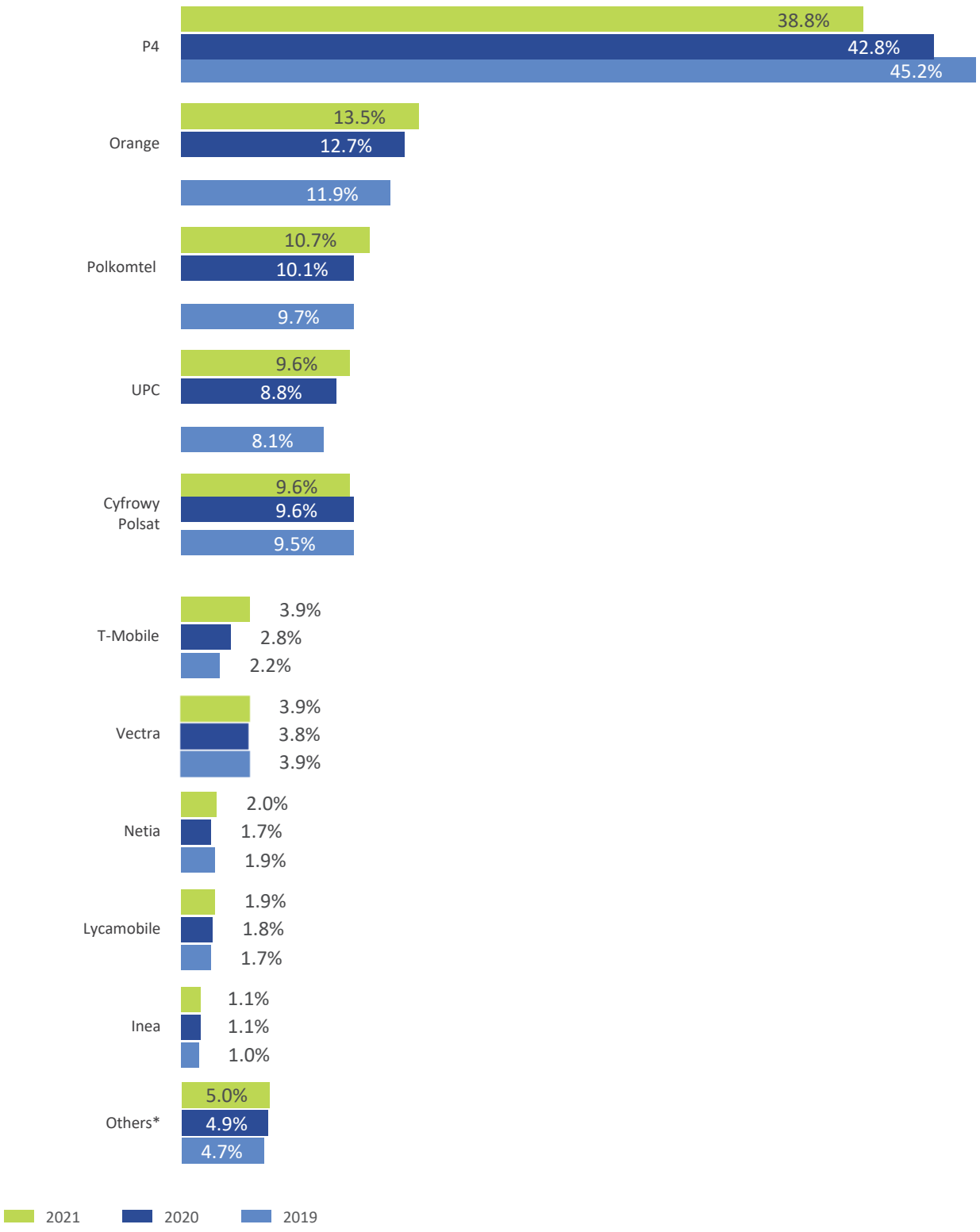


Source: UKE

* Others – bundles with individual share not exceeding 1%

Nearly 2/5 of bundled subscribers were held by P4 (down 4 p.p. compared to 2020). Orange managed to gather 13.5% of users.
Polkomtel increased its customer pool to almost 11%, and Cyfrowy Polsat maintained its share at 9.6%. The share of other entrepreneurs in the bundled services market was 5%.

Chart 77. **Shares of operators in terms of bundled services subscribers**



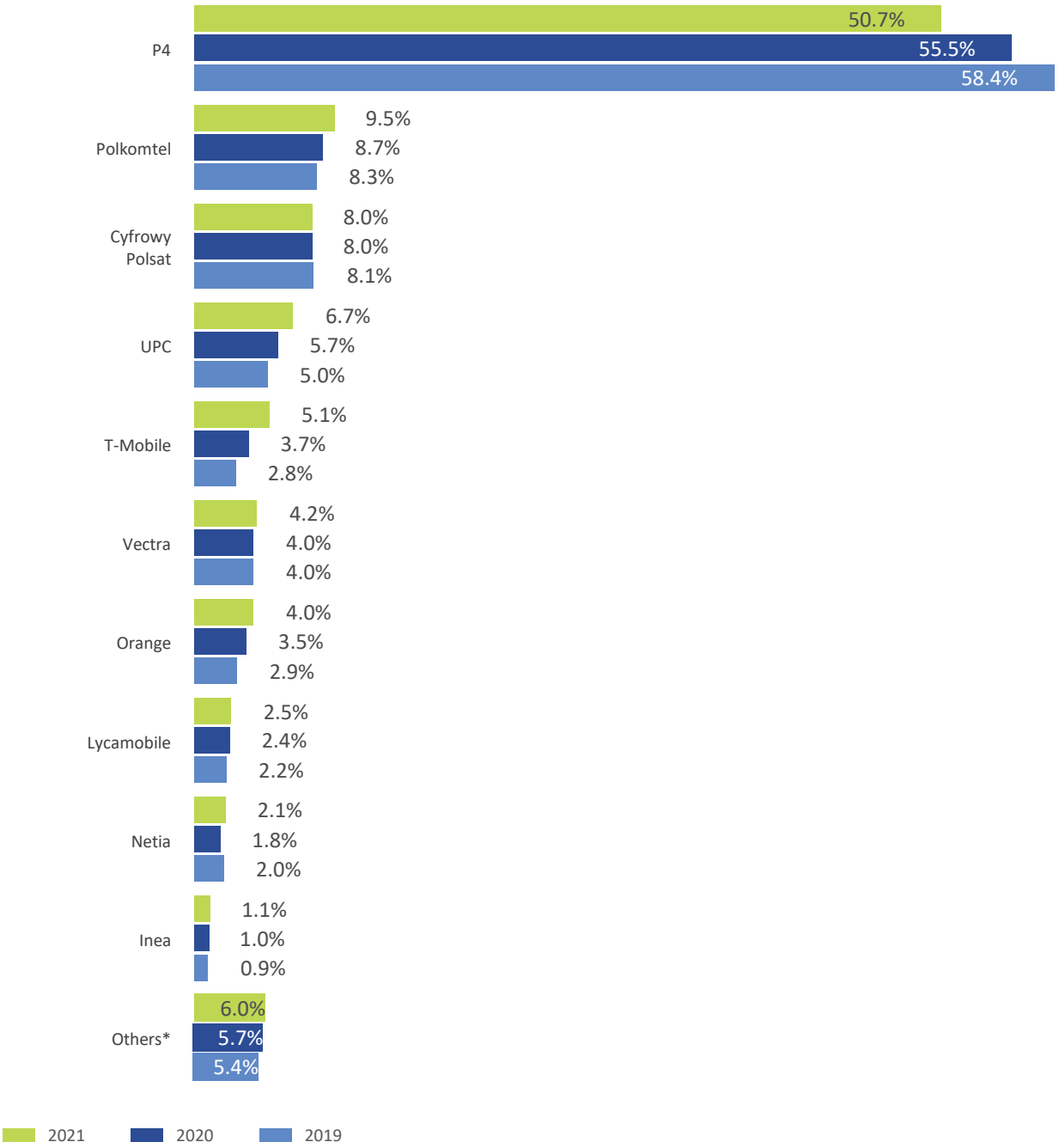
Source: UKE

* Others – enterprises with individual share not exceeding 1%

P4 had the largest share in terms of double play subscribers in 2021 (50.7%), but its shares fell by 4.8 p.p. compared to 2020. Polkomtel had the second largest share at around 9.5% of subscribers, and Cyfrowy Polsat was third at 8%.

UPC increased its subscriber base by 1 p.p. to 6.7%. T-Mobile recorded a large increase compared to the previous reporting year, gathering 5.1% of users, up 1.4 p.p. year-on-year.

Chart 78. **Operator shares in terms of bundled services subscribers – *double play***

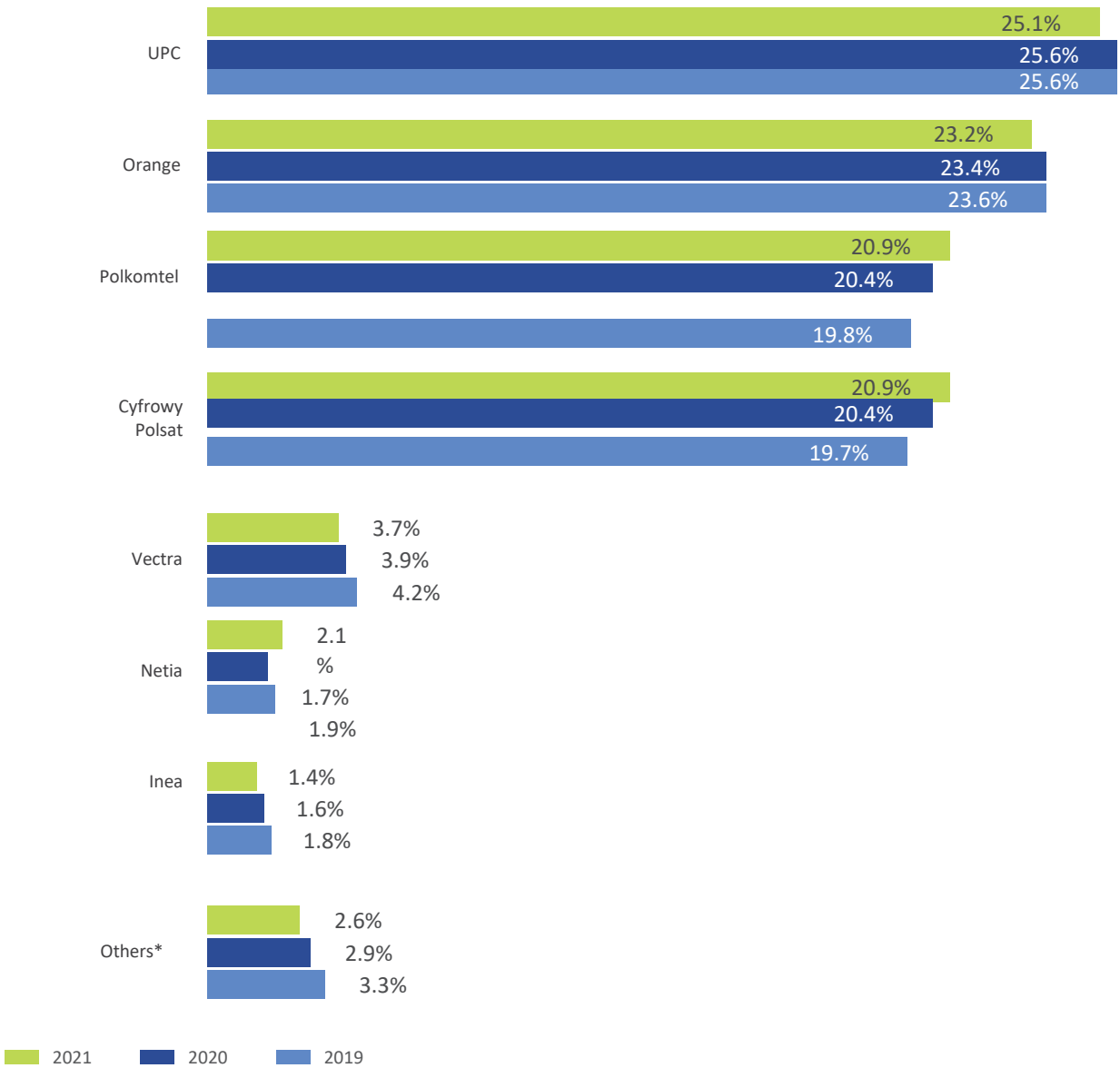


Source: UKE

* Others – enterprises with individual share not exceeding 1%

Among operators offering triple play bundles, UPC retained a ¼ share of subscribers. Orange (23.2%) and Polkomtel and Cyfrowy Polsat (20.9% each, respectively) followed. Next on the list, slight changes in the number of users of the three-service bundle were recorded by Vectra (3.7%), Netia (2.1%) and Inea (1.4%).

Chart 79. **Operator shares in terms of bundled services subscribers – *triple play***



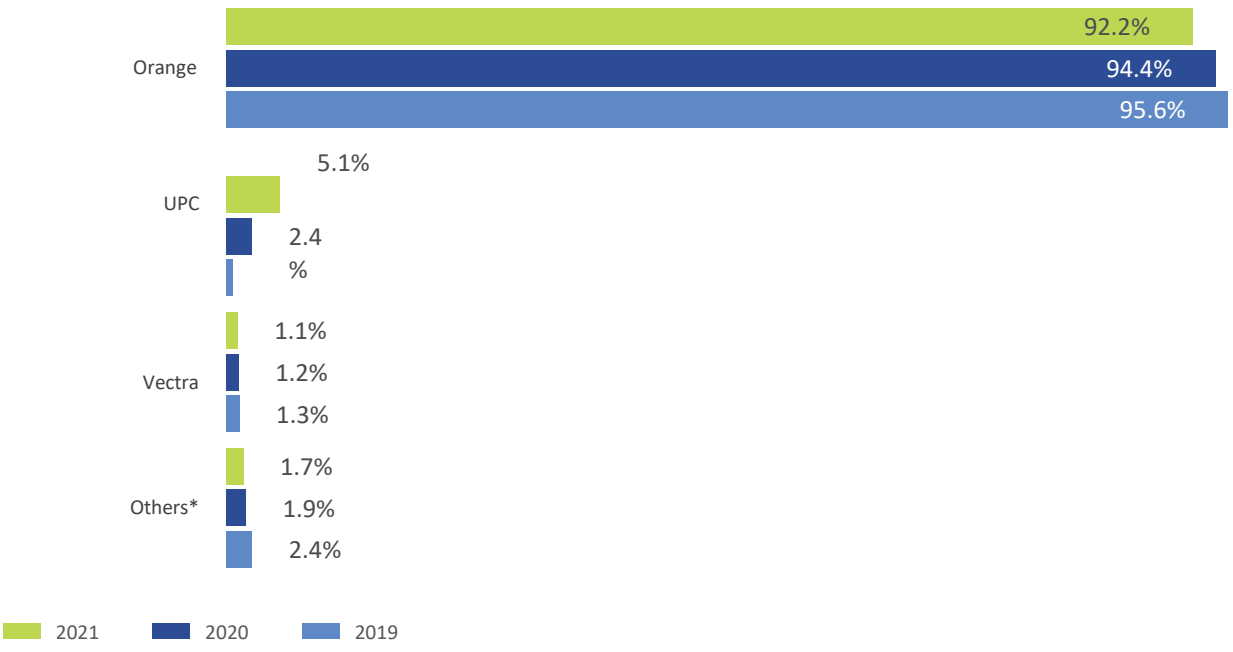
Source: UKE

* Others – enterprises with individual share not exceeding 1%

In 2021, among operators offering quadruple play bundles, a vast majority of the market in terms of the number of users remained invariably in the hands of Orange (92.2%). Significant growth was recorded by UPC, who increased shares by 2.7 p.p.

Third-ranked Vectra amassed about 1% of the total quadruple play bundled service customers in a year-on-year comparison.

Chart 80. **Shares of operators in terms of bundled services subscribers – *quadruple play***

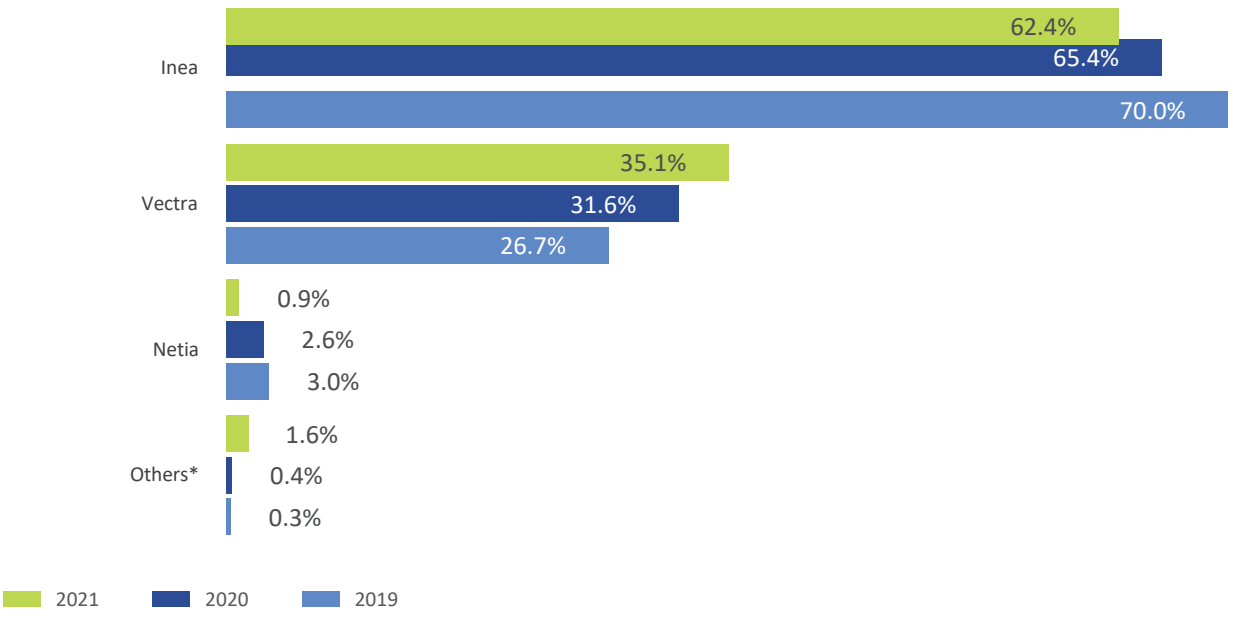


Source: UKE

* Others – enterprises with individual share not exceeding 1%

Among operators offering bundles of 5 services, the largest share belonged to Inea (62.4%), but this is a 3 p.p. decrease compared to 2020. Compared to 2020, Vectra recorded around 5% more users (35.1%). Netia's shares fell significantly, that is below 1%, down 1.7 p.p. year-on-year.

Chart 81. **Shares of operators in terms of bundled services subscribers – *quintuple play***



Source: UKE

* Others – enterprises with individual share not exceeding 1%

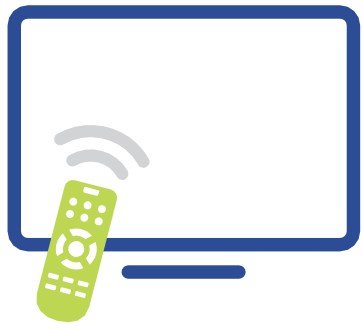
4

TV SERVICES

PART I
THE TELECOMMUNICATIONS MARKET

4.1. GENERAL INFORMATION

The number of users of pay-TV services has been decreasing year after year (10.8 million), while revenues from the market have been steadily increasing (PLN 6.7 million). Just under 30% of the TV services market is owned by Cyfrowy Polsat; 19% by Canal+. Users most often choose satellite TV (about 50%), but IPTV service is becoming increasingly popular, attracting more than 14% of users in 2021.



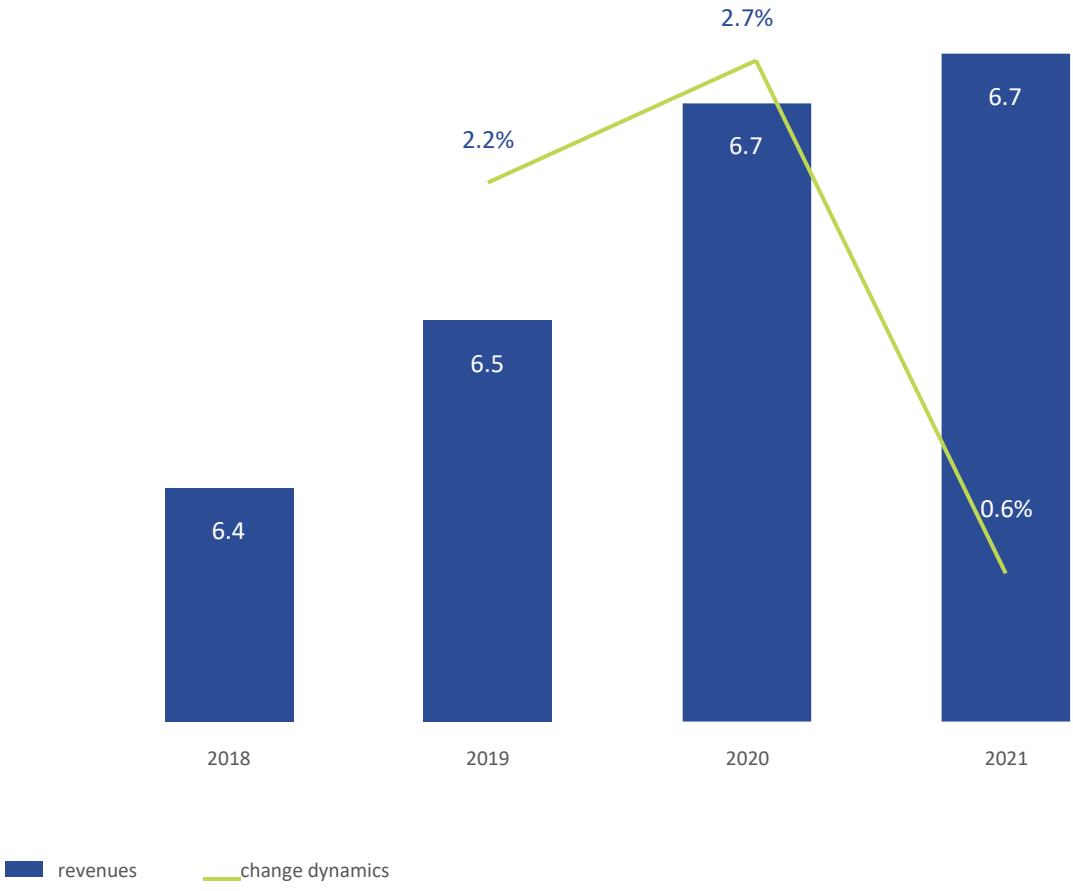
4.2. REVENUES

In 2021, the value of the TV services market was PLN 6.7 billion, a slight increase of PLN 0.04 billion compared to 2020.

PLN 6.7 billion

revenues from the TV services market

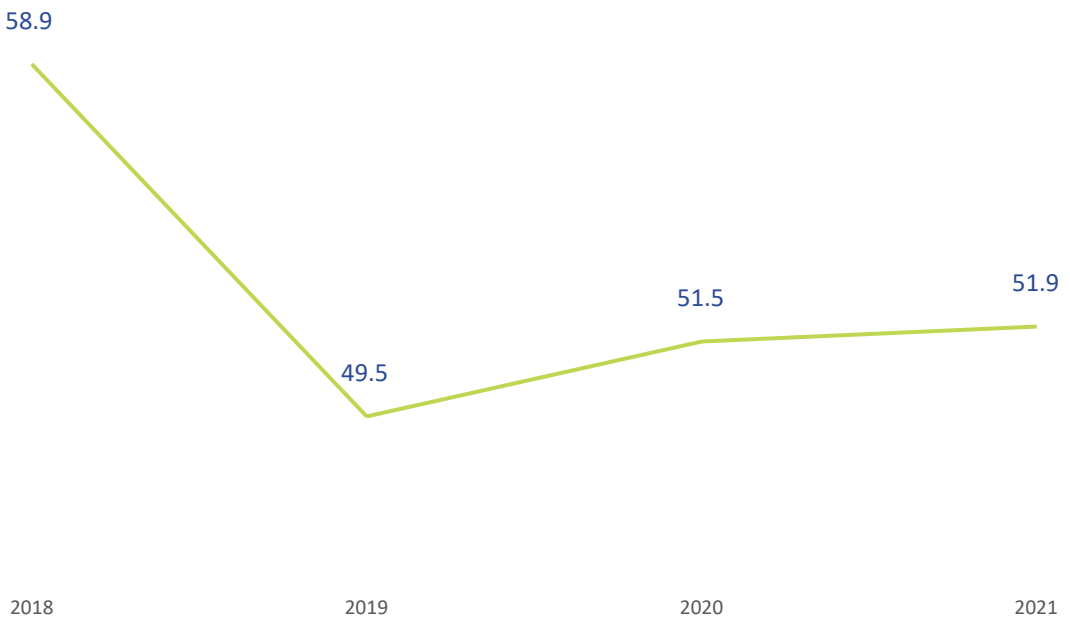
Chart 82. **Revenues from TV services (PLN million) and change dynamics**



Source: UKE

In 2021, the average monthly revenue per user (ARPU) was PLN 51.9, about PLN 0.40 more than in the previous year.

Chart 83. **Average monthly revenue per subscriber (APRU, PLN)**

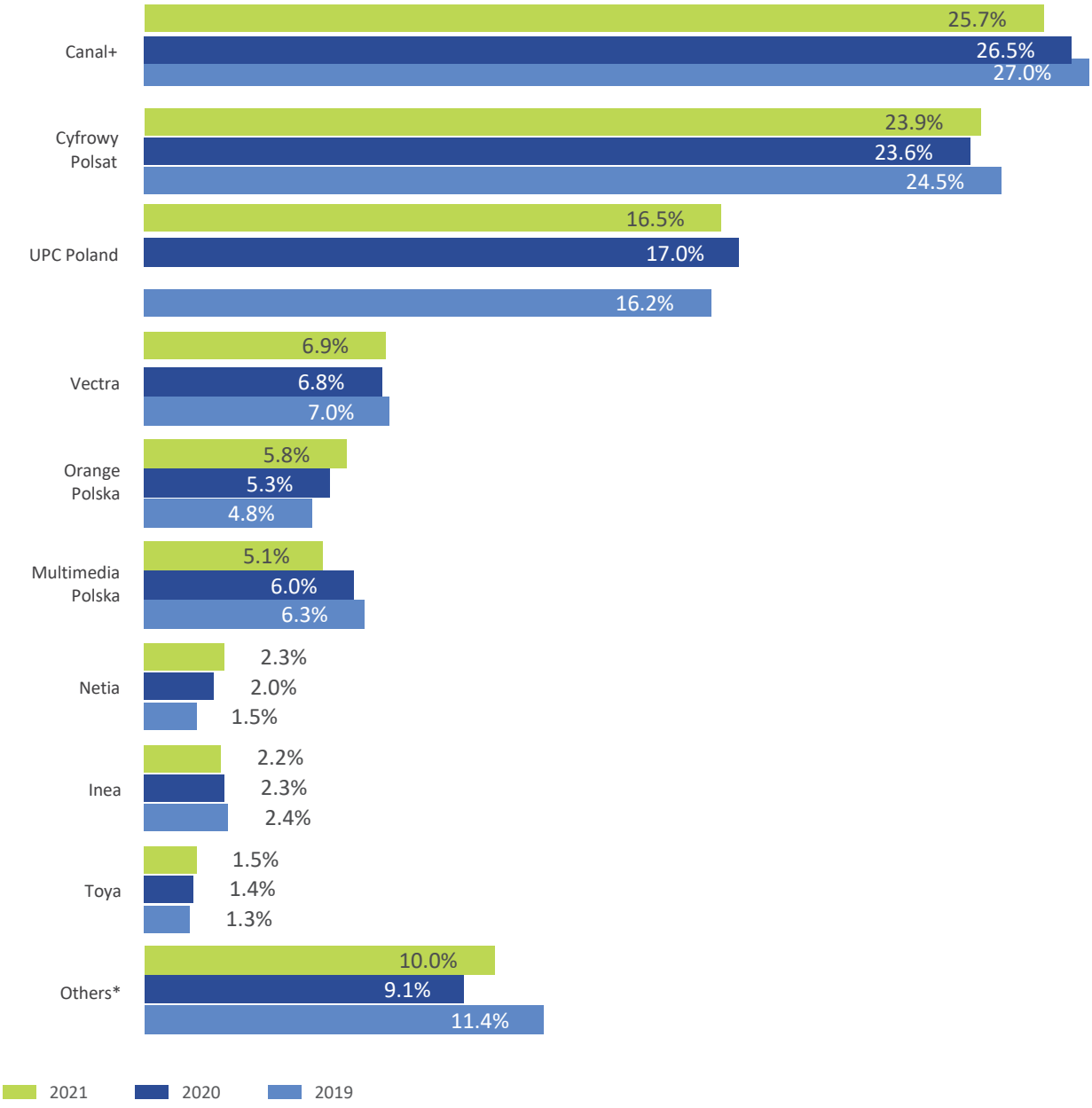


Source: UKE

The entities with the largest market share in terms of revenue are Canal+ (25.7%), Cyfrowy Polsat (23.9%) and UPC Polska (16.5%). Cyfrowy Polsat was the only one from among the above to increase its share in this segment by 0.3 p.p. At the beginning of July 2021, Inea S.A. was split into two companies – Fiberhost S.A. and Inea Sp. z o.o.

For the purposes of the report, Inea's shares for 2021 in terms of revenue include aggregate figures for both companies (2.2%).

Chart 84. **Shares of operators in terms of TV services revenues**



Source: UKE

* Others – enterprises with individual share not exceeding 1%

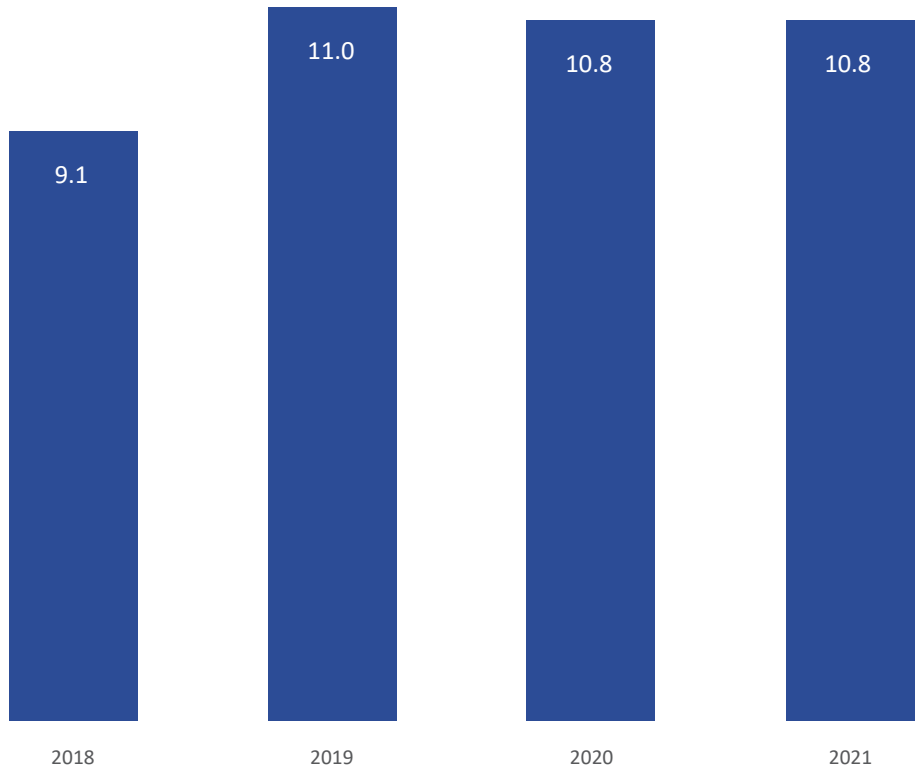
The share data in terms of revenue from television services for 2021 presented for the Inea entity includes data from Inea Sp. z o.o. and Fiberhost S.A (companies formed from the spin-off of Inea S.A..

4.3. USERS

The downward trend in the number of users of TV services continues. In 2021, there were 10.8 million subscribers, just over 20,000 fewer than a year earlier.

10.8 million
users of TV services

Chart 85. **Number of users of TV services (in millions)**

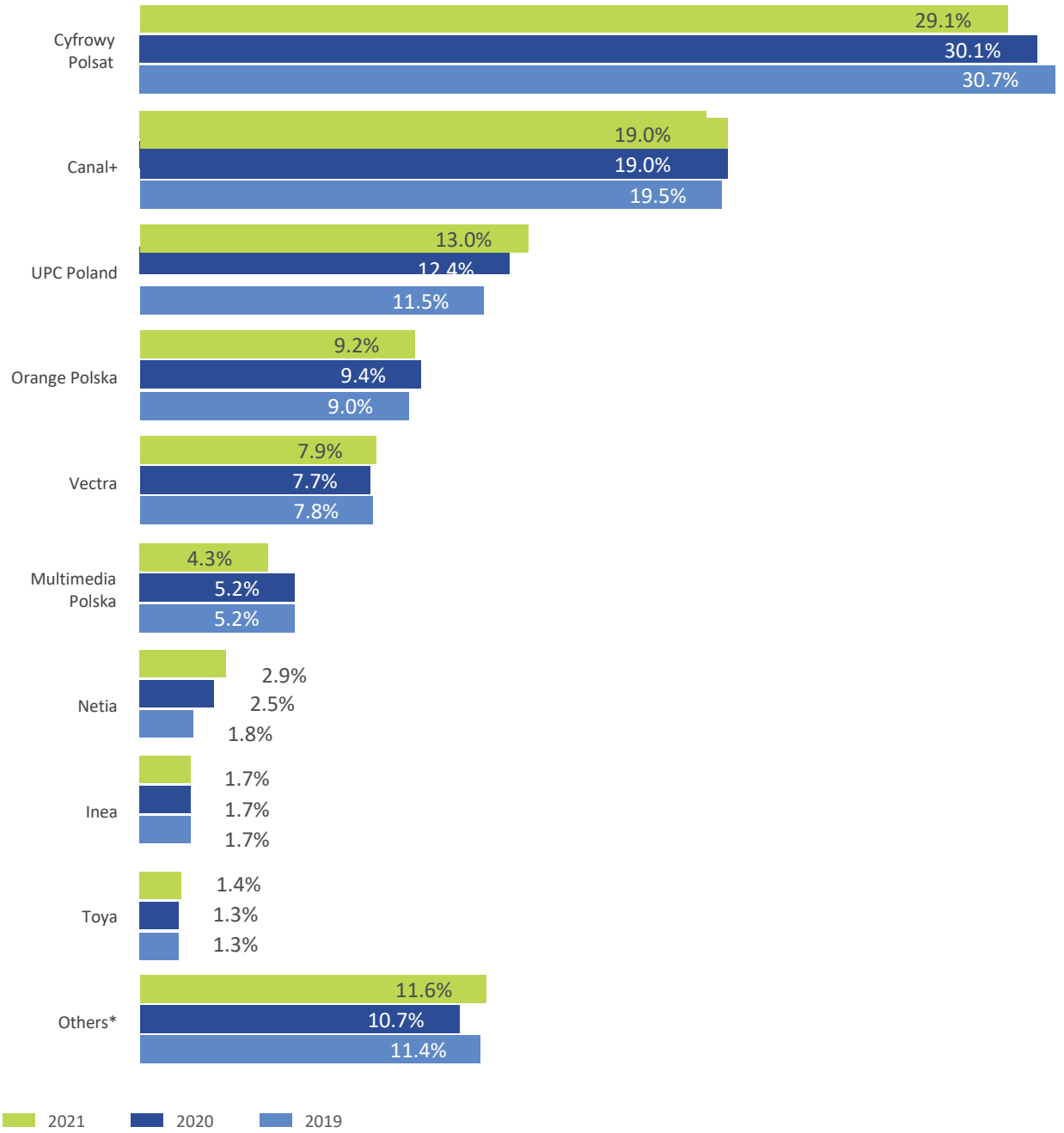


Source: UKE

In terms of the number of users, Cyfrowy Polsat took a dominant position in the TV services market. However, the operator has seen a decline in interest in its services in recent years. In 2021, it attracted just over 29% of the market, down 1 p.p. compared to 2020.

Canal+ slightly increased its share by less than 0.1 p.p. to 19%. UPC managed to attract 0.6 p.p. more customers. Inea has been steadily reporting a 1.7% share of the in the market. Other entrepreneurs increased their coverage by 0.9 percentage points, to 11.6%.

Chart 86. **Shares of operators in terms of the number of users of TV services**



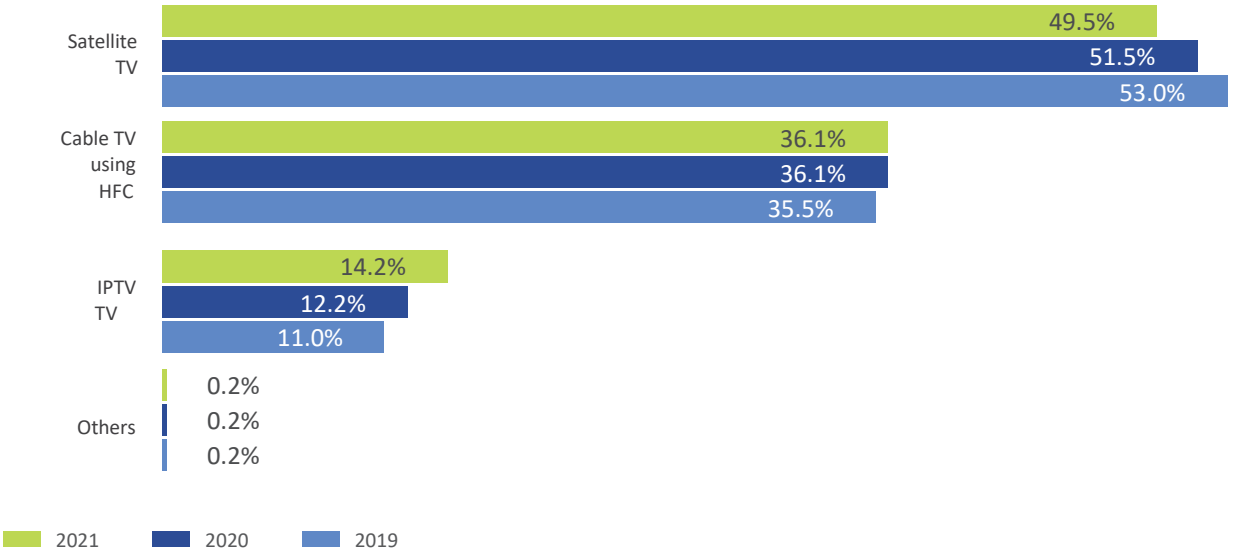
Source: UKE

* Others – enterprises with individual share not exceeding 1%

Uninterruptedly, the most popular type of TV service connection was satellite TV, which was chosen by nearly half of subscribers (49.5%) in 2021. Cable TV maintained its level of subscriber interest (36.1%).

IPTV is steadily increasing its share of the TV services market, expanding its audience by 2 p.p. in 2021. (14.2%).

Chart 87. **Access to TV services in terms of the number of users**



Source: UKE

The development of satellite TV, according to the forecast[24] is expected to increase interest in the service by 2025 and thus increase satellite TV's share of the pay-TV market by 7 p.p. (56.5%).

Chart 88. **Satellite TV penetration in terms of number of users**

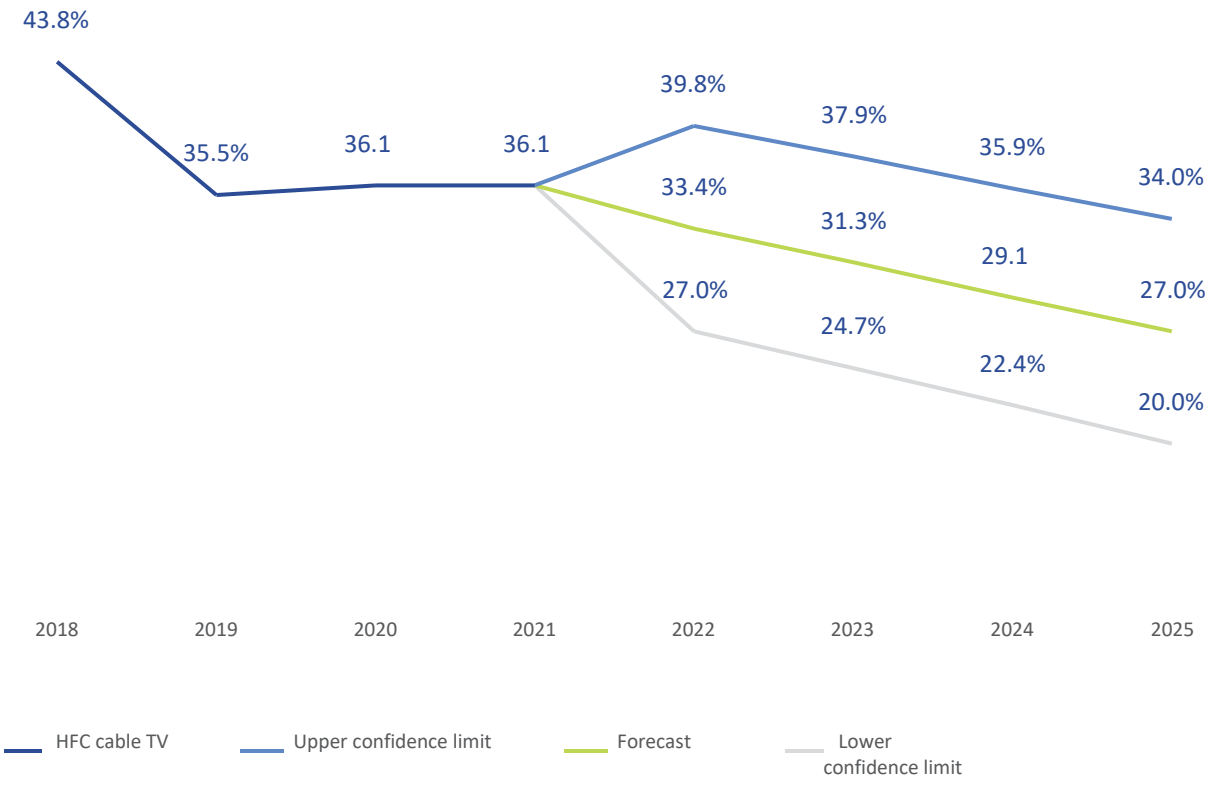
Source: UKE

[24] UKE's forecast based on historical data collected under Article 7 of the TL. The forecast predicts future values based on existing data using a forecasting function, i.e. using the AAA version of the exponential smoothing algorithm

(ETS). The forecast also includes a confidence interval that helps establish the accuracy of the predicted forecast at 95%.

It is estimated that cable TV's share of the pay-TV market will decline. In 2025, interest in the service would drop to 27%, which would be as much as 9.1 p.p. lower than in 2021.

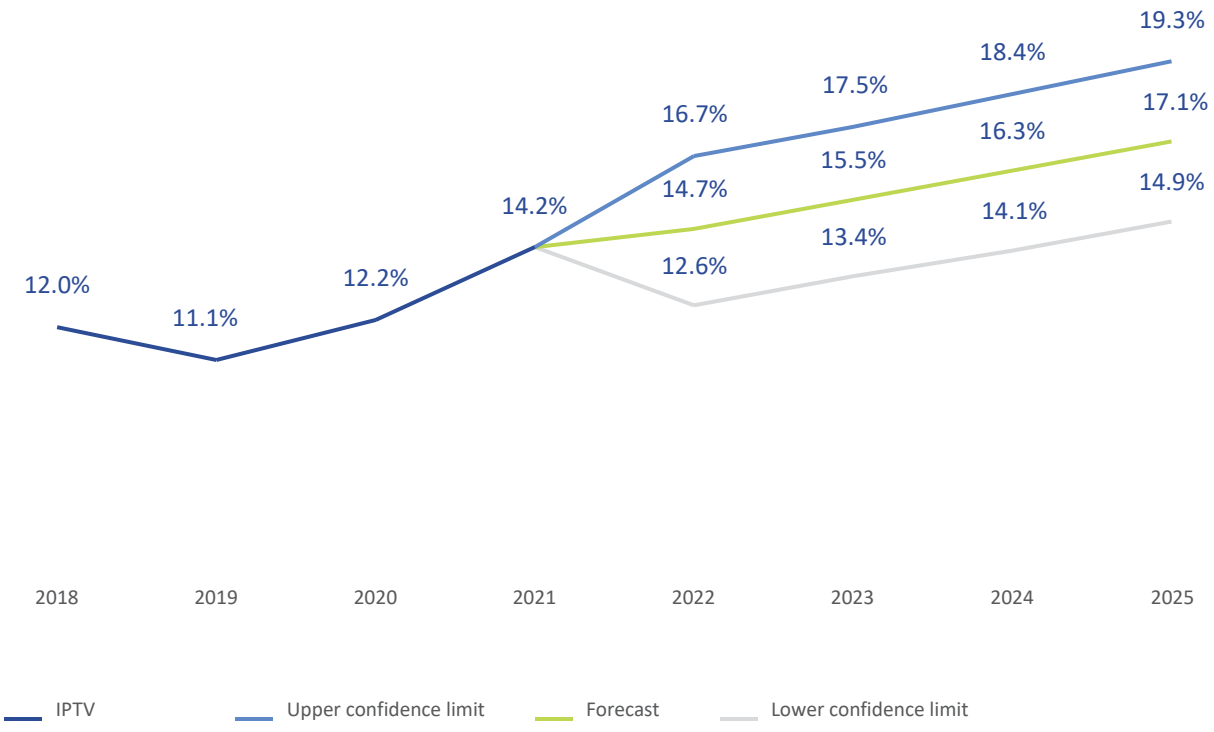
Chart 89. **Cable TV penetration in terms of the number of users**



Source: UKE

Given the upward trend in IPTV, it can be assumed that it will continue in the coming years. In 2025, interest in the service would increase to 17.1%, about 3 p.p. higher than in 2021. Taking into account the upper confidence limit, the forecast assumes a 5.1% increase in the number of IPTV users.

Chart 90. **IPTV penetration in terms of number of users**



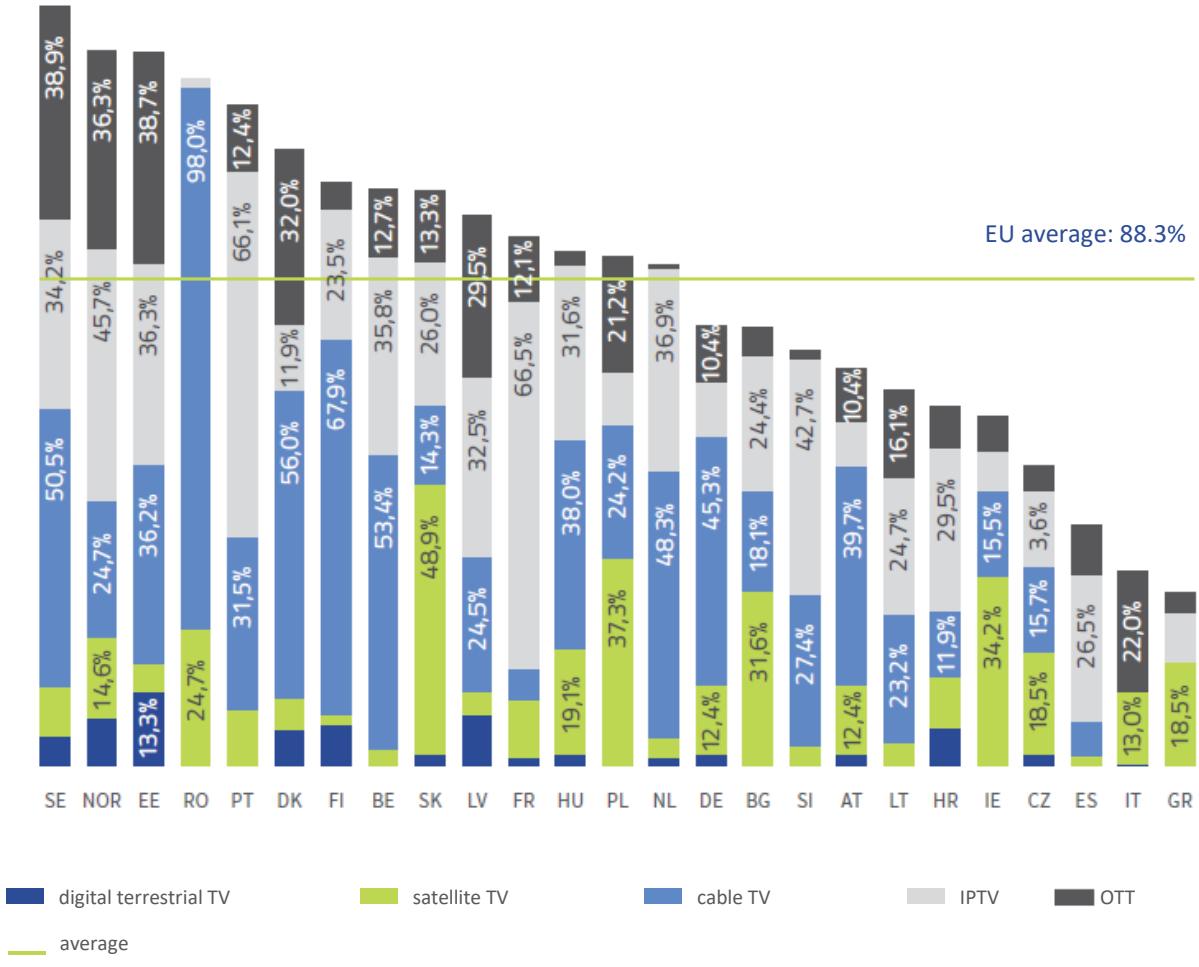
Source: UKE

4.4. COMPARISON WITH EUROPEAN COUNTRIES

According to Analysys Mason data, penetration of pay-TV services last year reached its highest level in Sweden (138%), of which just over 50% was cable connections. Norway also recorded very high penetration compared to European countries (130%), of which it was mainly IPTV-type connection (45.7%).

In 2021, the average penetration for EU countries was 88,3%. The rate for Poland was 93%, 4.3 p.p. above the EU average.

Chart 91. **Penetration of pay-TV services in European Union countries**



Source: Analysys Mason DataHub

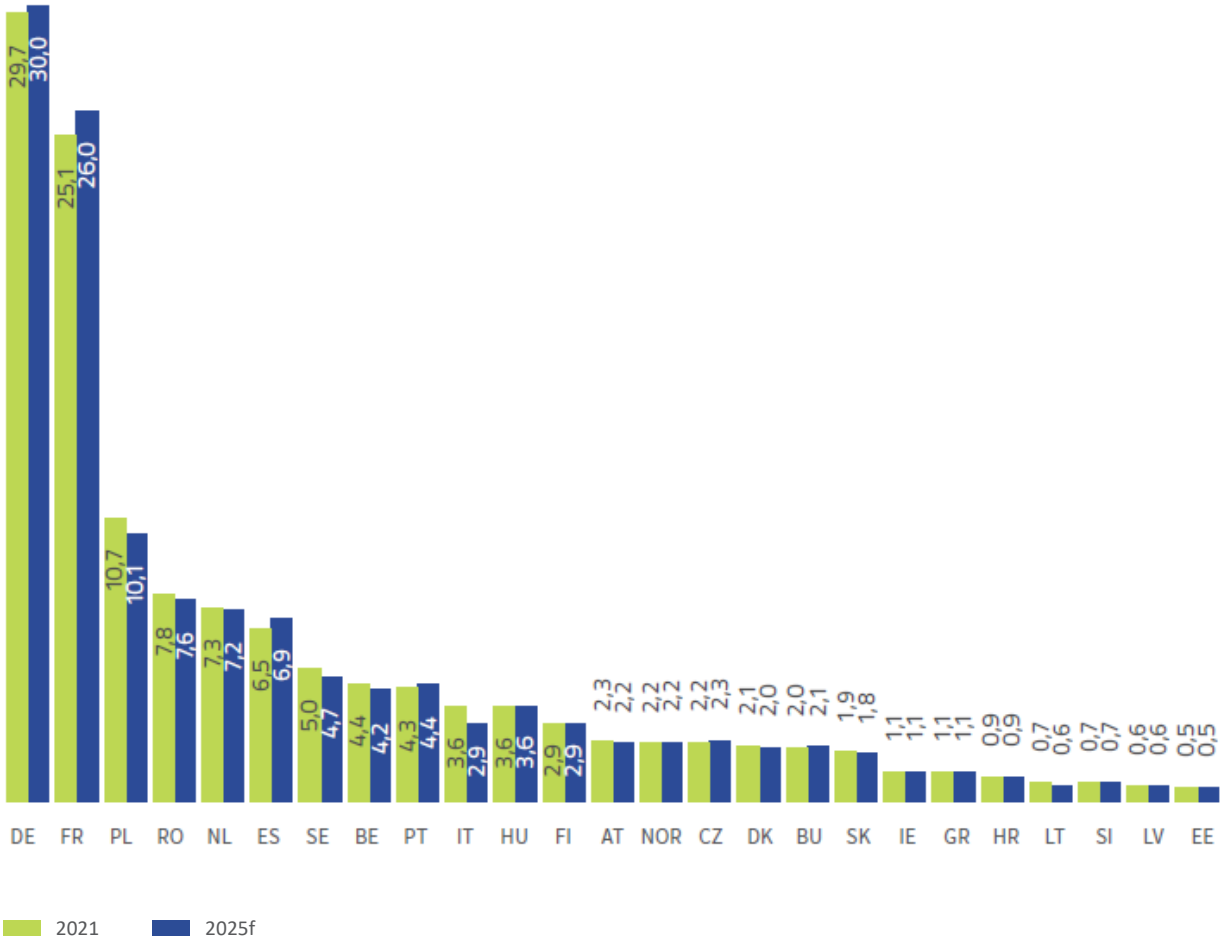
The share of each type of TV service connection differs from the data collected by UKE in its annual reporting due, among other reasons, to the fact that Analysys Mason's data includes additional services such as OTT TV[25].

[25] OTT television refers to the transmission of television content over the internet without guaranteed quality of service (QoS). Reception of the content is possible on an OTT device/decoder, HbbTV-enabled TV receiver/decoder or any device with internet access via an app.

Data extracted from Analysys Mason allows forecasting the development of pay-TV services in individual European Union countries. The forecast for 2025 shows that pay-TV services in most countries will remain at a similar level, and any changes will be minimal.

The prediction for Poland is a reduction of 0.6 million pay-TV service connections.

Chart 92. **Development of pay-TV services in European Union countries, by number of connections (in millions)**



Source: Analysys Mason DataHub

f-forecast

Total number of pay-TV connections, including analogue terrestrial, digital terrestrial, satellite, cable, IPTV. Mobile TV, OTT TV and internet TV were excluded from the calculations. Connections of the MMDS type have been included as cable connections.

1 STATISTICS OF DATA COLLECTED DURING INVENTORY

PART II TELECOMMUNICATIONS INFRASTRUCTURE AND NETWORK COVERAGES

This year's inventory, carried out in the Information System on Broadband Infrastructure (SIIS) used to collect data about the inventory of infrastructure and telecommunications services, covered 55 fewer entities than in the previous year (7562 entities' accounts). The slight difference in the number of entities was due to entries and deletions made in 2021 from the register of telecommunications entrepreneurs (RPT).

The deletions of telecommunications entrepreneurs based in Poland occurred due to:

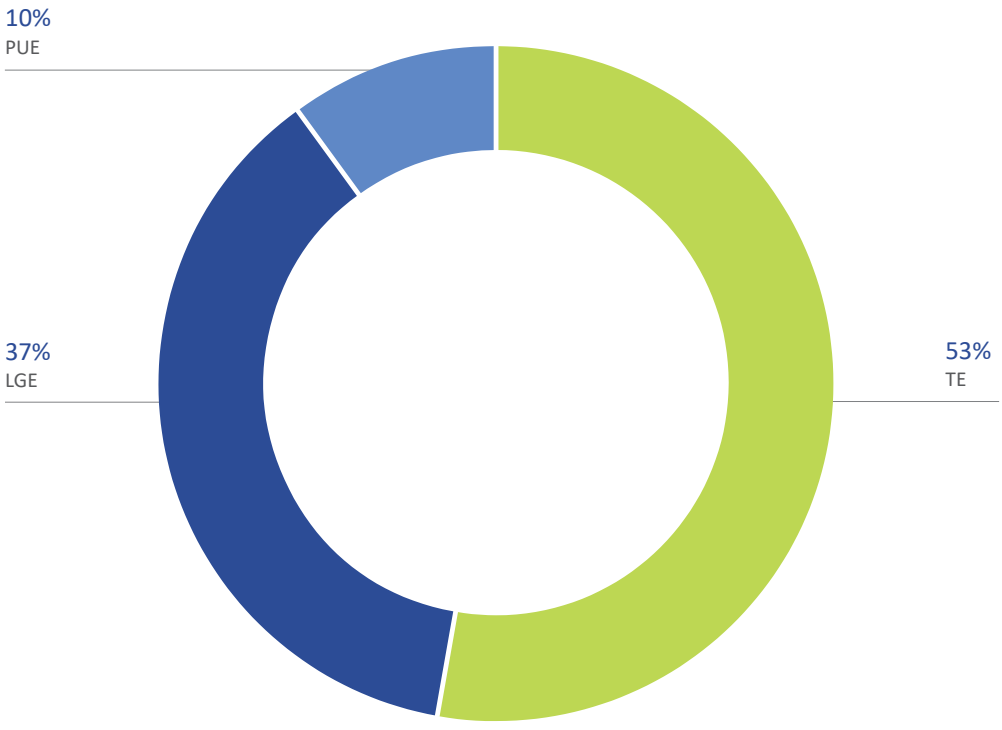
- entrepreneurs' applications for deletion (117 in number),
- deletions of entrepreneurs from CEIDG (25 deletions) and KRS (12 deletions),
- entrepreneurs' failure to fulfil their information obligations (45 deletions).

This year's percentage of accounts in SIIS held by entities obliged to provide information as part of the inventory, namely:

- telecommunications entrepreneurs (TE),
- pre-public utilities (PUE),
- local government units (LGU)

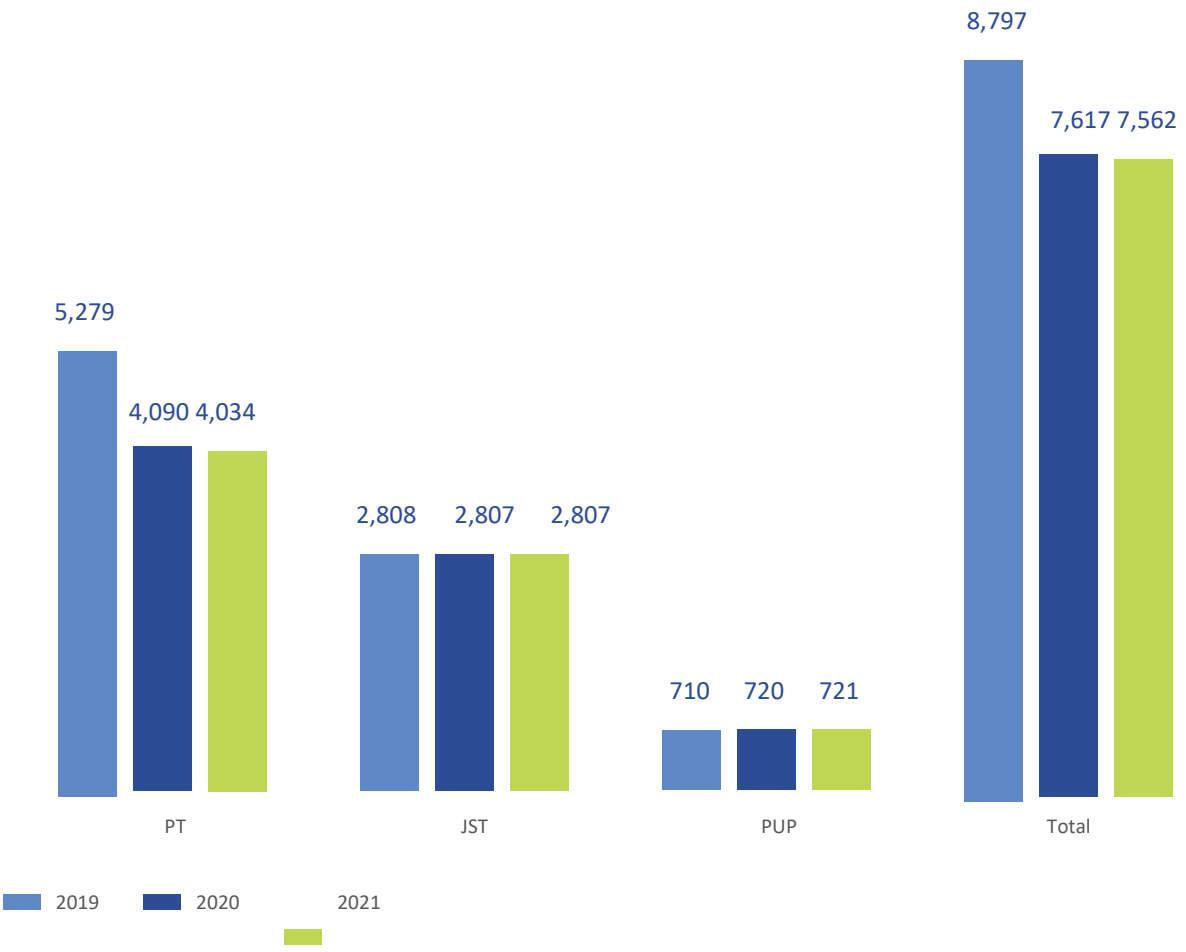
is shown in the chart (Chart 93), while changes in the size of each group of entities over the past 3 years is shown in the chart (Chart 94).

Chart 93. **Percentage distribution of entities in the SIIS in 2021**



Source: UKE

Chart 94. **Number of entities in SIIS at time of inventory in 2019–2021**

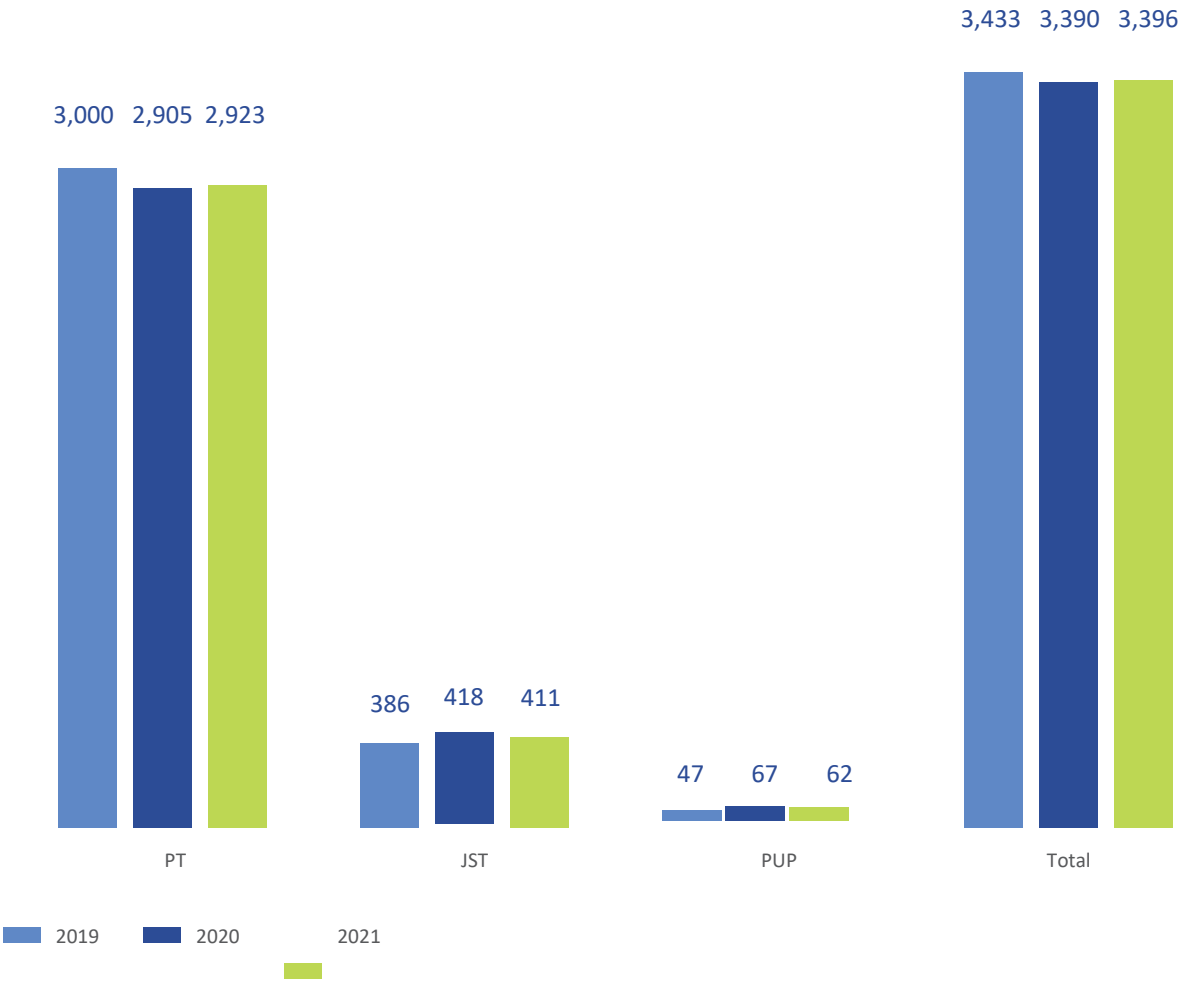


Source: UKE

This year's inventory shows that the number of entities that report infrastructure and service data in SIIS remains at a similar level. As in the previous year, the number of entities that submitted data on time was 3396. After the statutory deadline, an additional 74 entities (including 64 PTs) populated the system with data, making a total of 3470 entities (including 2987 PTs) in the system.

It is worth noting that 45 telecommunications entrepreneurs, included in the group of entities that failed to meet their inventory obligations for 2021, were removed from the register of telecommunications entrepreneurs in June 2022 due to failure to fulfil the information obligations referred to in Article 7(1) and (2) of the TL in the following two years (deletions under Article 12a(5) of the TL).
In 2022, 28 unreported entrepreneurs were removed from the registry, including 17 at the request of PTs, as well as on the basis of deletions from CEIDG (7) and the KRS (4).

Chart 95. **Number of entities that submitted data on time during inventory for 2019–2021**



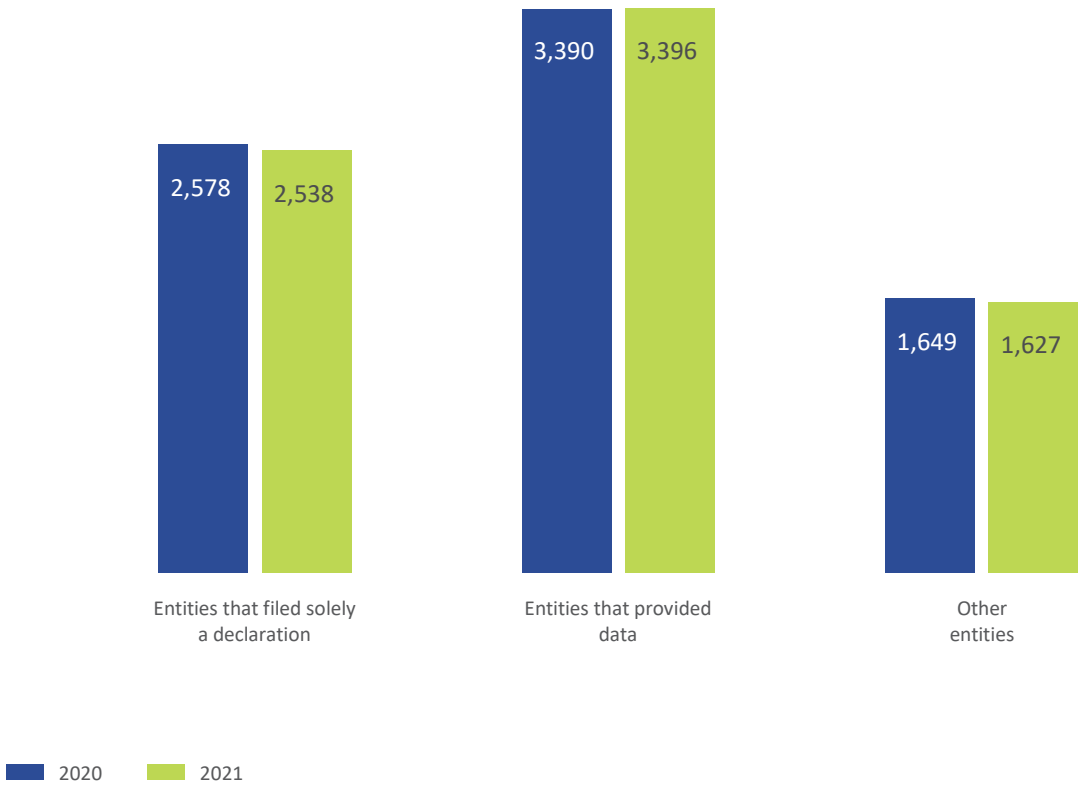
Source: UKE

For the second year in a row, pursuant to Article 29(2b) of the Act of 7 May 2010 on supporting the development of telecommunications services and networks, entities that do not have telecommunications infrastructure, public telecommunications networks, buildings that allow collocation and do not provide telephone services, data transmission services providing broadband internet access and radio and television programme distribution services were required to submit relevant declarations to the SBI system.

During the 2021 inventory, declarations filed by a total of 6130 entities were recorded, with 2706 entities filing declarations of no infrastructure and no services. Some of these statements (168) were made after 31 March 2022.

A total of 81.68% of entities with an SBI account have reported for 2021 by submitting data and statements.

Chart 96. **Number of entities that submitted data and declarations for the 2020 and 2021 inventories on time**



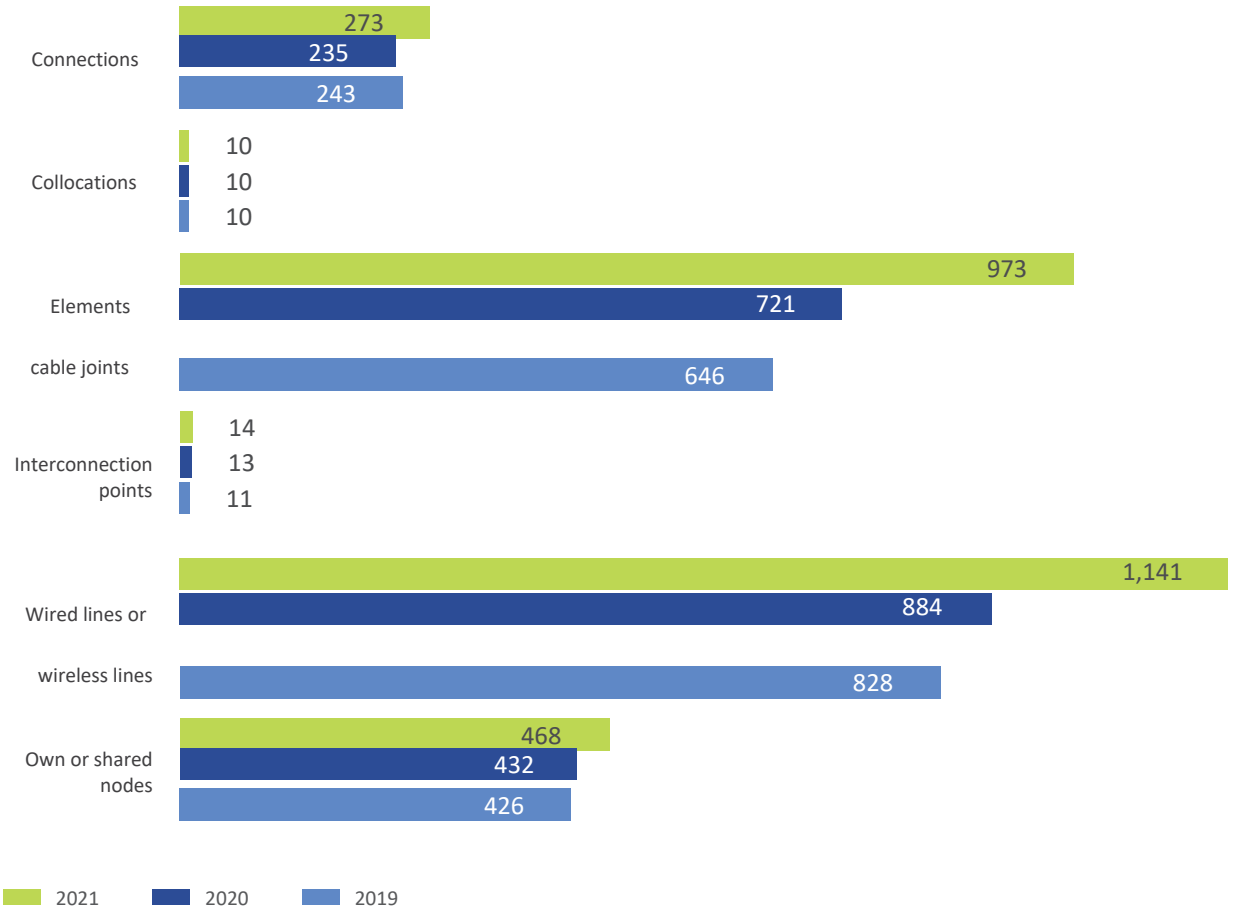
Source: UKE

Chart 97. **Number of entities that provided data and submitted statements in the 2021 inventory, including information provided after the deadline**

Source: UKE

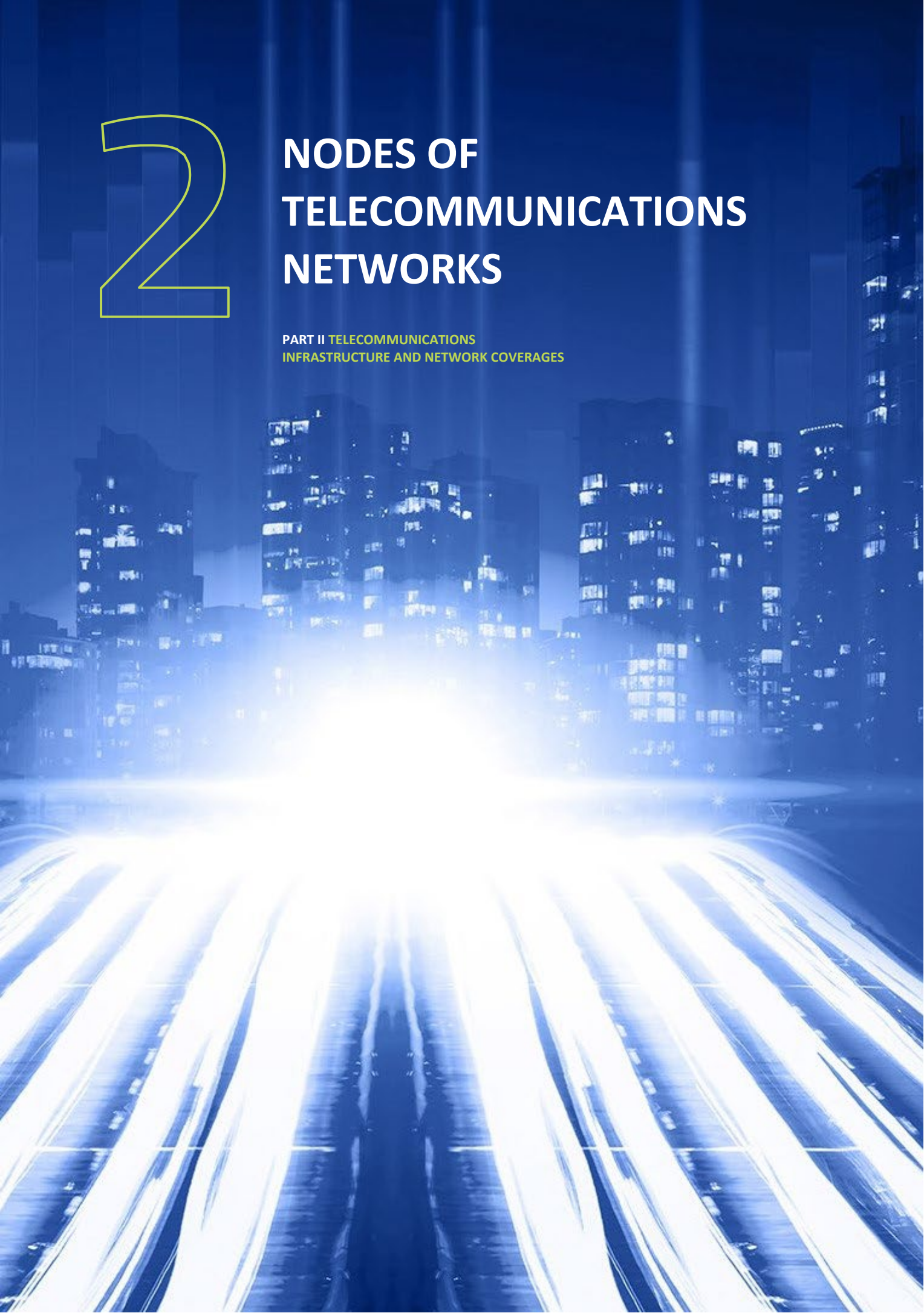
There was a marked increase in the number of data submitted this year. Growth can be observed in every category of infrastructure elements. There was a significant increase of 22.5% in the number of cable (and wireless) lines transferred, with a similar increase (25.9%) in cable connection components. The system was also fed with more data on proprietary nodes and shared (7.7%) and points of contact (7.3%).

Chart 98. **Number of infrastructure elements (in thousands) entered into SIIS between 2019 and 2021**



Source: UKE

As of 31 December 2021, 47.7 million network terminations have been declared, most of which are mobile network terminations.
This multiple exceeding the total number of buildings in Poland is due to the peculiarities of data transmission by mobile network operators, which indicate in the coverage of their networks almost all buildings in the country.



2 NODES OF TELECOMMUNICATIONS NETWORKS

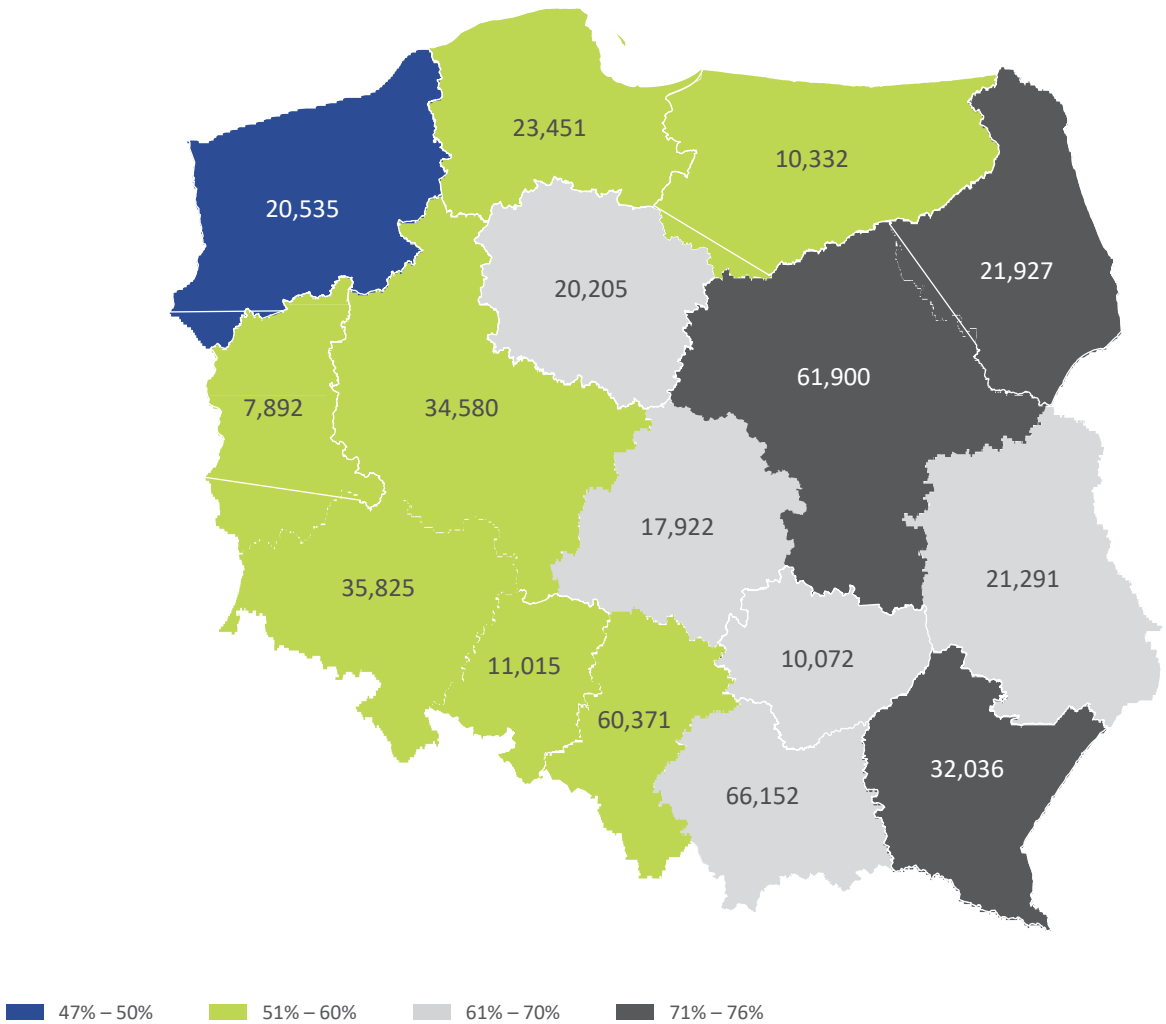
PART II TELECOMMUNICATIONS INFRASTRUCTURE AND NETWORK COVERAGES

In the 2021 inventory, entities reported a total of 455,506 proprietary nodes (excluding virtual nodes), which represents an increase of nearly 30,000 compared to the data for 2020. In the 2020 data, an increase in the number of access nodes is also observed, by more than 17,000, to 360,620.

The inventory for 2021 contains data about 288,028 fibre-optic nodes. The number of such nodes increased by 29,000 compared to 2020 and almost tripled compared to 2015 (Chart 99).

As in the previous year, the largest share of nodes with fibre-optic interfaces characterises the Podlaskie voivodeship –76% of nodes in this voivodeship have interfaces of this type. The least number of such nodes is found in the Zachodniopomorskie voivodeship (47%), although an increase has been observed regardless.

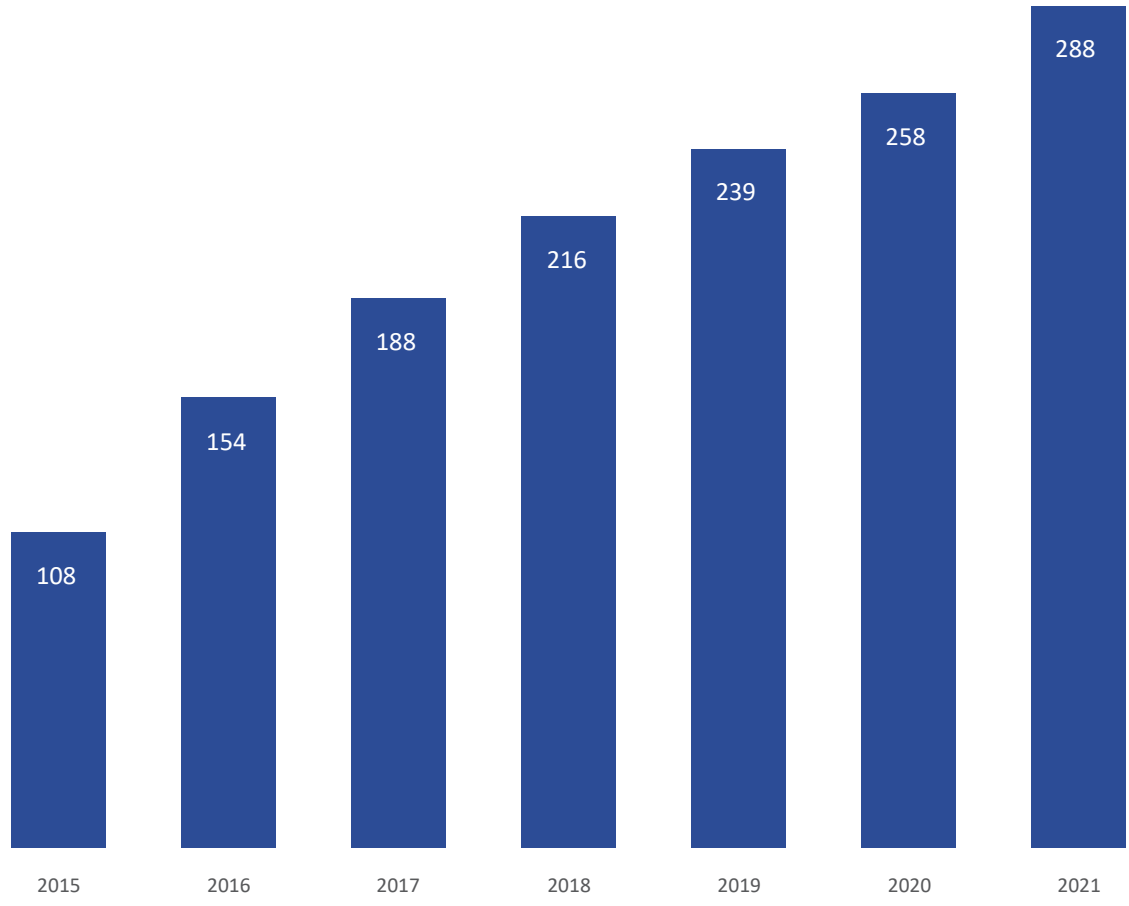
Map 2. **Number of nodes with fibre-optic interfaces in the total number of own nodes**



Source: UKE

The share of nodes equipped with fibre-optic interfaces is steadily increasing – such interfaces are already found in more than half of all nodes. The largest share of fibre-optic nodes characterises the largest towns with a population of over 100,000. On average, the least number of such nodes is found in very small localities with up to 100 inhabitants (Table 1).

Chart 99. **Number of fibre-optic nodes in each year (in thousands)**



Source: UKE

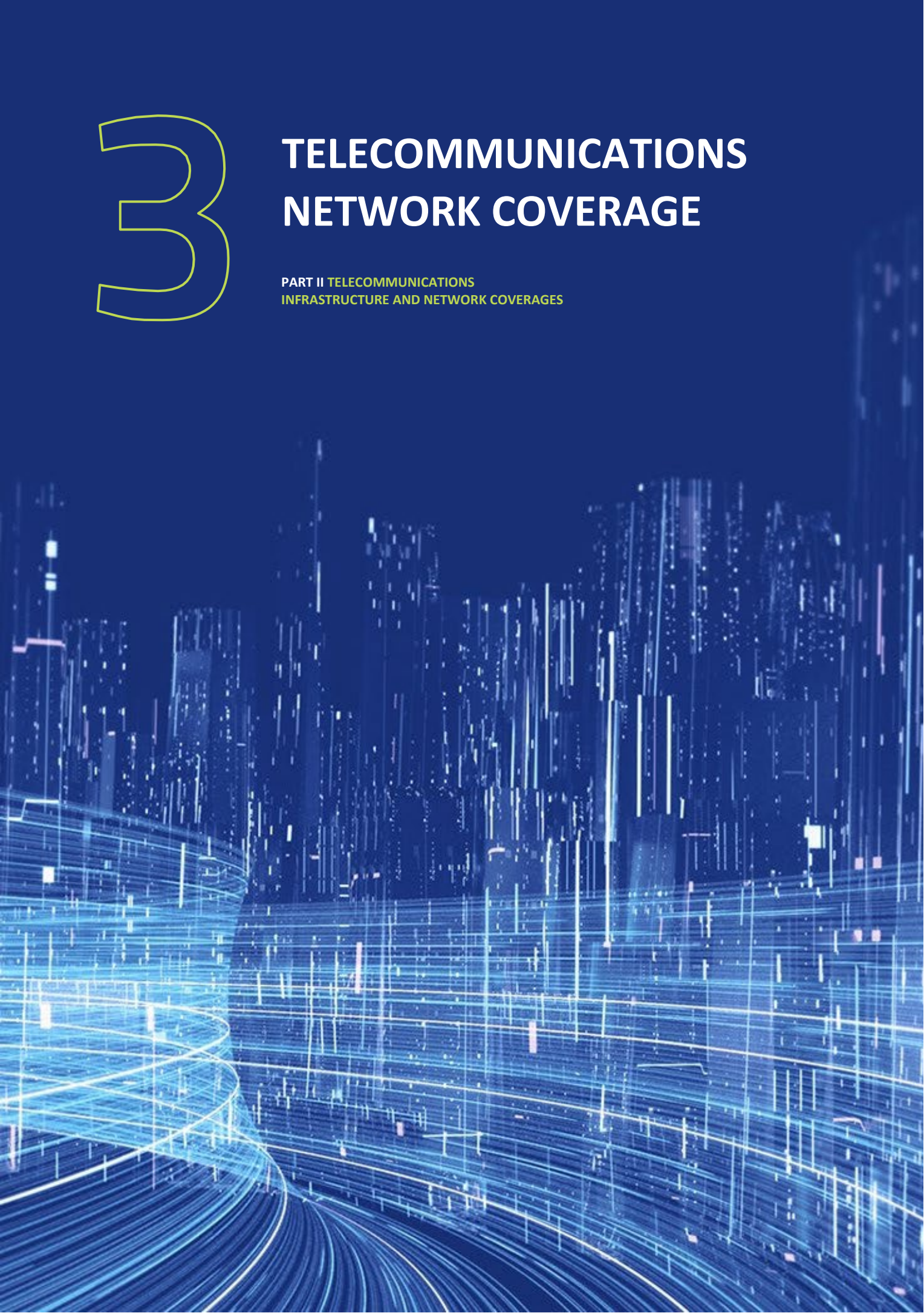
Table 1. **Number of nodes by medium in localities of different size categories**

Locality size	Number of own nodes	Number of fibre-optic nodes	Number of cable nodes	Number of radio nodes
more than 100,000	173,735	107,694	130,836	18,983
50,001–100,000	38,142	25,350	23,277	4,563
20,001–50,000	46,042	30,634	26,102	7,661
5,001–20,000	50,080	32,120	24,053	10,534
1,001–5,000	63,467	42,556	19,812	18,384
501–1,000	35,829	24,606	9,413	11,028
101–500	43,302	23,011	15,222	20,052
up to 100 inhabitants	4,907	2,056	2,167	2,929

Source: UKE

3 TELECOMMUNICATIONS NETWORK COVERAGE

PART II TELECOMMUNICATIONS
INFRASTRUCTURE AND NETWORK COVERAGES



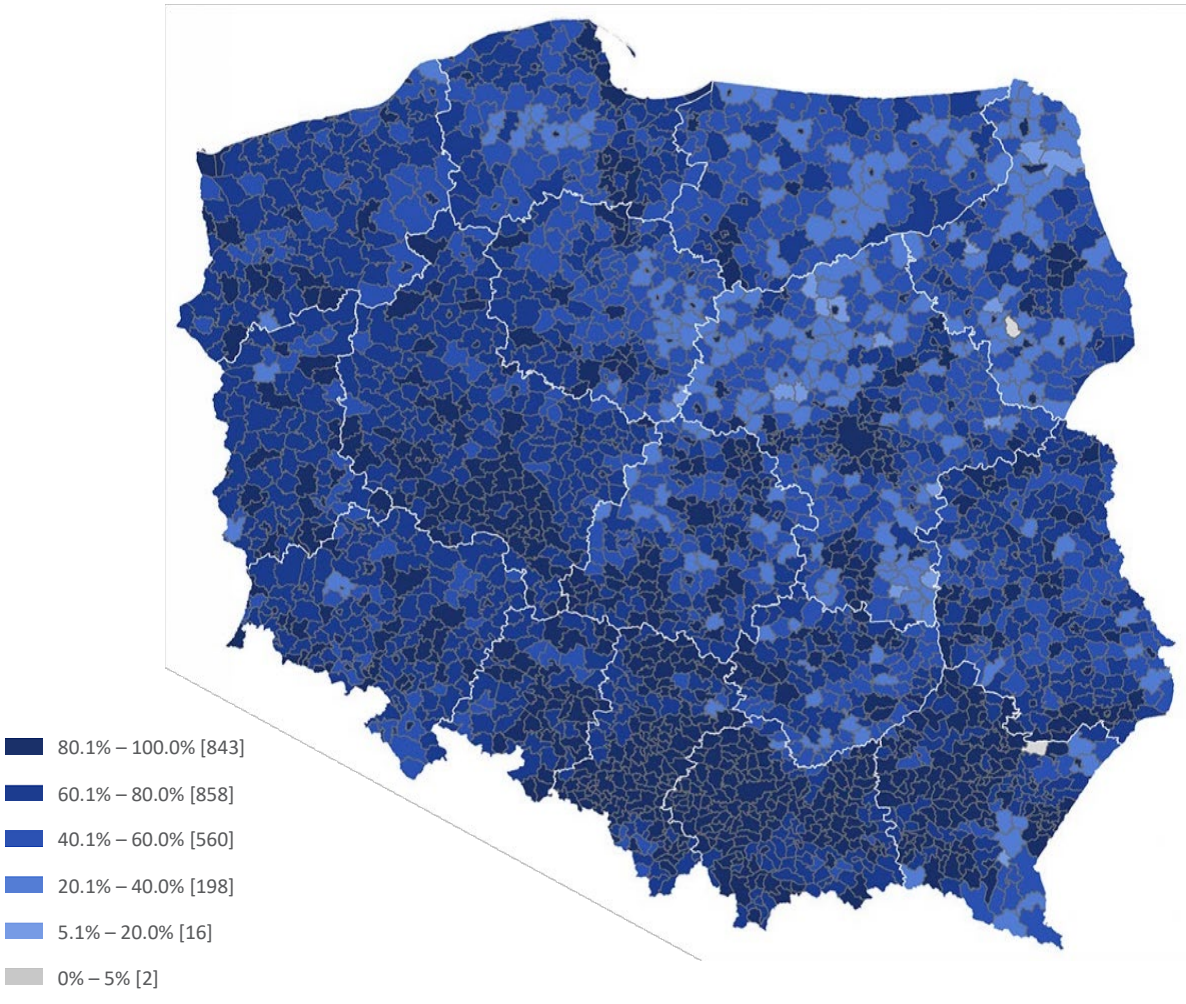
Telecommunications network coverage has been developed on the basis of an address database created in accordance with state registers: the address identification system of streets, properties, buildings and dwellings (NOBC) provided by the President of the Central Statistical Office (GUS), and the state register of borders and areas of the country's territorial divisions (PRG) maintained by the President of GUGIK.

The resulting set, consisting of about 8 million unique address points, was expanded to include about 64,000 addresses that, due to the data model in which the information is collected in the SBI system, were reported as network terminations by the reporting entities. In compiling the report, address points were equated with buildings.

3.1. BUILDING PENETRATION

The availability of public telecommunications networks is assessed by the ratio of the number of buildings within range of a network with certain parameters to the number of all buildings in the analysed area, referred to as the building penetration rate.
Buildings within the range of the network with specified parameters are considered to be buildings with the ability to provide services as declared by the operator.

Map 3. **Total building penetration with fixed-line internet coverages**



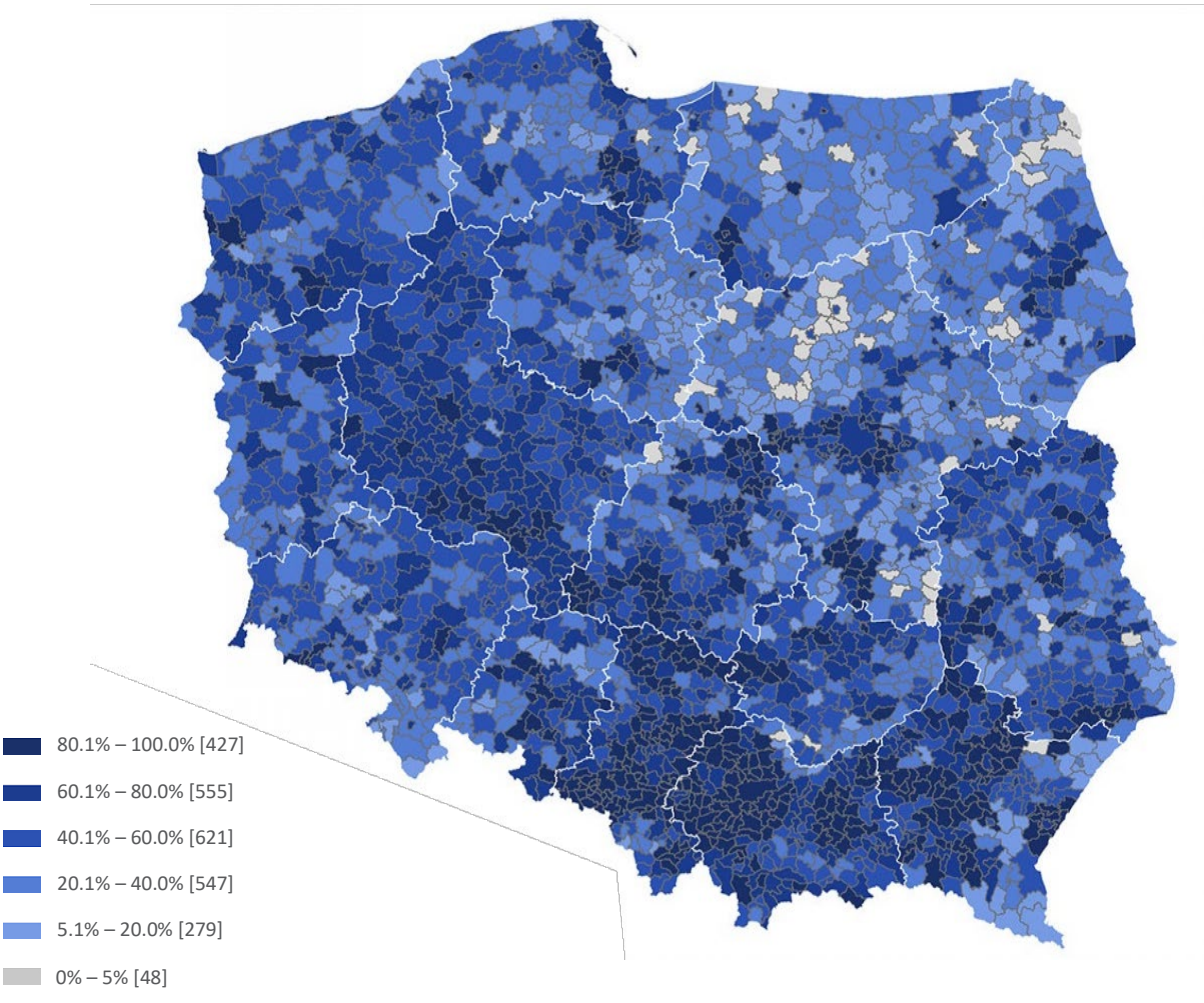
Source: UKE

The ongoing growth in the availability of 30Mbps and 100Mbps services continues. Building penetration of the higher capacity category ranges has exceeded 50%, and the lower category is approaching 60%. However, the building penetration rate for fixed-line internet decreased from 77% to 75%.

This decrease is due to a change in approach by one operator, where consumers are no longer offered the lowest speeds in xDSL technology.

Invariably, the highest penetration, reaching 100%, is achieved by municipalities located in the western and southern parts of the country and areas around large cities.

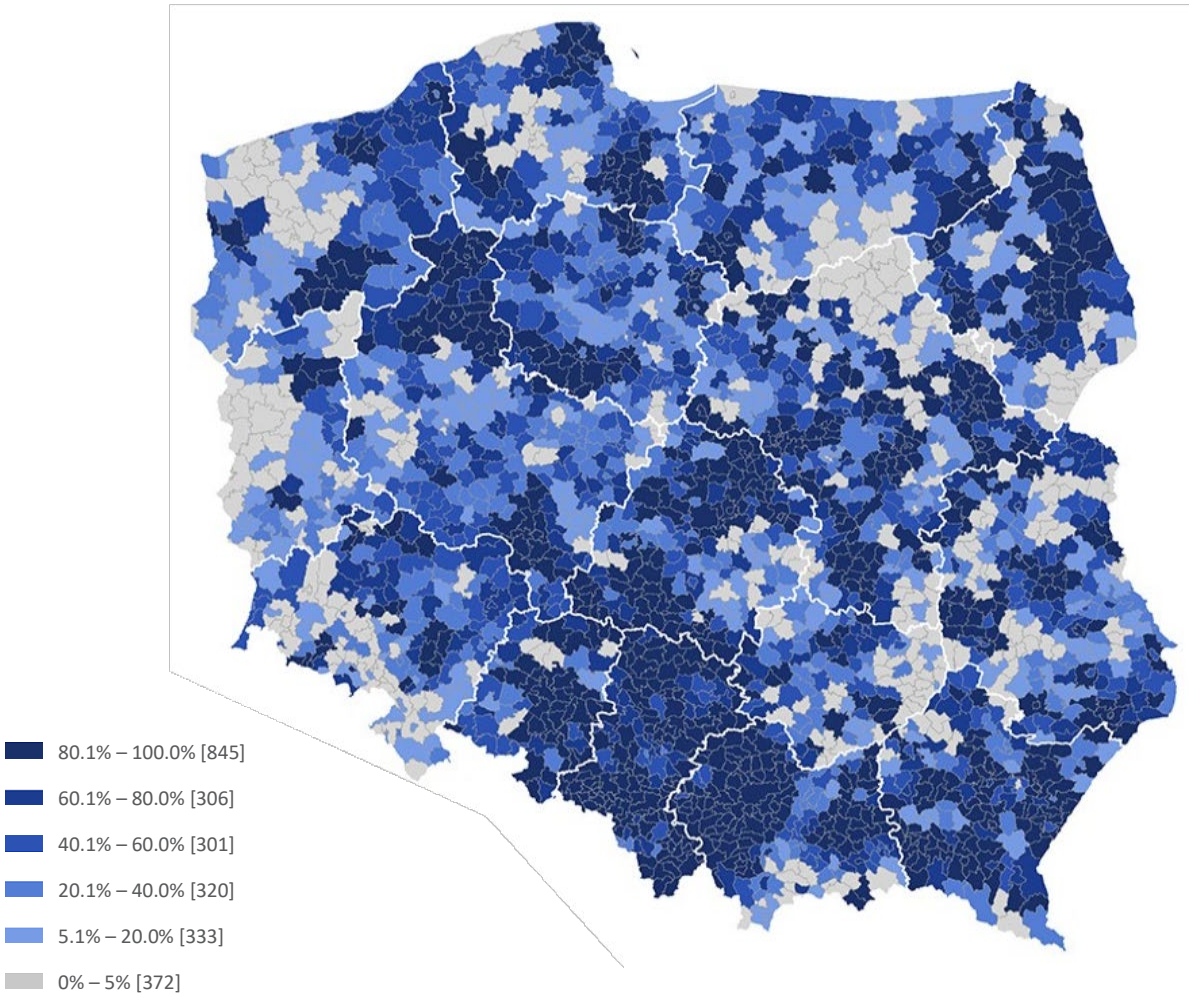
Map 4. **Building penetration with fixed-line internet coverage of at least 30 Mb/s capacity**



Source: UKE

The highest availability of 30 Mbps internet can be seen in the voivodeships of Małopolska (80%) and Śląskie (77%), the lowest, as in the previous year, in Warmińsko-Mazurskie (40%) and Podlaskie (43%). Most of the 48 municipalities with building penetration of less than 5% are located in the north-eastern part of the country.

Map 5. **Share of SMEs in the total number of reaches with at least 30 Mbps**



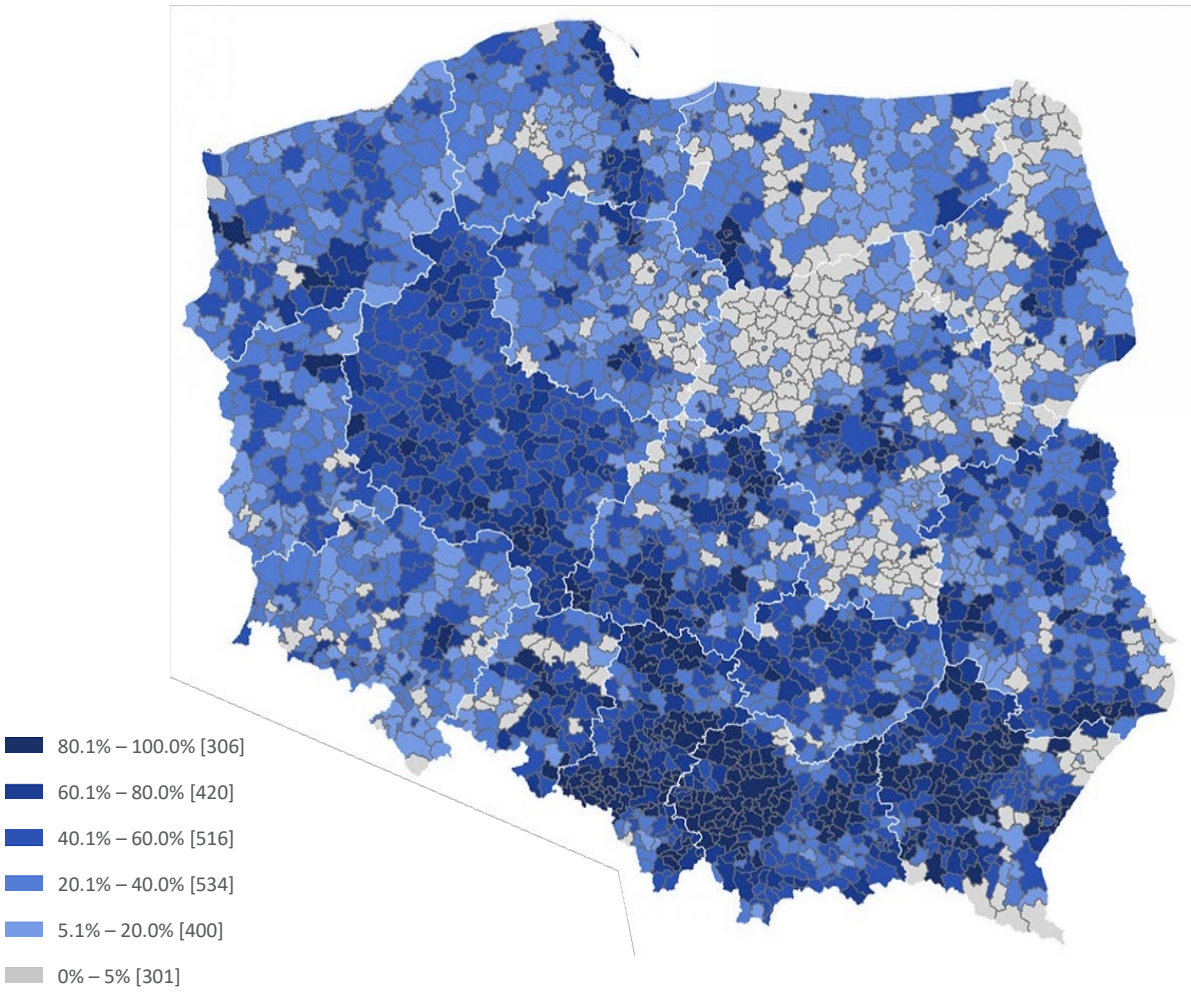
Source: UKE

The map with network coverage of small and medium-sized telecommunications entrepreneurs (SMEs) with a capacity of at least 30 Mbps has seen little change from last year's data.
An increase in the share of SME coverage is observed in building penetration in municipalities. "Map 5" shows that the share of SMEs in the total number of reaches with a capacity of min. 30 Mbps, as in the previous year, is particularly high on the so-called "eastern wall" and in southern Poland.

A relatively low share in the services provided is noticeable in the voivodeships with the largest urban centers in Poland.

The highest availability of 100 Mbps internet is seen in the voivodeships of Małopolska (74%), Silesia (71%) and also Podkarpackie (65%), and the lowest in Warmińsko-Mazurskie (31%), Kujawsko-Pomorskie (33%) and Podlaskie (34%). Large differences in the availability of service with given parameters are visible in the Mazowieckie region, where the building penetration rate for the entire voivodeship is 36%, while in its northern and southern parts clusters of municipalities with a rate of no more than 5% are visible. In municipalities centered around Warsaw, penetration approaches 100%.

Map 6. **Building penetration with fixed-line internet coverage of at least 100 Mbps capacity**



Source: UKE

3.2. LOCAL PENETRATION

One of the goals of the digital agenda for Europe (DAE) was to provide all European Union households with broadband access with speeds of at least 30 Mbps. In order to monitor and assess the degree of achieved provision, the indicator of premises penetration was used, understood as the ratio of the number of all dwellings in buildings in the range of min. 30 Mb/s capacity (a building in which operators declare themselves capable of providing specific services) and the total number of residential dwellings in the analysed area.

It should be clarified that for the purposes of monitoring progress toward DAE goals, a household is equated with a dwelling.

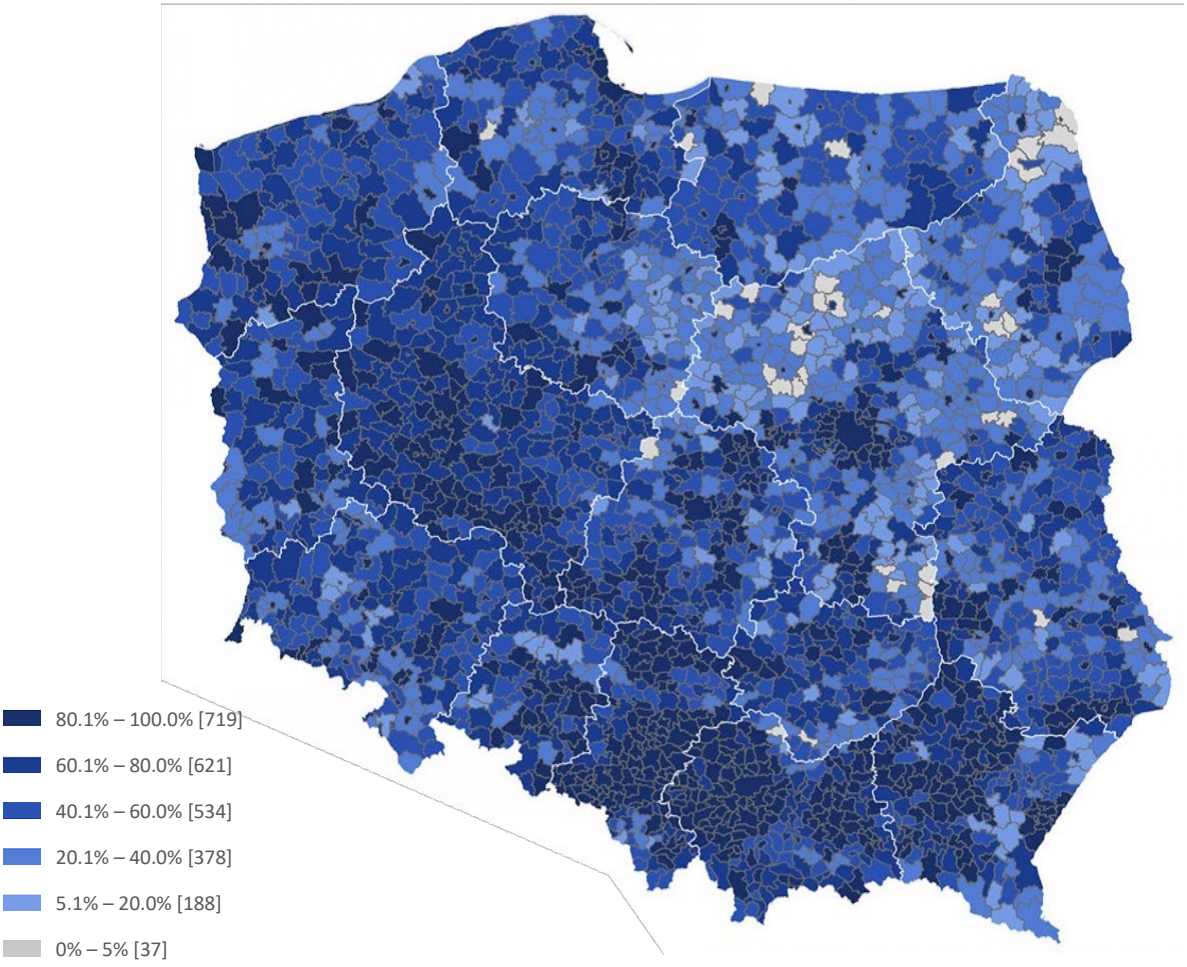
According to last year's report, among the countries of the community, only Malta and Cyprus managed to meet the DAE target.

In 2021, the three countries: Belgium, Luxembourg and the Kingdom of the Netherlands, came very close to meeting the target, their score was close to 100% (Chart 100).

In Poland, the percentage of households with broadband access of at least 30 Mbps in 2021 was. 80.1% and was 4.2 p.p. higher than in 2020. In terms of voivodeships, the highest housing penetration is in the Śląskie voivodeship (90.1%) and the lowest in the voivodship of Lublin (69.3%). The highest increase relative to the previous inventory was recorded in the Małopolskie voivodeship, at 8.4 p.p, and the lowest 0.5 p.p. in the Wielkopolskie voivodeship.

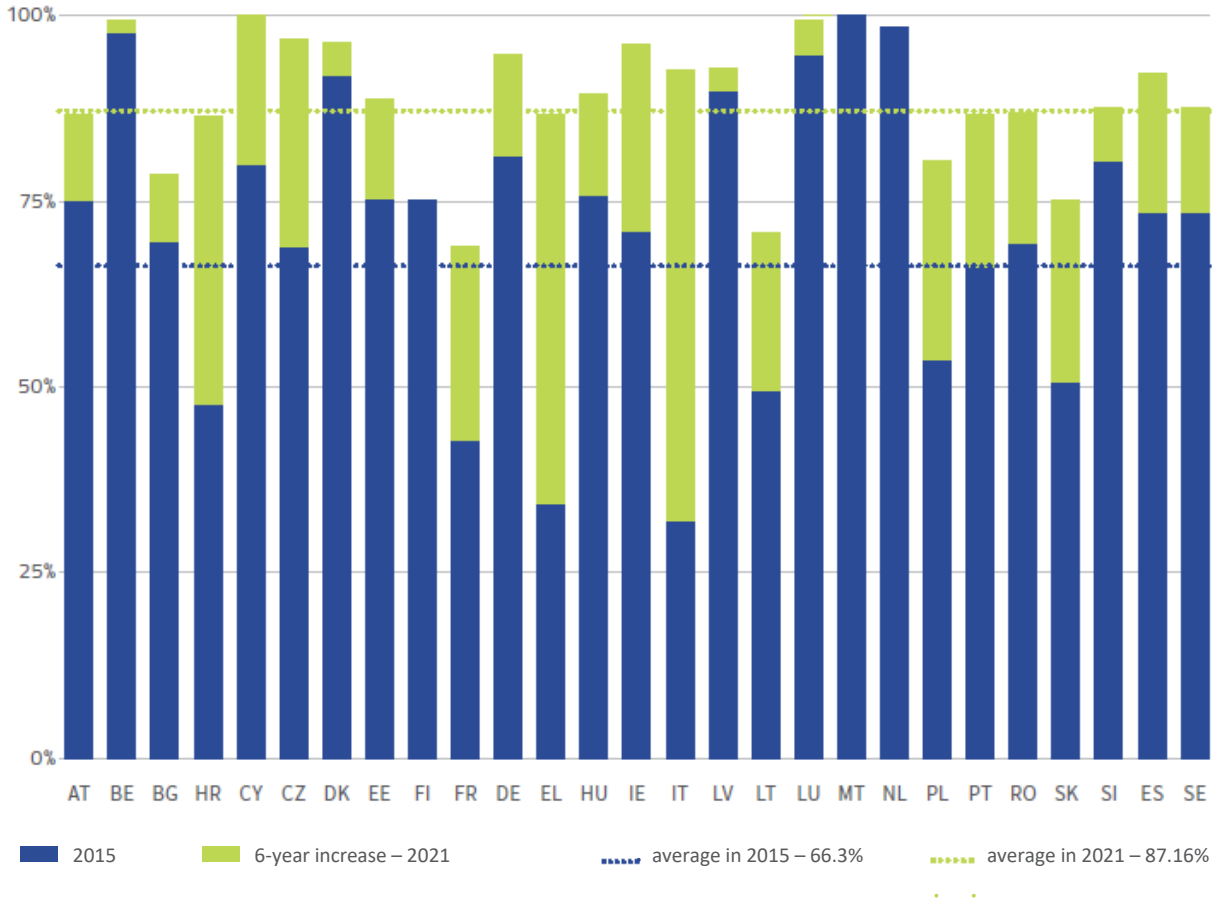
The share of households to which fixed-line internet access service with capacity of at least 30 Mbps can be provided, broken down by commune, has been shown in “Map 7.”

Map 7. **Premises penetration of fixed internet coverage of at least 30 Mbps**



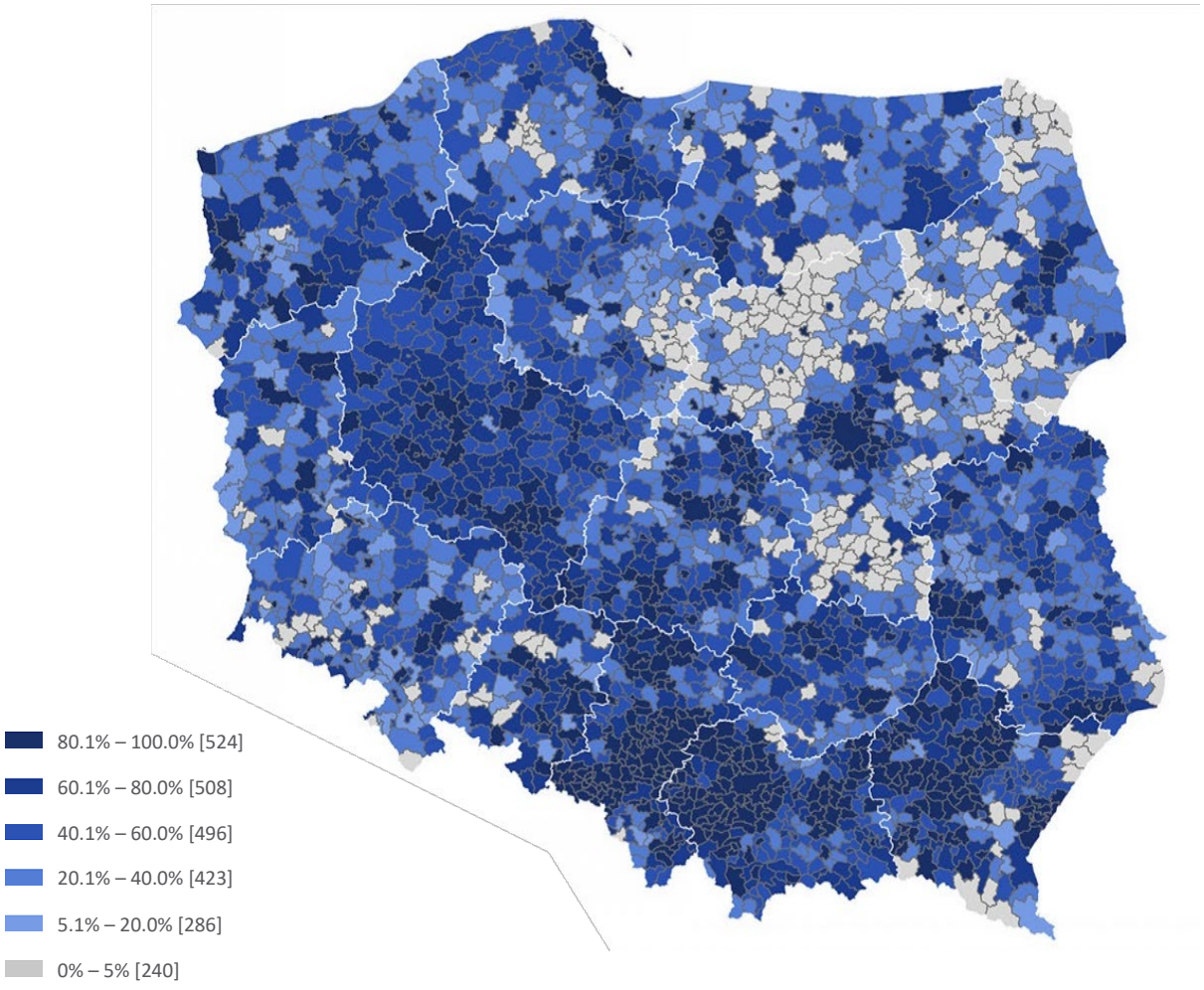
Source: UKE

Chart 100. **Percentage of households to which an internet access service with capacity of least 30 Mbps can be provided in European countries**



Source: data for Poland are derived from the inventory of infrastructure and telecommunications services carried out by the President of the UKE as of 31 December 2021; data for other countries are derived from reports of the Digital Economy and Society Index (DESI): https://digital-agenda-data.eu/charts/desi-see-the-evolution-of-two-indicators-and-compare-countries

Map 8. **Premises penetration of fixed Internet coverage of at least 100 Mbps**

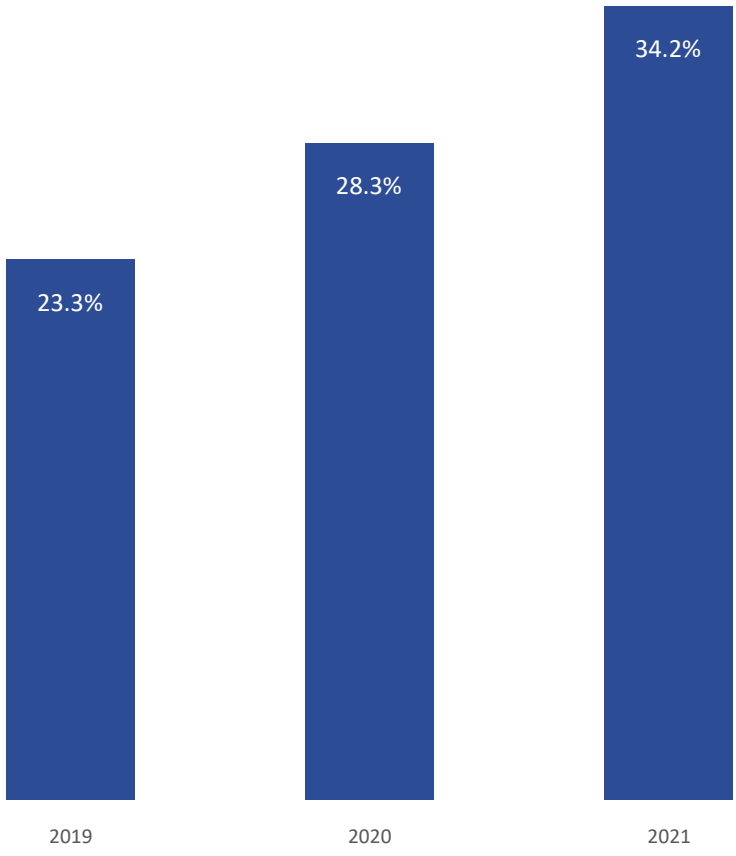


Source: UKE

The second goal of the DAE for half of all households to use internet access services with speeds of at least 100 MB/s and to continuously build demand for high speed services. Of the Community countries, Belgium, Hungary, Luxembourg, Portugal, Romania, Spain and Sweden have met this goal.

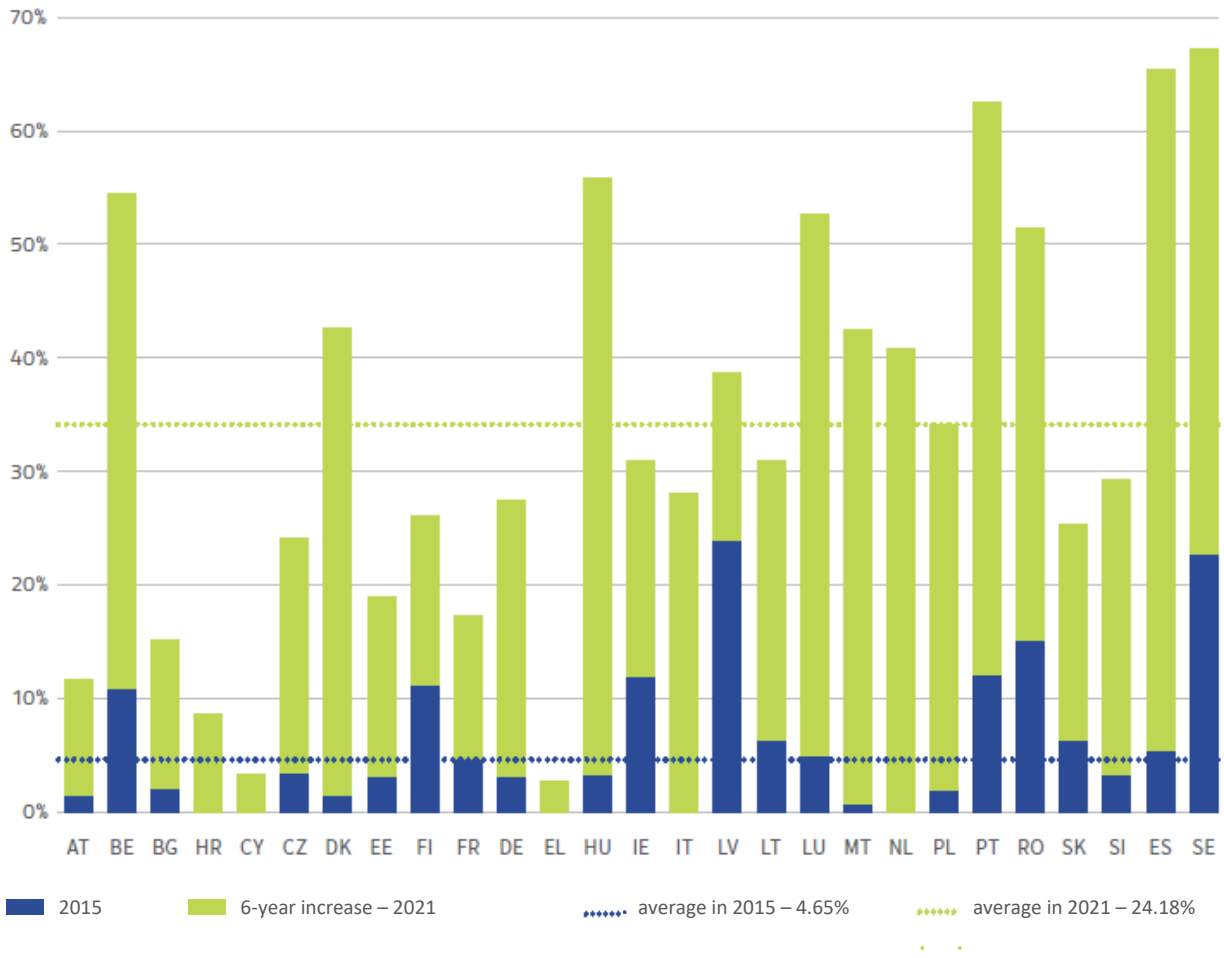
In Poland, the level of use of such services among all households increased by 5.9 p.p. compared to the previous year (Chart 101) and is close to the average for European countries (Chart 102).

Chart 101. **Share of households using internet access services of at least 100 Mbps in all households in Poland in 2019–2021**



Source: UKE

Chart 102. **Share of households using internet access services of at least 100 Mbps in all households in European countries**



Source: data for Poland are derived from the inventory of infrastructure and telecommunications services carried out by the President of the UKE as of 31 December 2021; data for other countries are derived from reports of the Digital Economy and Society Index (DESI): https://digital-agenda-data.eu/charts/desi-see-the-evolution-of-two-indicators-and-compare-countries

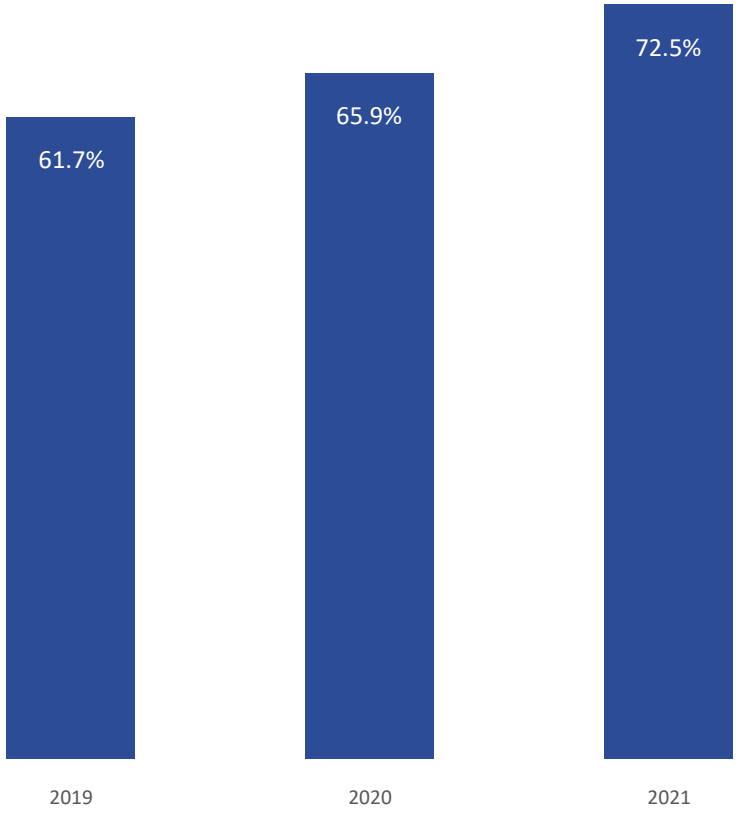
The Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions – *Connectivity for a Competitive Digital Single Market - Towards a European Gigabit Society* (COM(2016)587 final) sets out the targets for the Community in terms of broadband deployment foreseen to be met by 2025.The strategic goal for 2025 is for all households in Europe to have access to internet with a speed for the downlink of at least 100 Mbps, with the possibility of upgrading to speeds measured in gigabits.

In order to assess the achievement of this objective, households are equated with residential dwellings, similar to assessing the achievement of DEA objectives. Households having access to the Internet with a speed for the "downlink" of at least 100 Mbps, with the possibility of upgrading to speeds measured in gigabits are understood to be dwellings in those buildings that are within the reach of fibre-optic networks, copper coaxial

– with a limitation to *(EURO) DOCSIS 3.x* technology. , copper-pair – with limitation to *1 Gigabit Ethernet, 10 Gigabit Ethernet* technologies, and those residential premises where services with speeds above 100 Mbps are already provided using the radio medium.

Taking the above assumptions into account, the percentage of households covered by internet access of at least 100 Mbps capacity, with the option to upgrade to gigabit speeds, amounted at the end of 2021 to 72.5% and increased by 6.6 p.p. in relation to 2020[26] (Chart 103).

Chart 103. **Share of households covered with networks allowing internet access with "downstream" connection speed of at least 100 Mbps, with the option to upgrade to gigabit speeds in the total number of all households in Poland in 2019–2021**



Source: UKE

[26] Until 2019, when determining the degree of achieving this objective, the 100 Mbps Fast Ethernet technology for twisted pair cooper cable medium was treated as allowing the objective's assumptions to be achieved.
Since 2020, this technology is not taken into account when calculating the value of the indicator.

Monitoring the achievement of the remaining objectives stated in the above-cited communication:

- strategic objective for 2025: uninterrupted access to the 5G network for all urban areas and all major roads and railways;
- Strategic goal for 2025: gigabit internet access for all places that are major drivers of socioeconomic development, such as schools, transportation hubs and major public service sites, as well as for internet-intensive businesses;
- intermediate target for 2020: to provide 5G connectivity as a fully developed commercial service in at least one major city in each member state in connection with the roll out of 5G networks in 2018

will be possible only after the provision of Article 29 (2a) of the Act on supporting the development of telecommunications services and networks and the implementing act specifying the detailed scope and method of data transmission come into force. At the current stage, a national methodology for monitoring these objectives is being developed.

3.3. POST-OPDP NETWORK COVERAGE

The Operational Program Digital Poland (OPDP) aims to eliminate territorial disparities in access to high-speed internet. As part of OPDP's Priority Axis I, a telecommunications infrastructure is being built to achieve bandwidths of at least 30Mbps. In 2016–2020, the areas covered by European Union funding covering the entire territory of Poland were announced in a competitive mode. The beneficiaries of these areas are to connect more than 11,000 public facilities, including schools, community centres and fire stations, as well as about 2 million address points. Most of the beneficiaries have chosen fibre-optic technology for their projects.

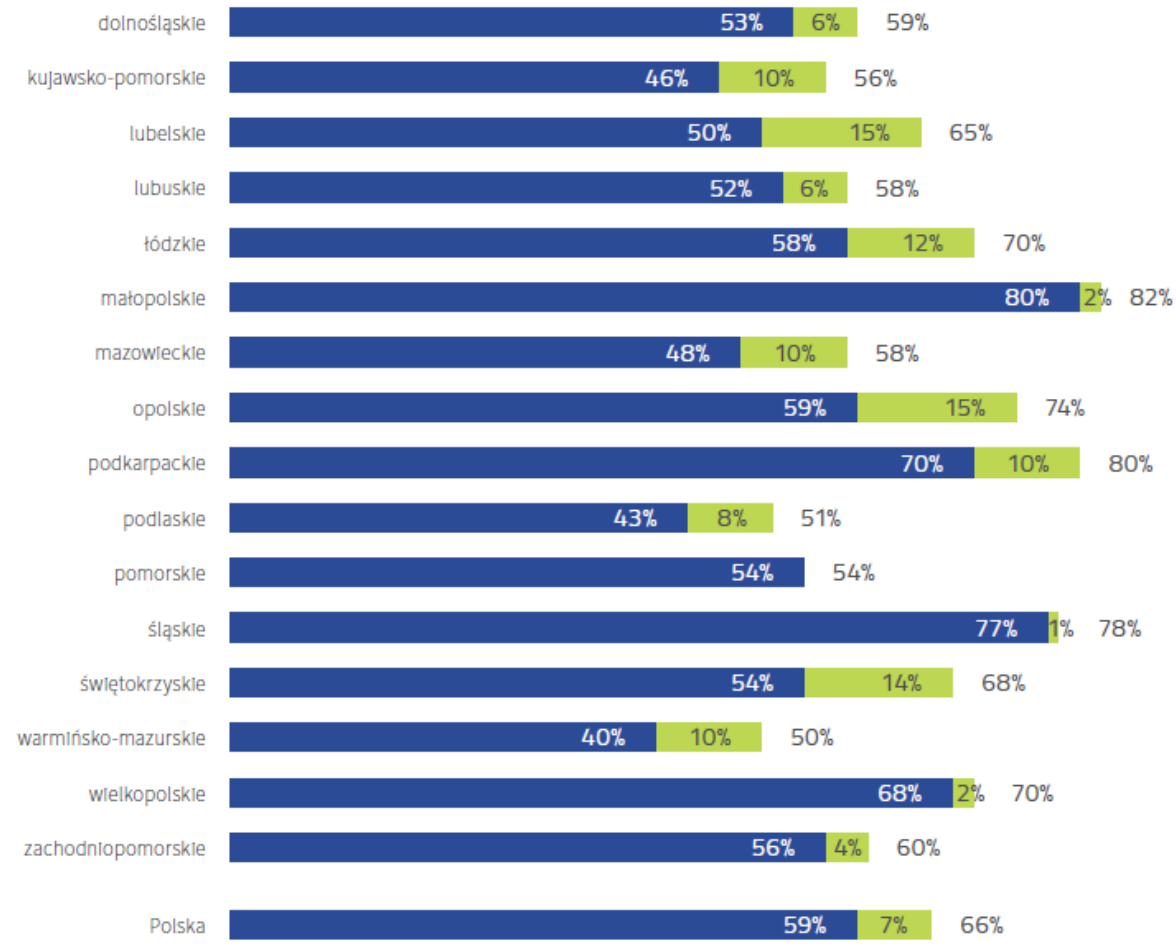
Currently, competition 1 has been completed, 2 and 3 are in the final stages of implementation, and competition 4 is in the design phase.
Completion of all areas will achieve a building penetration of 30Mbps fixed-line internet coverage of 66% (Chart 104). The 1 p.p. increase in this figure compared to 2020 is due to the fulfilment of the additional coverage obligation resulting from delays in the implementation of OPDP projects.
The delay affects nearly half of the ongoing projects.

The low gains in building penetration after OPDP investments in the Pomorskie and Śląskie voivodeships are due to the fact that there are only areas from competitions 2 and 3 that are almost completed and included in the inventory data of telecommunications infrastructure and services for 2021.

The lowest value of building penetration with a bandwidth of min. 30Mb/s despite OPDP support is characterised by the Warmińsko-Mazurskie (50%) and Podlaskie (51%) voivodeships. This is due to the fact that these areas are scattered with low-density housing and are not attractive for investment. Despite the designation of 5 areas under the 4th OPDP competition in the warrmińsko-mazurskie voivodeship, no beneficiary has applied for funding for the implementation of these areas. Similarly, in the voivodeship of Podlaskie, only 1 out of 5 areas in the 4th OPDP call is being implemented.

The highest building penetration values with a throughput of min. 30Mb/s after the implementation of OPDP competitions will be achieved by the Łódzkie, Małopolskie, Podkarpackie and Śląskie voivodeships – approximately 80%. There is a lot of competition in the telecommunications market in these voivodeships and operators have shown great interest in participating in competitive calls.
Most of the areas from these voivodeships selected for funding in competitions 2–4 are being implemented (39 out of 43) and many times 2 or more applications have been submitted for 1 area.

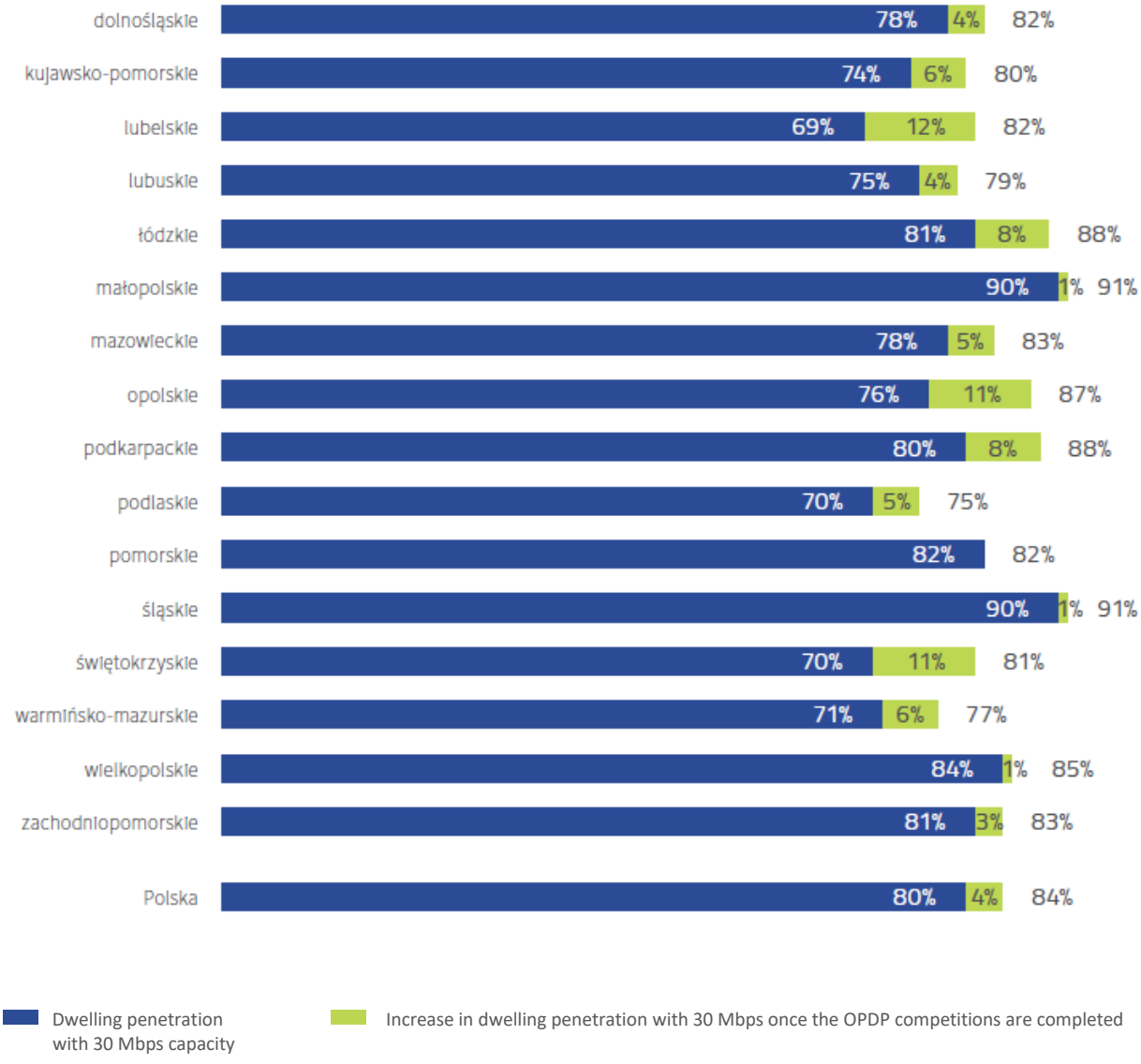
Chart 104. **Building penetration with fixed-line internet coverages with at least 30 Mbps capacity once OPDP investments are completed**



Source: UKE

Completion of areas under the OPDP will result in an increase in premises penetration with a capacity of min. 30Mbps to 84% (Chart 105). The highest value of housing penetration will be achieved in the voivodeships of Małopolskie and Śląskie – more than 90%.

Chart 105. **Dwelling penetration with fixed-line internet coverages with at least 30 Mbps capacity completed within the OPDP investments**



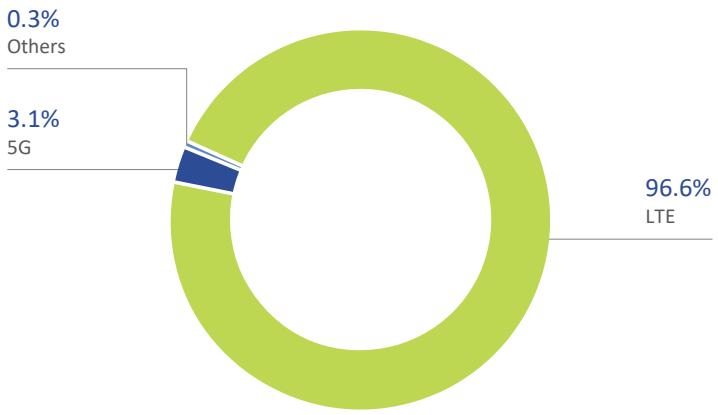
Source: UKE

3.4. MOBILE NETWORK COVERAGE

Mobile network coverage is defined as all address points located in the technological area of base stations (BTS) with access to mobile networks and services. As in the previous year, the dominant mobile technology continues to be the fourth generation, i.e. LTE with a share 0.4% higher than last year, i.e. 96.6% (Chart 106).

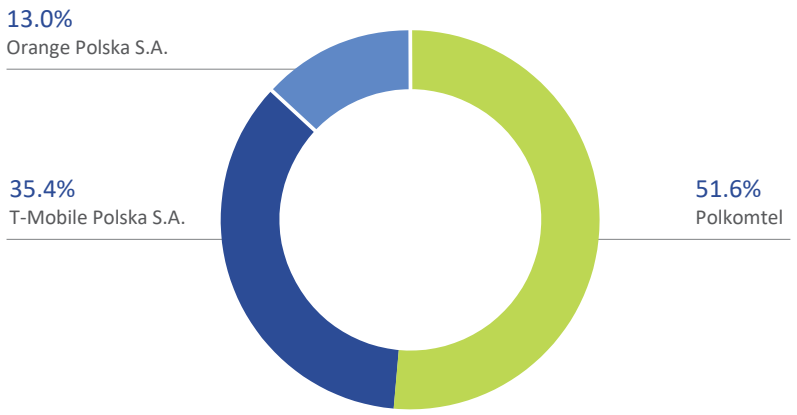
In the 2021 report, 5G infrastructure began to be reported, along with Polkomtel Sp. z o.o. and Orange Polska S.A., by T-Mobile Polska S.A (Chart 107). The fifth-generation network's share of total mobile internet coverage reported for 2021 was 3.1%.

Chart 106. **Share of individual technologies in mobile internet coverages**



Source: UKE

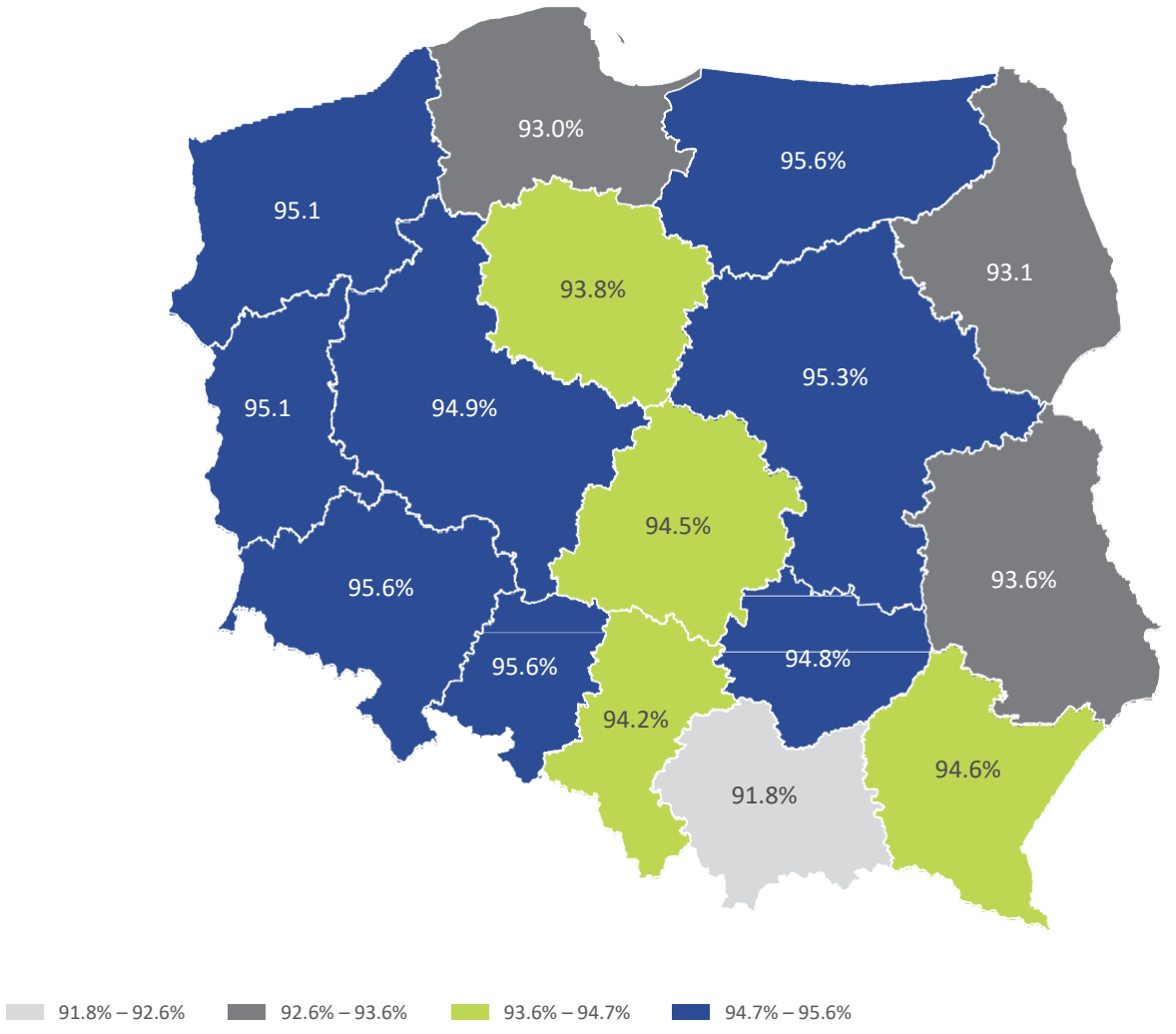
Chart 107. **Percentage of 5G network coverages reported by telecommunications operators**



Source: UKE

Building LTE mobile network coverage in Poland has all the time remained at a high, stable level exceeding 90% in all voivodeships across the country. The highest level of LTE mobile network availability is located in the dolnośląskie, opolskie and warmińsko-mazurskie voivodeships (95.6%).

Map 9. **Percentage buildings covered by LTE**



Source: UKE

The list of localities deprived of internet access includes a list only of those with at least one inhabited dwelling, which makes it possible to exclude uninhabited localities, the inclusion of which in the following list could give an inaccurate picture of the lack of accessibility and thus digital exclusion in a larger number of localities in Poland.

Based on inventory data showing the status as of 31 December 2021, the number of standalone localities without LTE network access amounts to 11, 5 of which are completely deprived of access to mobile or fixed line. There are 24 residential buildings located in these localities. The downward trend in the number of localities with severely limited or no access to internet services continues all the time, reflected in a decline of nearly 27%, from 15 localities in 2020 to 11 last year. The list of inhabited localities deprived of LTE internet access is shown in Table no. 2, which additionally indicates localities completely deprived of internet access.

Table 2. **List of inhabited localities having no internet access via LTE, with designation of localities having no internet access whatsoever**

	Name of independent locality	SIMC code	Type of locality	Internet access total
1.	Bielice	0855546	village	
2	Brzegi Górne	0356122	village	
3	Dubne	0454787	village	
4	Huta Polańska	0355520	village	
5	Kronowo	0767612	settlement	none
6	Niwki	0603017	settlement	
7	Orzeszków	1003012	settlement	none
8	Piaskowice	0851459	village	none
9	Roztoka	0418455	tourist refuge	
10	Tarnawa Niżna	0356317	village	none
11	Trępnowy	0153672	settlement	none

Source: UKE

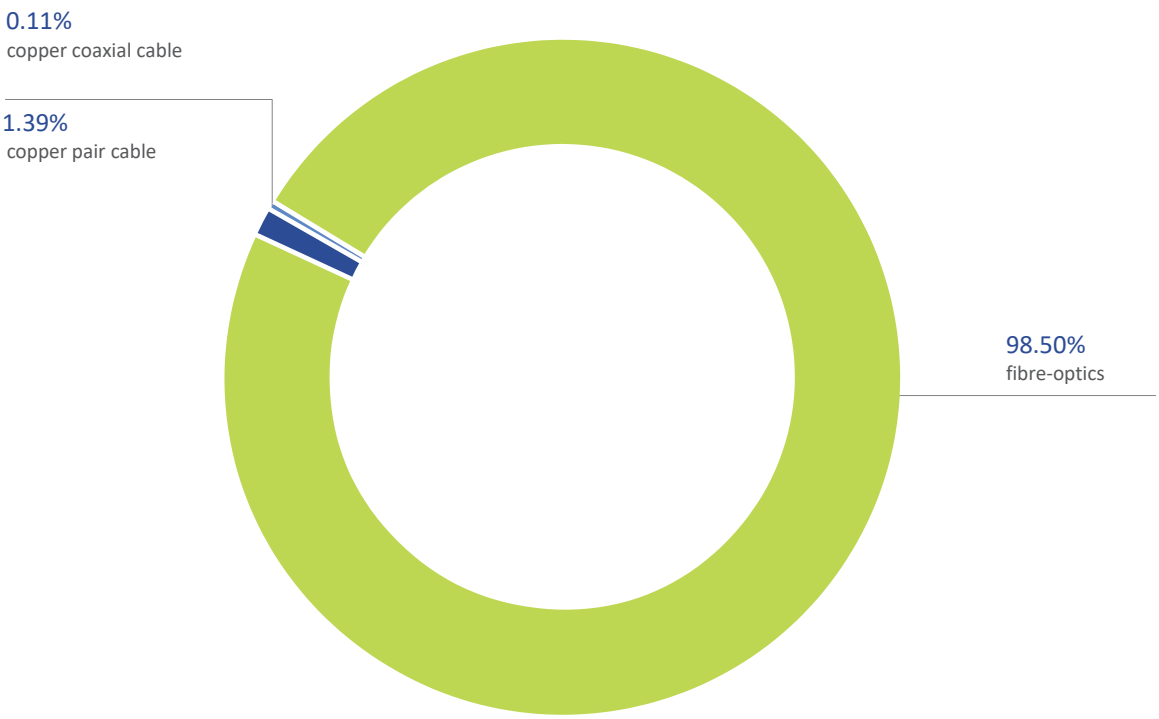
4 WIRED INFRASTRUCTURE

PART II TELECOMMUNICATIONS
INFRASTRUCTURE AND NETWORK COVERAGES

While the data acquired as part of the annual inventory of telecommunications infrastructure and services does not reflect the actual routing of telecommunications networks, but only the relationships of line infrastructure (the beginning and end of lines), one of the attributes of the cable line records is information on the length of the line network. On this basis, it can be concluded that the length of the relational own runs of wire lines, estimated based on the information submitted to SIIS, amounted to 427 thousand km as of 31 December 2021. In addition, data was provided on 41 thousand km of line infrastructure made available to those reporting entities.

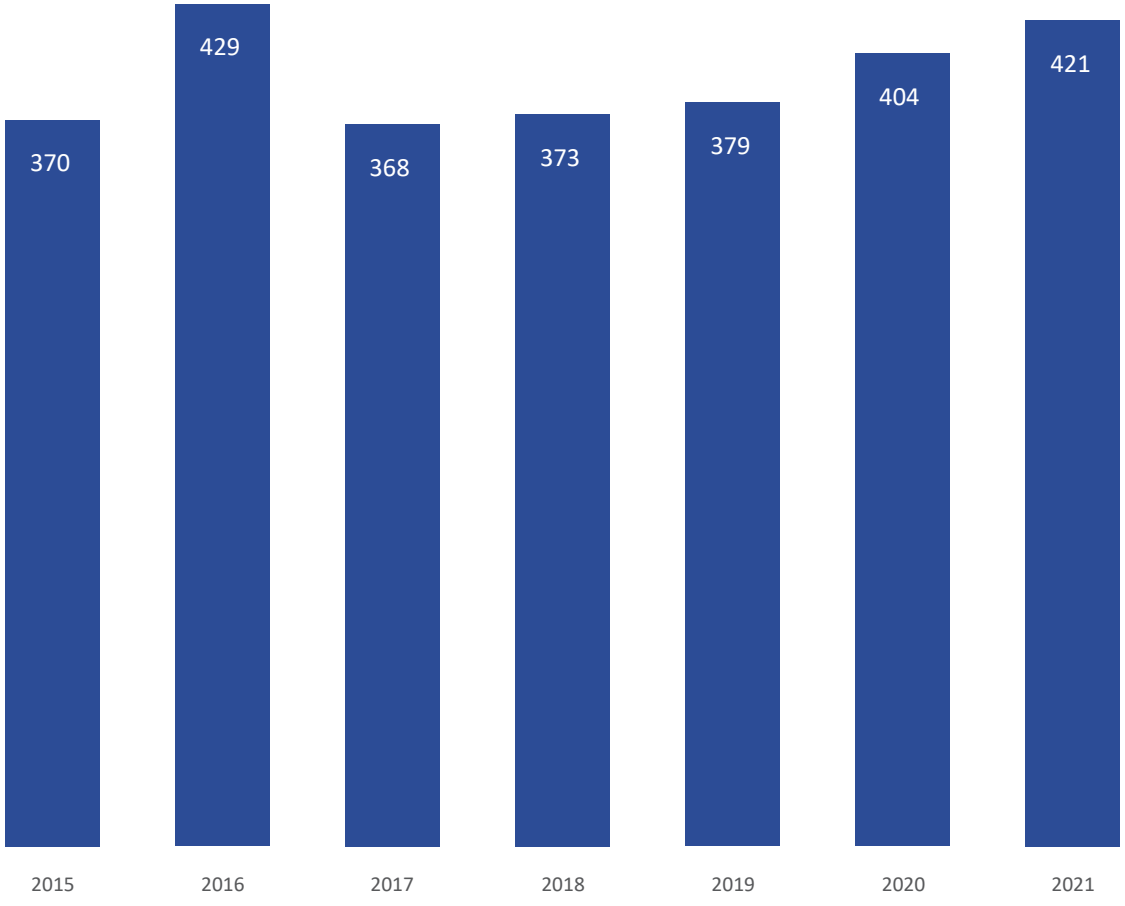
Chart 108 shows the share of individual media in line infrastructure for own infrastructure. Line infrastructure is dominated mostly by fibre-optic infrastructure (98.5% of all lines), whose estimated length at the end of 2021 was 421 thousand km. Chart 109 shows the change of the total length of fibre-optic networks submitted to SBI each year.

Chart 108. **Share of different media in own line infrastructure**



Source: UKE

Chart 109. **Length of own infrastructure lines in km in 2015–2021**[27]



Source: UKE

Map 10 shows verified routes between fibre-optic lines in Poland (straight-line connections between network nodes). A notable density of lines is obviously associated with the most urbanised areas (Upper Silesia, Tricity, Warsaw, Poznań, Wrocław) as well as main communication routes that link the largest agglomerations in the country.

[27] An increase in the length of fibre-optic network in 2016, followed by a decrease in 2017, is the result of an erroneous submission of data by certain entities, as also explained in the report on the state of the telecommunications market in 2017. For example, in 2017, just one entity noted a drop by over 72,000 km, from 76,724 km to 4,513 km. The subsequent decrease in the length of the fibre-optic network and the persistence of values at similar levels is due to more accurate data submission to SIIS by stakeholders.

Map 10. **Relations of own fibre-optic networks in Poland**

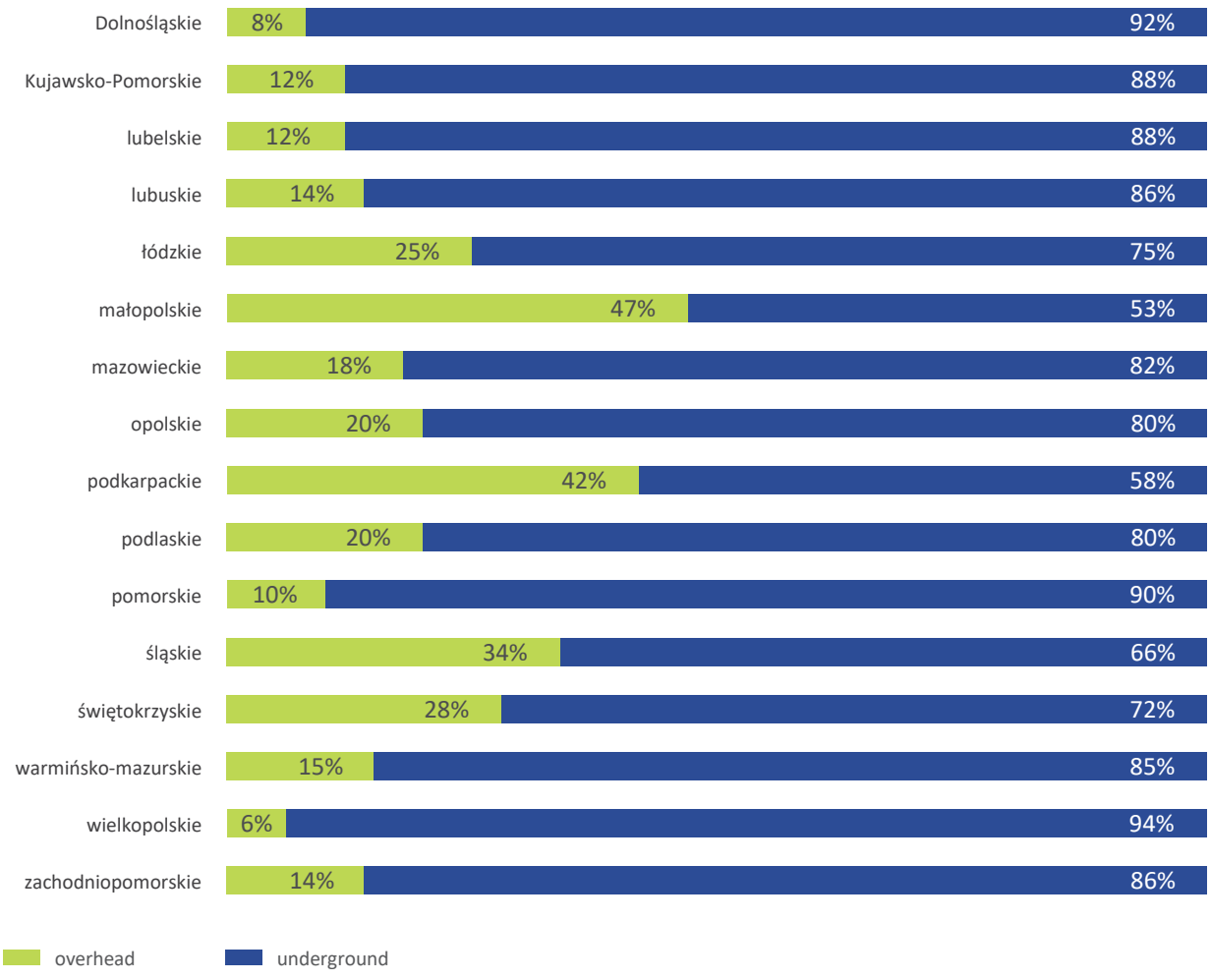
Source: UKE

Chart 110 shows the share of own wire networks in the underground and overhead course. The length of the diagrams varied with the density of linear infrastructure in each voivodeship. It should be noted here that because of the model of data used to collect information about line infrastructure (line relations instead of actual courses), information about the share of each route type and network density are approximations only.

The share of individual types of routes in own wired lines differs from voivodeship to voivodeship.

The share of overhead routes ranges from about 6% in the Wielkopolskie voivodeship to about 47% in the Małopolskie voivodeships.
The difference in individual types of routes result from terrain configuration in a particular region, and the possibility of cable suspension and the availability of process ducts. A spatial relationship can also be seen in the graph (Chart 110). Regions located in southern Poland are characterised by a higher share of overhead lines, while in lowland areas (Wielkopolskie and Dolnośląskie voivodeships) underground infrastructure predominates. Analysing the data year-on-year, a decrease in the share of overhead lines can be observed in all voivodeships.

Chart 110. **Share of routes: underground and overhead routes for wired own networks by voivodeship**

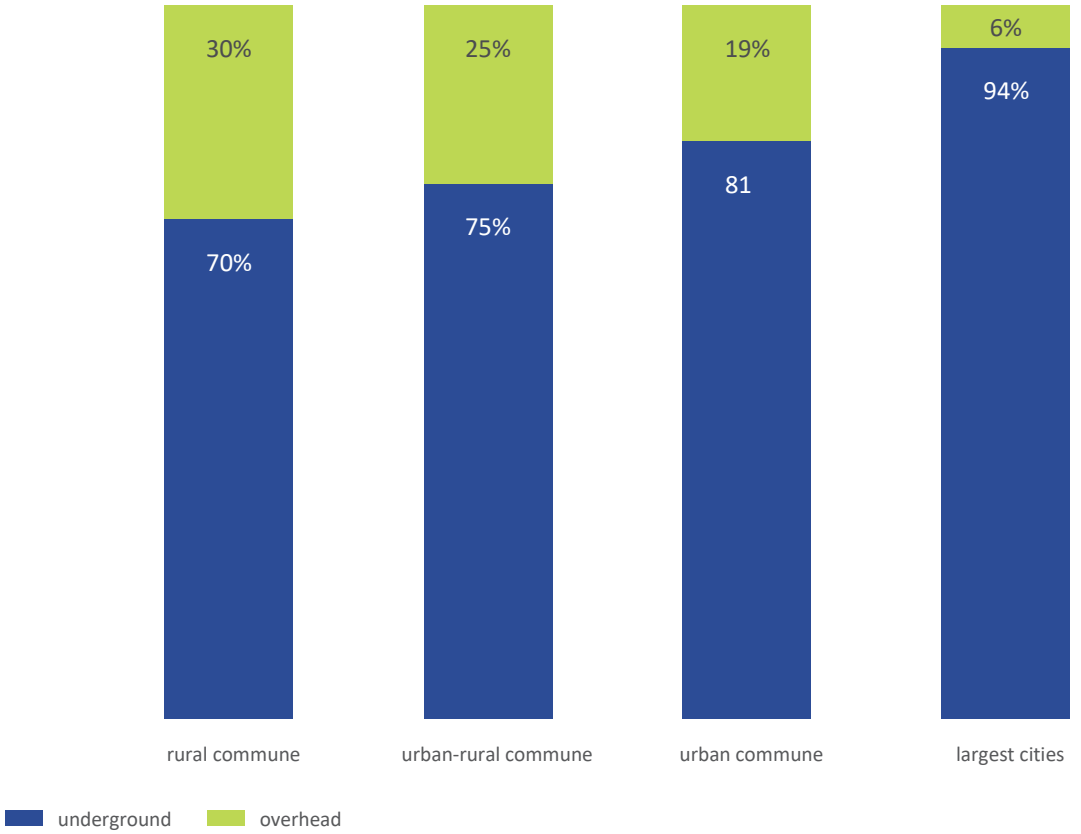


Source: UKE

The share of individual types of routes for own lines is slightly different due to the type of commune through which the approximate course of the line passes. The data presented in the chart (Chart 111) shows that overhead networks have a share ranging from 30% for rural municipalities to 19% for urban municipalities excluding the largest cities. In the twenty largest cities, the share of overhead route networks is lower, with about 6% of the total length of own networks running overhead.

In terms of average density of linear infrastructure, the Śląskie voivodeship dominates, with about 3.8 km/km$_2$, and the Małopolskie voivodeship, with about 2.3 km/km2. The lowest density of line infrastructure is in the Warmińsko-Mazurskie voivodeship, where there are about 0.6 km of wire lines per 1 km$_2$ of area. The average density of wired networks in Poland in 2021, as in the previous year, was 1.3 km/km$_2$.

Chart 111. **Network routes for own wired networks in different types of areas**



Source: UKE

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