Office of Electronic Communications | UKE

Report on the state of the telecommunications market in Poland in 2018

Warsaw, June 2019

CONTENTS

INTRODUCTION

We are pleased to provide you with the Report on the telecommunications market in 2018. Like last year, the publication covers two issues. The first concerns the market itself, the second concerns the telecommunications infrastructure.

It is worth noting the changes in the annual reporting of telecommunications undertakings that entered into force on 12 December 2018. In the light of the new regulations, each telecommunications entrepreneur was obliged to submit reports on telecommunications activities using a dedicated Electronic Services Platform. The conclusions presented to you in the report have been prepared on the basis of current data as of 31 December 2018.

Last year was a huge challenge for the Polish telecommunications market. In terms of business, there was a growing convergence and even stronger competition, both cross-sectoral and global. The expectations and needs of our clients also increased.
Jerzy Straszewski, President of PIKE

In 2018, the value of the telecommunications market amounted to PLN 39.2 billion. This is a slight decrease in relation to 2017 (by PLN 0.3 billion). The value of expenditure on telecommunications investments amounted to PLN 7.9 billion.

Penetration of households with broadband internet services was at the level of 105%, which meant a slight increase compared to 2017. The very value of the internet access services market has increased, compared to 2017, by around 15% (PLN 5.4 billion). Invariably for several years, there has been an upward trend for the number of lines with the highest capacities – the share of lines equal to or above 100 Mb/s reaches about 43%.

A large increase in the number of entities providing mobile telephony services (85 telecommunications undertakings) results from the appearance of companies on the market that have an agreement with a mobile operator (MNO) and resell services to other small operators.

In 2018, there was also a decline in revenues from mobile telephony services. Total revenues of operators amounted to PLN 13.8 billion and were by 8% lower than a year earlier. Despite the decline in the value of this segment of the market, it still constituted a very important area of telecommunications activities. This market generated over 35% of revenues in the entire telecommunications market in Poland.

In this segment, the number of active SIM cards is systematically falling. In 2018, a total of 51.6 million of them was recorded, i.e. 3% less than in 2017. The penetration of mobile telephony services also dropped, reaching 134%. However, the trend of increasing the number of M2M cards has been maintained. Last year, 3.3 million M2M cards were used, an increase by 15%, compared to 2017.

As a consequence of the Roam Like at Home principle introduced in 2017, there was a 32% increase in the duration of voice calls made by Poles staying abroad.

In the area of bundled services, a further upward trend can be observed. The number of users in comparison with 2017 increased by 35%. The value of the bundled services market alone amounted to PLN 7.38 billion. Users have opened up to the market of this type of services and started to use the available packages more fully.

However, the value of the market and the number of users of fixed-line telephony are decreasing year by year. In 2018, revenues of operators fell below PLN 2 billion, and the number of subscribers amounted to approx. 4.1 million. Moreover, the costs of using fixed-line telephony services are lower, and the prices of the services in Poland are among the lowest in the European Union countries.

The number of VoIP telephony users was 2.49 million last year. This is a record result, taking into account the past 4 years. Thus, the volume of traffic of this service increased by 28%.

Despite these challenges facing the industry, we believe that regulatory policy will be conducted according to clearly defined, long-term goals and adequate measures used to implement them. To make it happen, constant dialogue and continuation of cooperation between the market and the regulator are necessary, as well as predictability and transparency of new regulations, favouring the development of gigabit infrastructure, which is the foundation of the innovative economy in Poland.
Jerzy Straszewski, President of PIKE

The second part of the Report presents information on country coverage with telecommunications infrastructure providing broadband internet access. The section presents the state of the infrastructure based on data collected on 31 December 2018.

We would also like to remind you that in connection with the 2016 amendment to the Act on supporting the development of services and telecommunications networks that establishes a catalogue of information that is not subject to reservation due to business secrets (Article 29 (6b)), most of the data provided during the inventory is public, therefore, as in the previous year, detailed data does not constitute attachments to the report, but is available in the form of API on the Open Data portal: https://dane.gov. pl/dataset/588 and in the form of a search engine on the UKE website: https://wyszukiwarka.uke.gov.pl/.

One of the indicators for the development of telecommunications infrastructure is the increase in the number of telecommunications network nodes installed, the number of which increased by over 30,000 in 2018 compared to 2017.

Nowadays, the development of telecommunications networks is mainly achieved by increasing the share of the fibre length. In 2018, the share of this medium was over 90%. Compared to the previous inventory for 2017, there are approx. 28,000 fibre nodes more in Poland, which means an increase by 13% and with an increase in the number of fibre nodes by 5,000 km the length of fibre nodes has increased in Poland.

The increase in investments in fibre networks, including in poorly urbanized areas was an important trend in 2018. It was possible thanks to the use of EU funds and thanks to the entrepreneurs' own investments. In 2018, the implementation of the OSE project (Ogólnopolska Sieć Edukacyjna – Nationwide Educational Network), very important from the point of view of social goals, began. This trend will contribute to the dynamic development of services, and thus the entire market. The development of fibre infrastructure is extremely important for the Polish economy and contributes to its digital transformation, and operators have a significant share in that.
Andrzej Dulka, President of PIIT

The report also presents the analysis of the share of overhead and underground routes in the existing networks. The underground route prevails strongly, while the networks using the overhead route assume, depending on the region, the value from 5 to 35 percent. There is a regional pattern here – voivodships located in the south of Poland are characterized by a higher share of the overhead network, which results from natural conditions.

The use of the existing pole foundation is extremely important for the development of the network: Hopes for infrastructure development were in 2018 also associated with conducted analyses regarding the use by telecommunications operators of the pole foundation belonging to national grid operators. There is a high demand for the use of pole foundation on the telecommunications market and access to poles has a direct impact on both the development of telecommunications networks and the information society as well as the prices of telecommunications services.
Jarosław Tworóg, President of KIGEiT

The report shows the possibility of accessing fixed-line internet with the minimum speed of 30 Mb/s for approx. 43.1% of buildings. Access to the services of the highest speeds, at least 100 Mb/s, is currently provided for people residing in every fourth residential building in Poland – in 2017, 10% of buildings had such access.

Poland has also come closer to achieving the objectives of the European Digital Agenda (EDA). In order to assess the degree of implementation of the goal of providing internet access with the capacity of at least 30 Mb/s until the end of 2020, a household penetration rate was used, understood as the ratio of the number of residential apartments in buildings within the coverage of a network providing at least 30 Mb/s to the total number of residential apartments. Average penetration of residential apartments with fixed-line internet coverage of at least 30 Mb/s is 71.7%, and it has increased by almost 5 pp. in comparison to the previous year.

Another objective of EDA is to achieve the use of internet access services with the capacity of at least 100 Mb/s by 50% of households by the end of 2020; at the end of 2018 the level was 19.3%, which was an increase by 6.5 pp.

Achieving the goals of the Digital Agenda seems possible with the greatest possible cooperation between companies, but also with the clear support from the government for creating conditions for network development.
Jarosław Tworóg, President of KIGEiT

The investments already initiated under the Operational Programme Digital Poland are of great importance in achieving these goals. Implementation of investments related to measure 1.1 of the OPDP should cause, according to the information provided in the applications of the beneficiaries, increase in the penetration of apartments with fixed-line internet coverage of at least 30 Mb/s – up to almost 82%.

2018 also brought significant progress in the implementation of the OPDP. A large part of the projects from the first call were completed, the beneficiaries of which were small operators (2016). Projects launched under the second call (2017) reached the stage of full implementation, and the third call for proposals was also completed.
Karol Skupień, President of KIKE

1. INTERNET ACCESS

1.1. GENERAL INFORMATION

At the end of 2018, the penetration of broadband internet services[1] in Poland per household amounted to 105%. This is an increase compared to the first half of 2017, by 2 p.p. The penetration, compared to the number of inhabitants, increased by 2017 by 0.8 pp. and amounted to 38.5%.

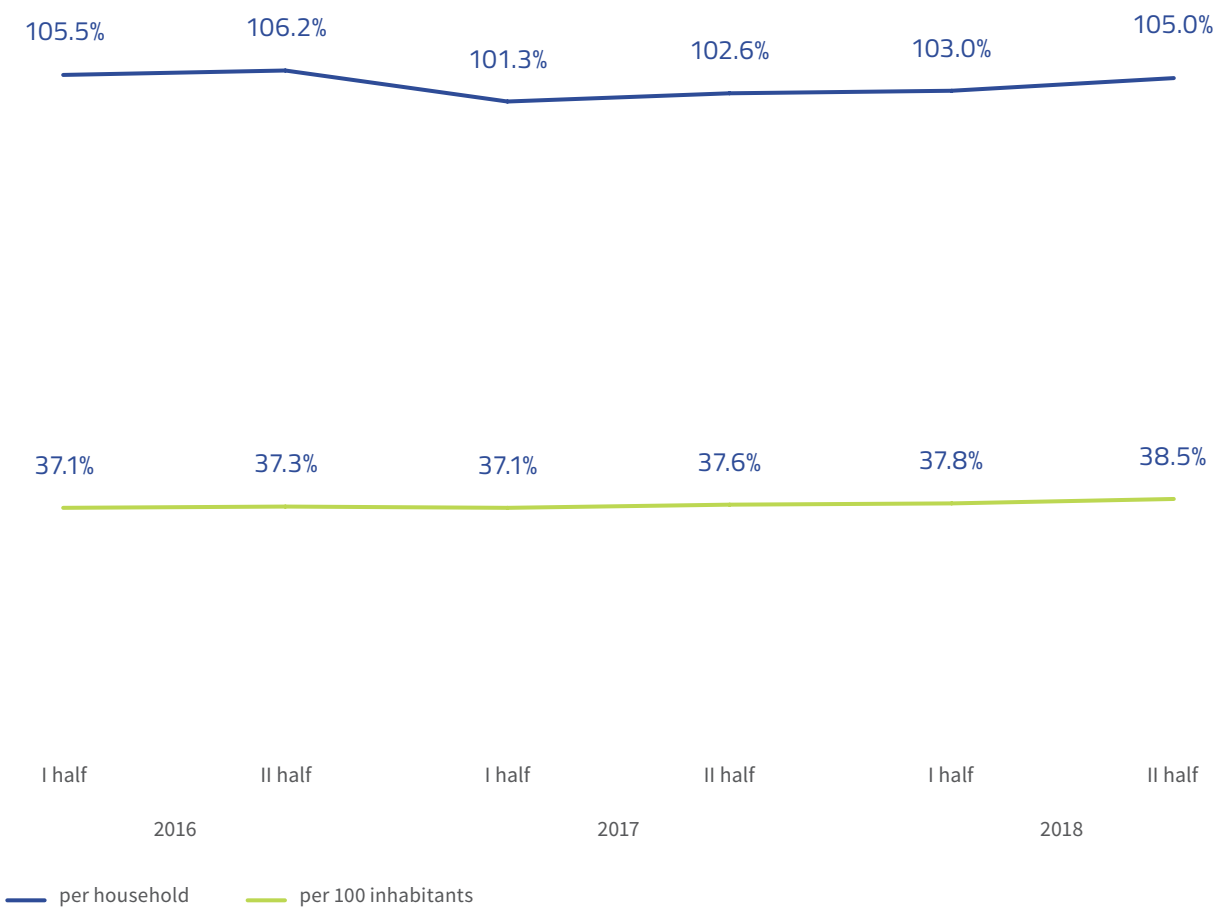
[1] Wired and wireless fixed-line internet and dedicated devices for 2G/3G/4G mobile access (modems, cards, keys)

[2] In 2017, the basis for calculating the rate was changed. Until 2016, the basis for calculating the penetration was the number of households amounting to 13.5 million. However, in 2017-2018, the 2016 Central Statistical Office forecast was used to determine the rate. On that basis the number of households was set at around 14.1 million. The change had an impact on the lower value of the penetration rate in 2017.

2018 is the time of on-line acceleration. This applies in particular to mobile internet. However, you can also see the first effects of investments borne by telecommunications undertakings, although it must be emphasized that in this case investment commitment of telecommunications undertakings is connected with regulatory activities of the President of UKE, as well as creating conditions for broadband roll-out. Also, long-term state solutions are important, for instance in terms of investment, legal and financial stability of operations. With average internet access prices being one of the lowest in Europe, this is an extremely important issue.

Stefan Kamiński, President of KIGEiT

CHART 1. **BROADBAND INTERNET SERVICES PENETRATION RATE[2]**



Source: UKE

1.2. REVENUES

In 2018, telecommunications undertakings reported a market value of internet access services which was by 15% higher than in 2017. It was at the level of PLN 5.4 billion.

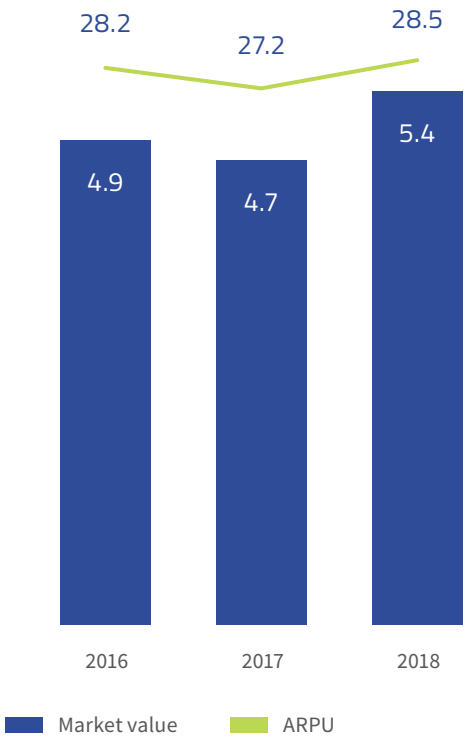
There was also a slight increase in the average monthly revenue per user, which amounted to PLN 28.5 in 2018.

PLN 5.4 billion

value of the Polish internet access market in 2018

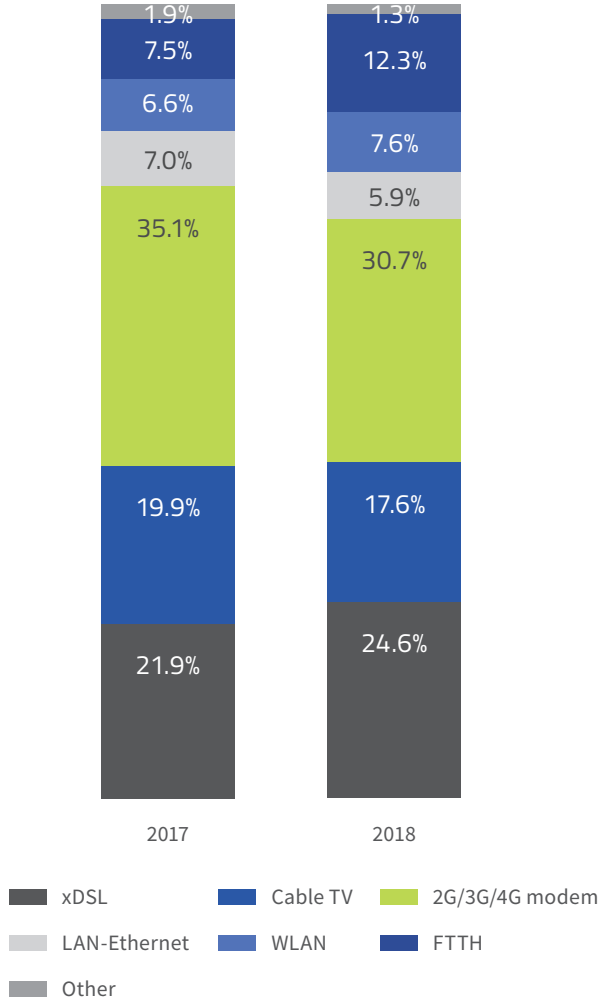
The revenue structure changed slightly compared to the previous year. Operators continued to gain the most revenue from internet access services using dedicated mobile devices (30.7%), however, this share decreased by 4.4 percentage points. The xDSL technology still had another significant share (24.6%), although its number of users decreased every year. The cable TV modem remained at third position, just like in 2017. Among all technologies, the highest increase in revenue (over 88%) was recorded in relation to FTTH. At the same time, the share of FTTH in the revenue structure increased by almost 5 pp. up to 12.3%.

CHART 2. **VALUE OF THE INTERNET ACCESS MARKET (PLN BILLION) AND AVERAGE MONTHLY REVENUE PER USER (ARPU IN PLN)**



Source: UKE

CHART 3. **REVENUE STRUCTURE IN TERMS OF TECHNOLOGY USED**



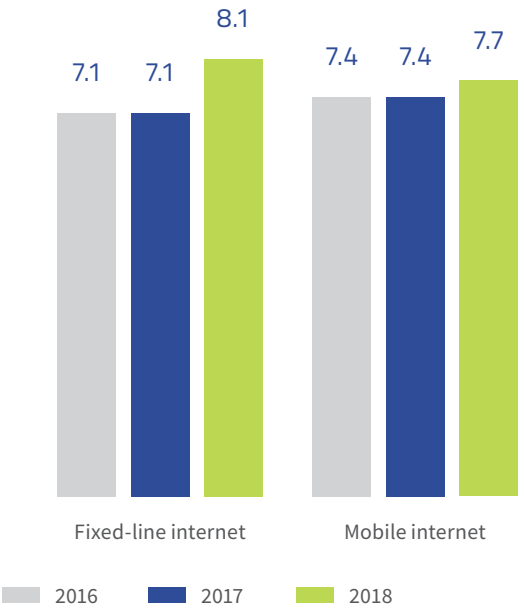
Source: UKE

1.3. USERS

At the end of 2018, there were 15.8 million users of internet access services in Poland, of which 8.1 million were made up of fixed-line internet users. There was an increase in the number of users by over 9.2%, compared to 2017.

15.8 million
internet access users in 2018

CHART 4. **NUMBER OF FIXED-LINE AND MOBILE SUBSCRIBERS (MILLION)**



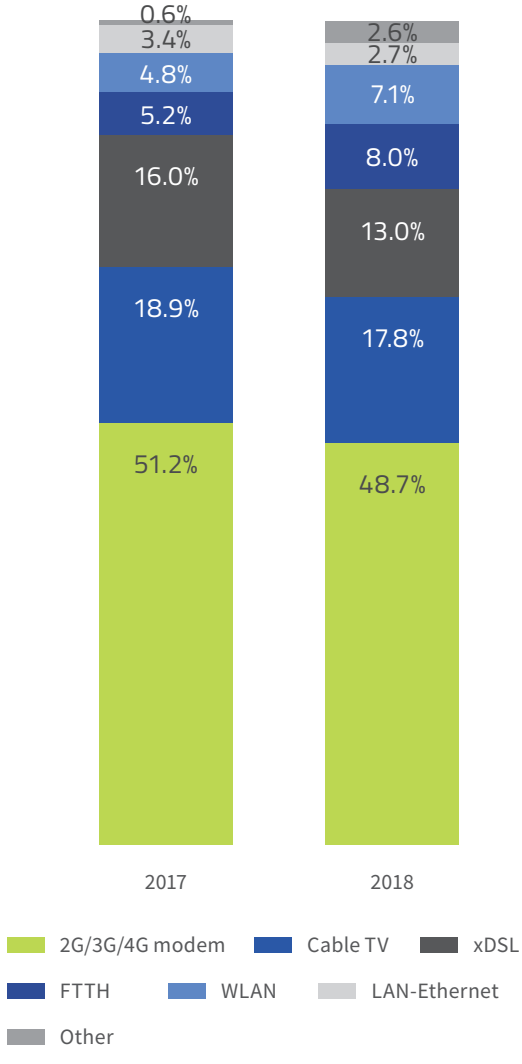
Source: UKE

In 2018, there was a significant increase in the quality of internet access services. A large number of new fibre networks have resulted in a significant increase in network capacity.

Karol Skupień, President of KIKE

Similarly to the previous year, the largest number of users used the service using dedicated devices for 2G/3G/4G mobile access – modems, cards or keys. The second most popular category was cable technology (17.8%), followed by xDSL (13%). A significant increase in terms of shares was recorded for fibre lines, in particular FTTH. The share of them in the structure of lines amounted to 8%, i.e. almost 3 pp. more than a year earlier.

CHART 5. **STRUCTURE OF SUBSCRIBERS IN TERMS OF ACCESS TECHNOLOGY USED**

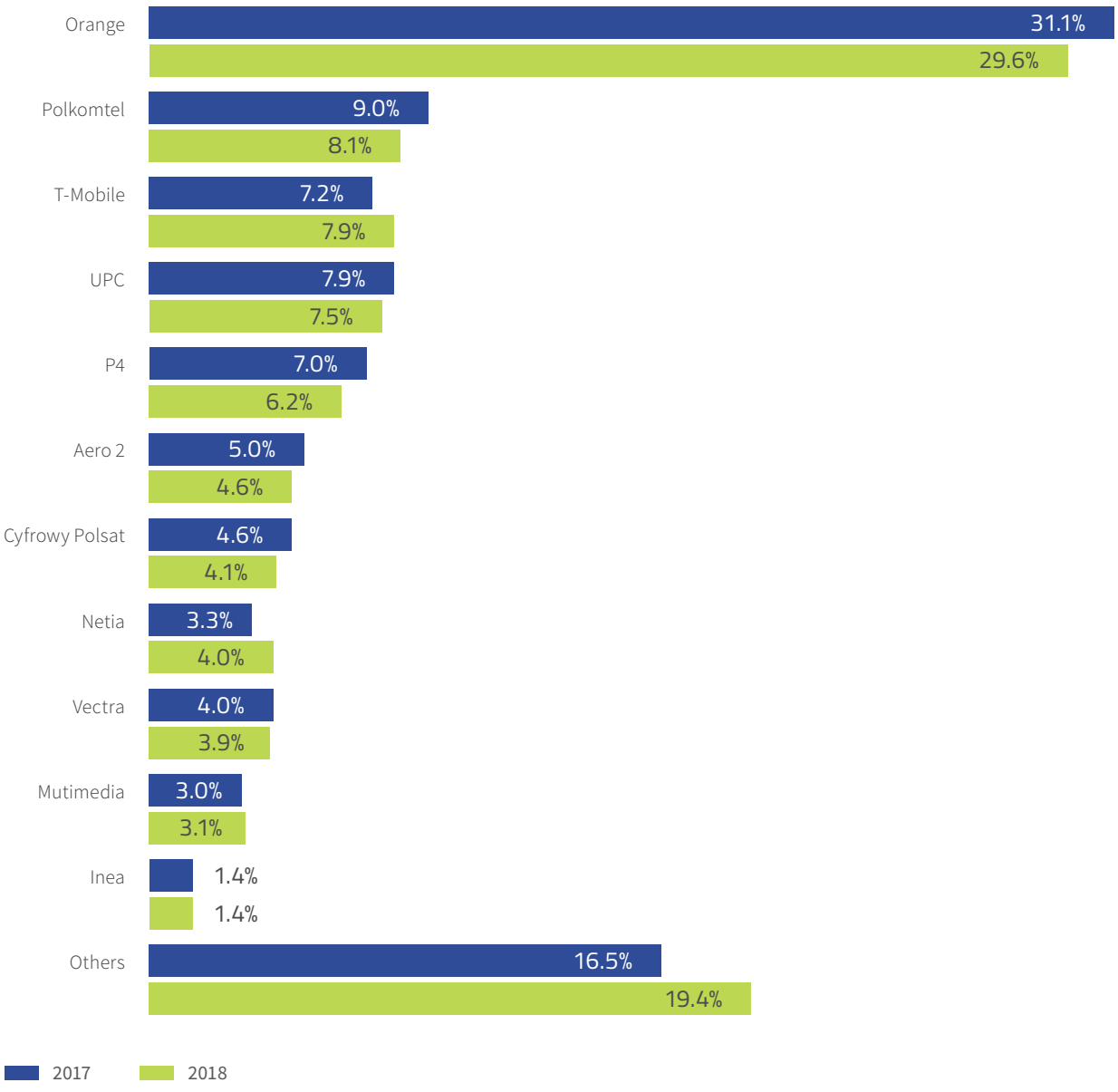


Source: UKE

1.4. MARKET STRUCTURE

In 2018, as in previous years, Orange Polska had the largest number of internet access users. Its share in the internet access market in terms of the number of users amounted to 29.6%, which means a decrease of 1.5 pp., compared to 2017. Polkomtel was at the second position, also with a slight drop and with a share of 8.1% in 2018. The next position in the ranking was taken by T-Mobile with a 7.9% share. From among significant internet market operators in Poland, only T-Mobile, Netia and, to a very small extent, Multimedia increased their shares in the user market.

CHART 6. **OPERATORS' SHARES IN TERMS OF THE NUMBER OF INTERNET USERS**



Source: UKE

1.5. INTERNET ACCESS TECHNOLOGIES

Mobile devices (modems, cards, keys)

The market share of operators using mobile devices did not change significantly compared to 2017. The leader was still Orange Polska with one third of the market. The share of Polkomtel, at 16.6% of users, fell slightly. Slightly less (16%) was held by T-Mobile. The value of the internet access services market using mobile devices reached the level of PLN 1.7 billion in 2018.

Cable TV modem

As in previous years, UPC had the largest number of internet access users via a cable TV modem. Its share in the access market in this technology increased slightly to 41.9%. Vectra's share (20.7%) was half of that, also without major changes compared to 2017. Multimedia Polska was at the third position, providing internet for 14.2% of users. The value of the internet access market via cable modems was almost PLN 1 billion.

CHART 7. **OPERATORS' SHARES IN THE TOTAL NUMBER OF USERS USING MODEMS**

Source: UKE

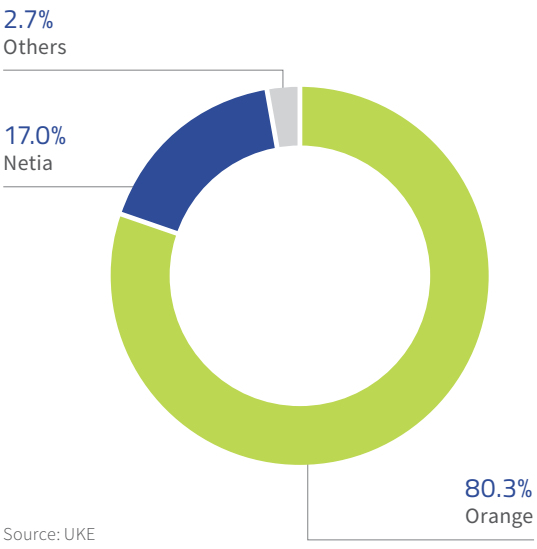
CHART 8. **OPERATORS' SHARES IN THE TOTAL NUMBER OF USERS USING THE INTERNET ACCESS SERVICE VIA CABLE TV MODEMS**

Source: UKE

xDSL

In 2018, the value of the internet access services market using xDSL technology amounted to PLN 1.3 billion. The main provider of services in this technology was still Orange Polska, whose share amounted to over 80%. The second position was taken by Netia, with a share of 17%. Other undertakings, of which none had more than a 1% share, in total provided this type of service to 2.7% of users. The number of users of xDSL technology decreased by almost 11% compared to 2017.

CHART 9. **OPERATORS' SHARES IN THE TOTAL NUMBER OF USERS USING XDSL-BASED INTERNET ACCESS SERVICES**

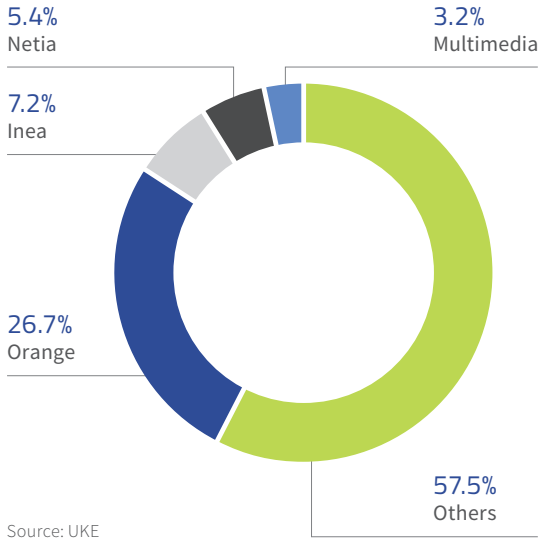


Source: UKE

FTTH

Undertakings providing internet access services in FTTH technology obtained revenues in the amount of PLN 0.7 billion in 2018. Orange Polska, Inea, Netia and Multimedia were significant operators in this market segment, holding together approximately a 43% share in terms of users. Among them, Orange Polska enjoyed the largest number of users. The remaining part of the market was very fragmented. Over 57% of shares belonged to companies that provided services to less than 1.5% of users of this technology.

CHART 10. **OPERATORS' SHARES IN THE NUMBER OF USERS USING FTTH-BASED INTERNET ACCESS SERVICES**



Source: UKE

WLAN and LAN-Ethernet

The internet access markets using WLAN and LAN Ethernet technologies were very fragmented. Internet services in these technologies were provided by entrepreneurs whose share in a given market usually did not exceed 1%. Among the companies that provided services via WLAN, only five had a share between 1% and 2%. Shares of other companies were below 1%. In the case of LAN Ethernet, the shares of the largest 14 companies ranged from 1% to 5%.

In total, approximately 1.3 million people used the services provided by the two technologies in 2018. The value of the WLAN access market in 2018 was PLN 0.4 billion, while in Ethernet technology – PLN 0.3 billion.

1.6. CAPACITY

2018, thanks to investments of private operators, was a year of significant acceleration in internet access offers – with 1 Gb/s offers in the market and the first 5G tests allowing to achieve similar speeds.

Andrzej Dulka, President of PIIT

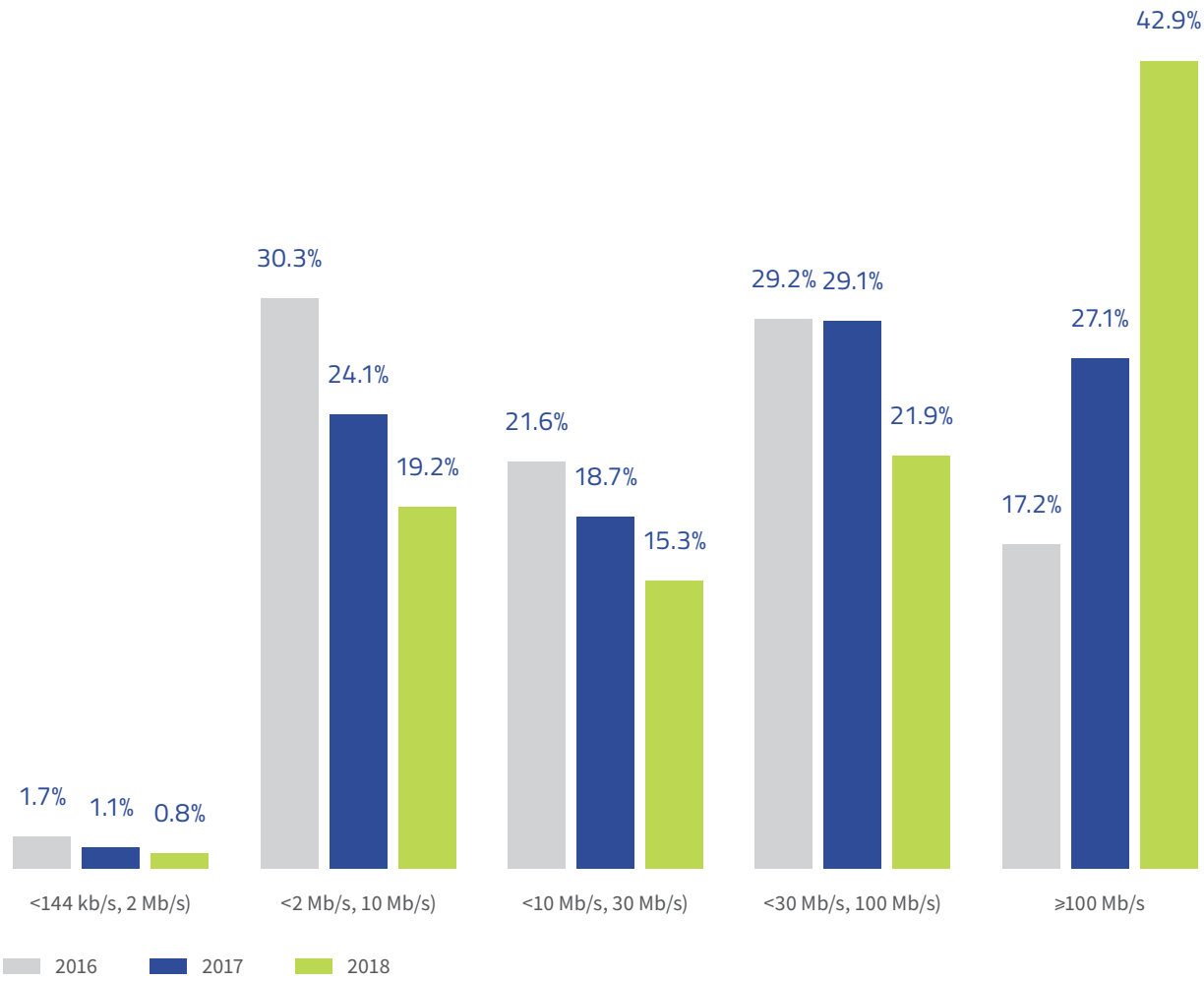
In 2018 a significant increase in the number of lines with the highest capacities, i.e. minimum 100 Mb/s, was recorded. Their share in the total number of lines increased to almost 43%. In 2018, there were 60% more of them than the year before.

The percentage of lines with the lowest capacity decreases each year. In 2018, they constituted only 0.8% of total lines. The percentage of lines with the lowest data rates is getting smaller every year.

43%

lines of minimum capacity of 100 Mb/s

CHART 11. **SHARES OF LINES BY SPEED**



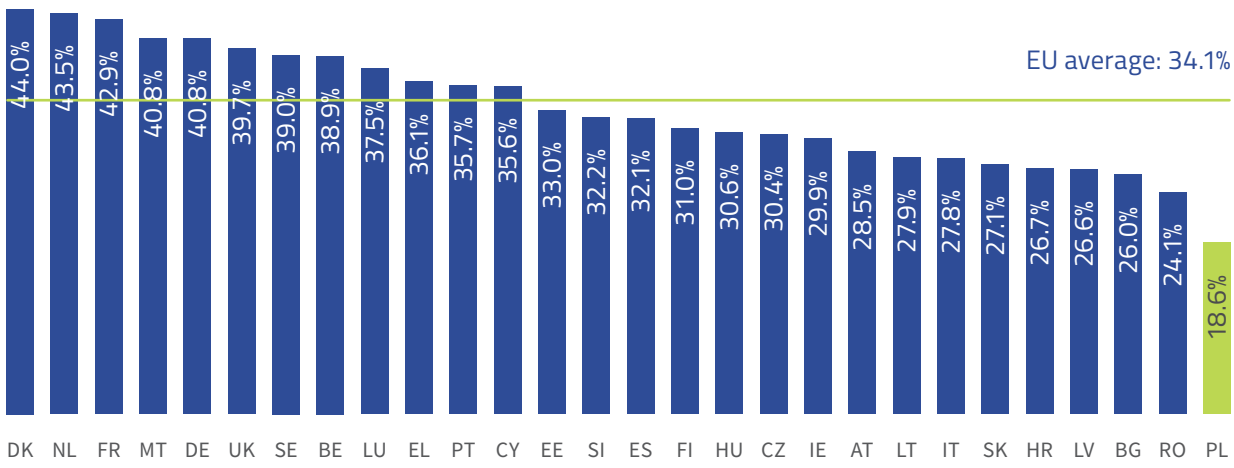
Source: UKE

1.7. COMPARISON WITH EUROPEAN UNION COUNTRIES

The highest penetration of fixed-line internet access services in 2018 was recorded in Denmark, where it amounted to 44% and was higher than the EU average by almost 10 pp. In this ranking Poland was at the last position, with penetration of fixed-line internet services in our country at the level of less than 19%.

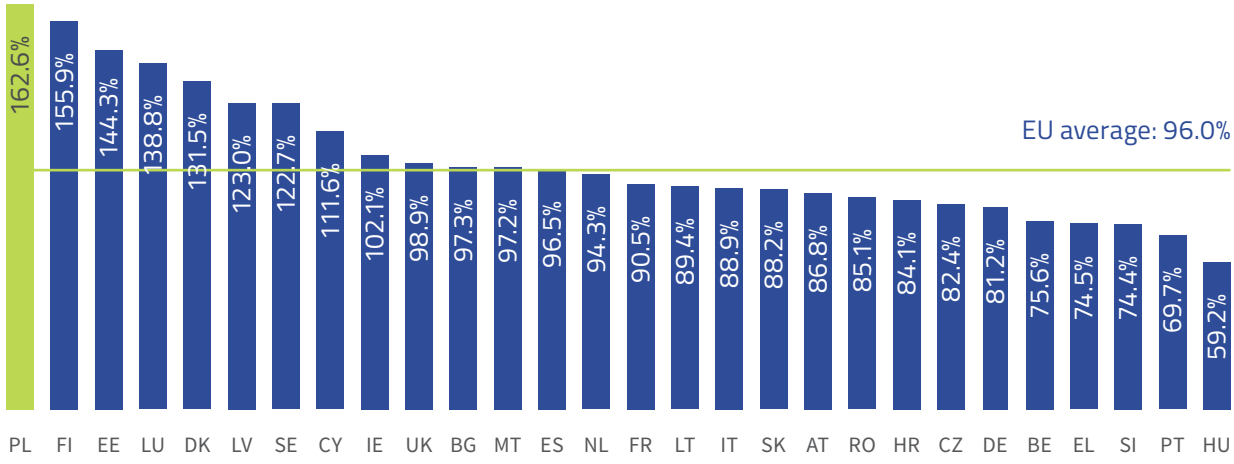
In the case of mobile internet access services, Poland was able to boast in 2018 of the highest penetration rate of almost 163% among European countries. Our result was better by almost 69 pp. than the EU average, which amounted to 96%.

CHART 12. **PENETRATION OF FIXED-LINE BROADBAND IN THE EU**



Source: Digital Agenda Scoreboard, June 2018.

CHART 13. **PENETRATION OF MOBILE INTERNET SERVICES IN THE EU**



Source: Digital Agenda Scoreboard, June 2018.

1.8. PRICES OF FIXED-LINE INTERNET ACCESS SERVICES

Prices of fixed-line internet access services in European countries were compared using *Fixed Price Broadband*[3] database, valid for December 2018.

Two speed ranges were used for benchmarks: from 30.7 Mb/s to 102.4 Mb/s and above 102.4 Mb/s.

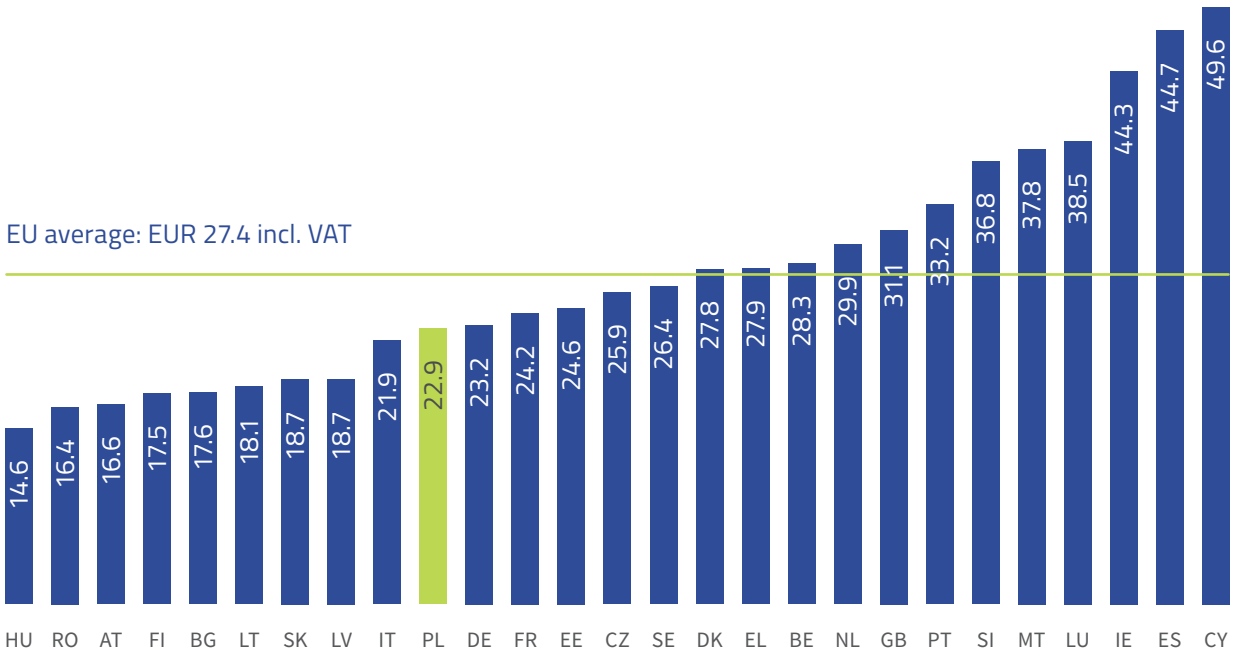
The cheapest offers were considered in each of the ranges. The prices of services were compared on the basis of three price baskets:

- **OECD Medium basket: 30 GB/>=10 Mb/s (possibility of using 30 GB of data, minimum internet speed 10 Mb/s),**
- **OECD Medium basket: 60 GB/>=25 Mb/s (possibility of using 60 GB of data, minimum internet speed 25 Mb/s),**
- **OECD Medium basket: 120 GB/>100 Mb/s (possibility of using 120 GB of data, internet speed over 100 Mb/s).**

Considering the OECD Medium basket: 30 GB/>=10 Mb/s and internet capacity range from 30.72 Mb/s to 102.4 Mb/s, the most expensive access to fixed-line internet was offered by Cyprus. The service was paid for in the amount of around EUR 50, while the European average was at the level of EUR 27.4. The price of the service in our country was lower than the European average by 4.5 pp. and amounted to EUR 22.9.

[3] The database developed by the analytic company Strategy Analytics

CHART 14. **AVERAGE MONTHLY SERVICE COST IN THE EU FOR THE OECD MEDIUM BASKET: 30 GB/>=10 Mb/s FOR SPEEDS FROM 30.7 Mb/s TO 102.4 Mbit/s**

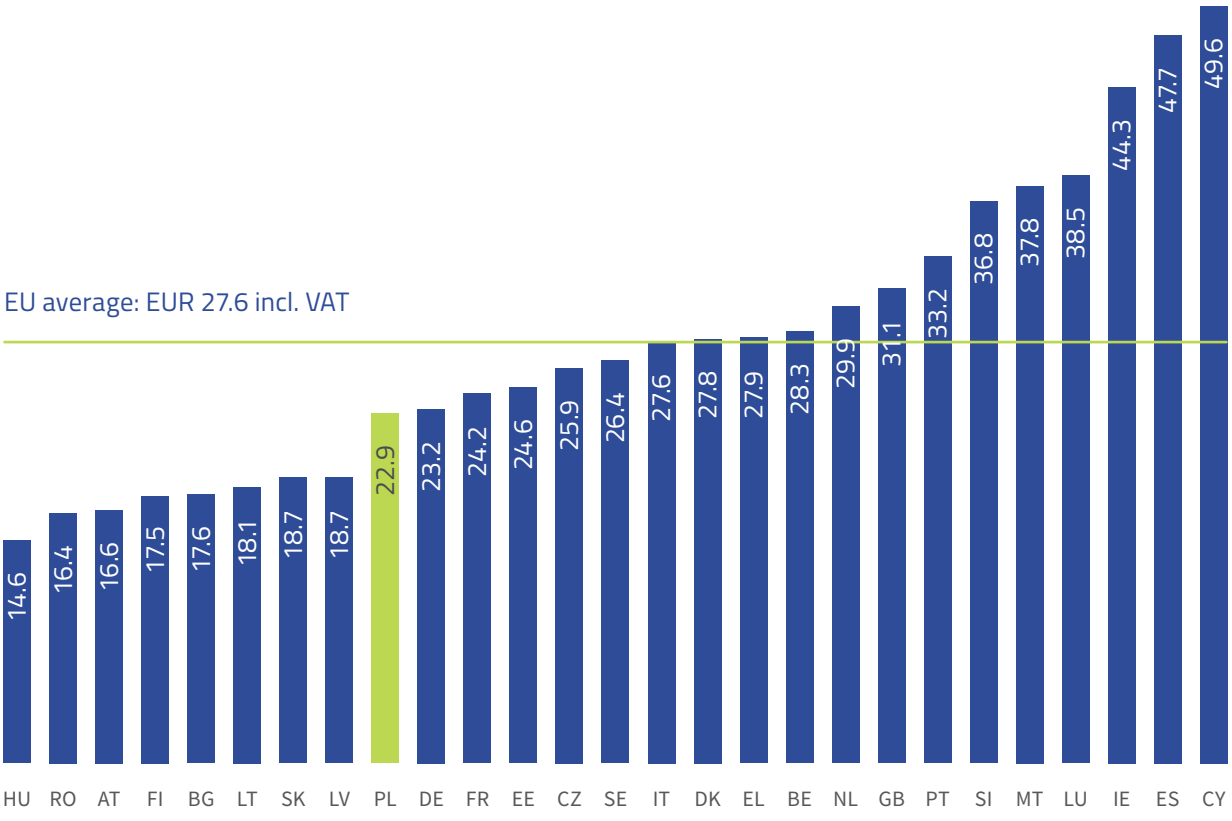


Source: UKE based on Fixed Broadband Price Benchmarking, Strategy Analytics

Note: tariffs for residential and business customers purchasing only internet access (bundles were excluded from the analysis). For Poland, the UPC Biznes internet Smart 10 (24M) offer was selected. Cost of the service as of December 2018.

The European average for the OECD Medium basket: 30 GB/>=10 Mb/s for services with data speeds above 102.4 Mb/s amounted to EUR 27.6, i.e. only by 0.2 pp. more than in the case of speeds from 30.7 Mb/s to 102.4 Mbit/s. The EU average was raised by the price of the basket in Italy, the only country where the price of the service was dependent on the internet capacity and in the range above 102.4 Mb/s it was by about EUR 5.7 higher than in the range with lower speeds.

CHART 15. **AVERAGE MONTHLY SERVICE COST IN THE EU FOR THE OECD MEDIUM BASKET: 30 GB/>=10 Mb/s FOR SPEEDS HIGHER THAN 102.4 Mbit/s**

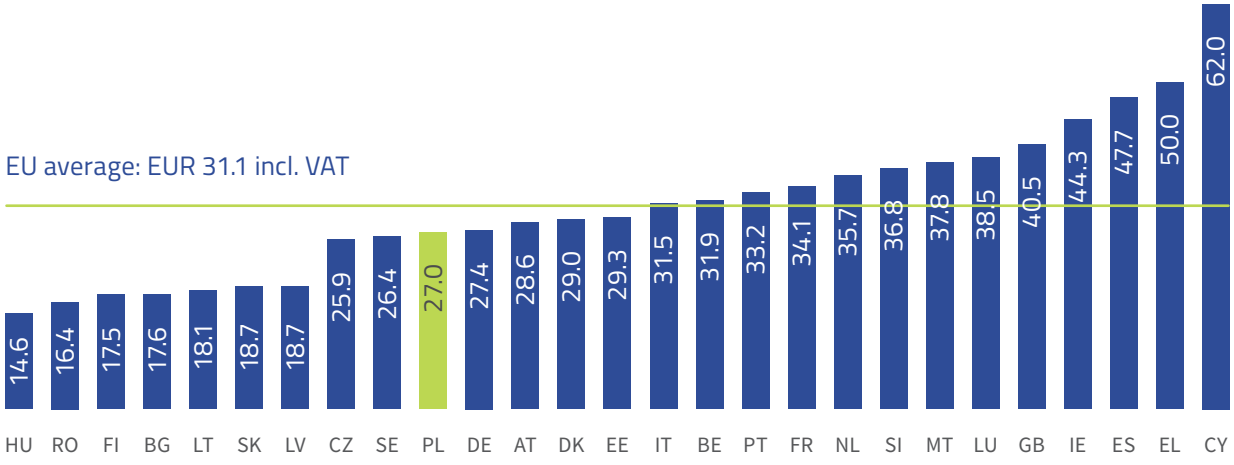


Source: UKE based on Fixed Broadband Price Benchmarking, Strategy Analytics

Note: tariffs for residential and business customers purchasing only internet access (bundles were excluded from the analysis). For Poland, the UPC Biznes internet Smart 10 (24M) offer was selected. Cost of the service as of December 2018.

In the case of price baskets with more intense use of services, the difference between speed ranges is blurred in several countries. In both analysed ranges, prices of services for OECD baskets Medium 60 GB/>=25 Mb/s and OECD Medium: 120 GB/>100 Mb/s were the same in 8 countries, including Poland. In the first case, the EU average was EUR 31.1 (the price in Poland is lower by EUR 4.1) and in the second case EUR 40.6 (the price in Poland is lower by EUR 13.6). The EU average was raised significantly by the price of the basket in Cyprus. The price difference between the two baskets was more than EUR 100 for Cyprus.

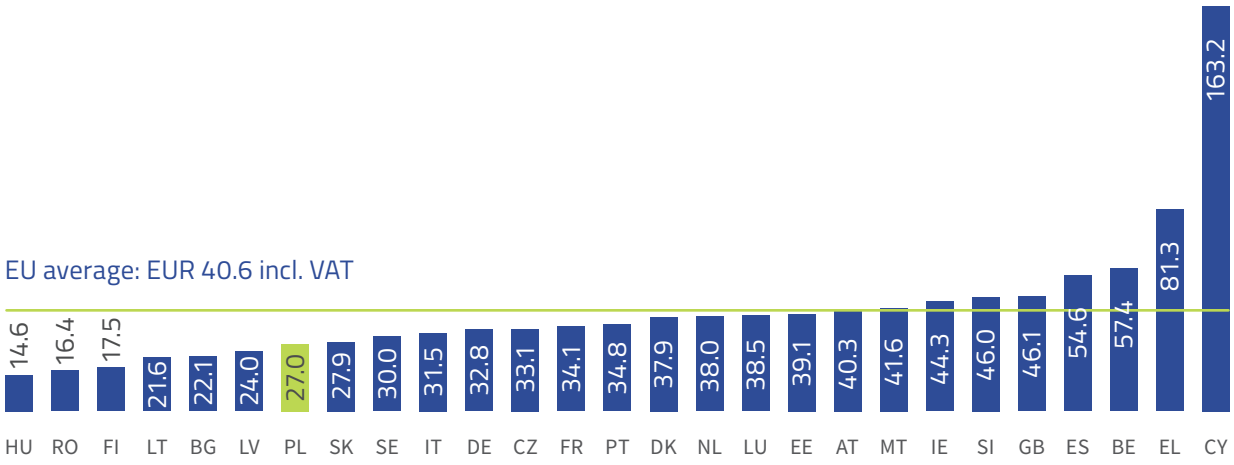
CHART 16. **AVERAGE MONTHLY SERVICE COST IN THE EU FOR THE OECD MEDIUM BASKET: 60 GB/>=25 Mb/s**



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

Note: tariffs for residential and business customers purchasing only internet access (bundles were excluded from the analysis). For Poland, the UPC Fibre Power 150 Mb/s (24M) offer was selected. Cost of the service as of December 2018.

CHART 17. **AVERAGE MONTHLY SERVICE COST IN THE EU FOR THE OECD MEDIUM BASKET: 120 GB/>100 Mb/s**



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

Note: tariffs for residential and business customers purchasing only internet access (bundles were excluded from the analysis). For Poland, the UPC Fibre Power 150 Mb/s (24M) offer was selected. Cost of the service as of December 2018.

2. MOBILE TELEPHONY

2.1. MARKET CHARACTERISTICS

It is worth noting that in the mobile telephony service a lot of small operators concluded agreements with mobile operators for MVNO services, thanks to which they expanded their retail offer.

Karol Skupień, President of KIKE

At the end of 2018, 85 telecommunications undertakings operated in the Polish mobile telephony market, more than twice as many compared to the previous year, when 31 entities declared this type of activity.

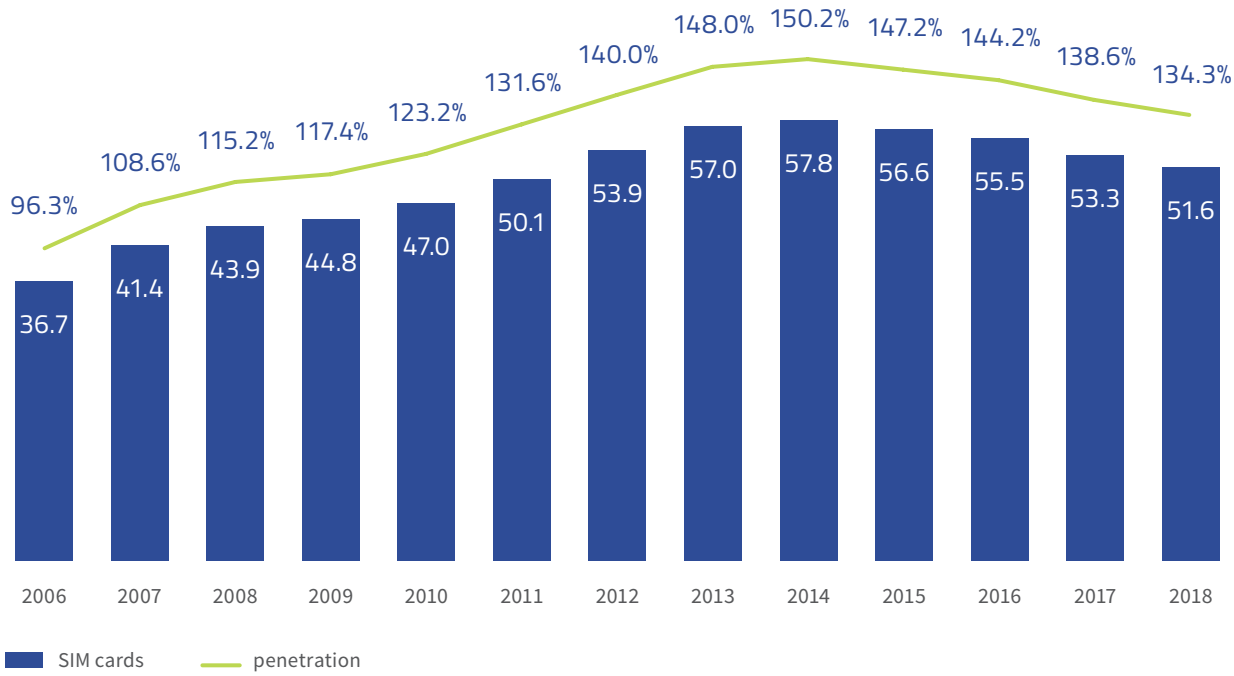
Such a large increase in the number of operators providing mobile telephony services results from the emergence of companies in the market that have a contract with a mobile operator (MNO) and resell their services to other small operators. As a result of such cooperation, small MVNOs provide mobile telephony services based on the contract they have with an intermediary, and not directly with the mobile operator.

51.6 mln
SIM cards

Out of all operators operating in the mobile telephony market, five had their own infrastructure (MNO operators), while 80 used a network of a selected technology partner (MVNO operators). In Poland in 2018, the following entities were operating as MNOs: Aero 2 Sp. z o.o., Orange Polska S.A., Polkomtel Sp. z o.o., P4 Sp. z o.o. and T-Mobile Polska S.A.

In the past few years there has been a systematic drop in the number of mobile telephony users. At the end of 2018, a total of 51.6 million active SIM cards were recorded. This means a decrease of 3% compared to 2017. At the same time, the penetration of mobile telephony services was lower and amounted to over 134% (a decrease by 3 pp. compared to 2017). However, the number of M2M cards increased by more than 15% and reached the level of 3.3 million. The cards accounted for 6.4% of all SIM cards, compared to 5.3% in 2017.

CHART 18. **NUMBER OF USERS (SIM CARDS IN MILLIONS) AND PENETRATION OF THE MOBILE TELEPHONY MARKET IN POLAND**



Source: UKE

134%

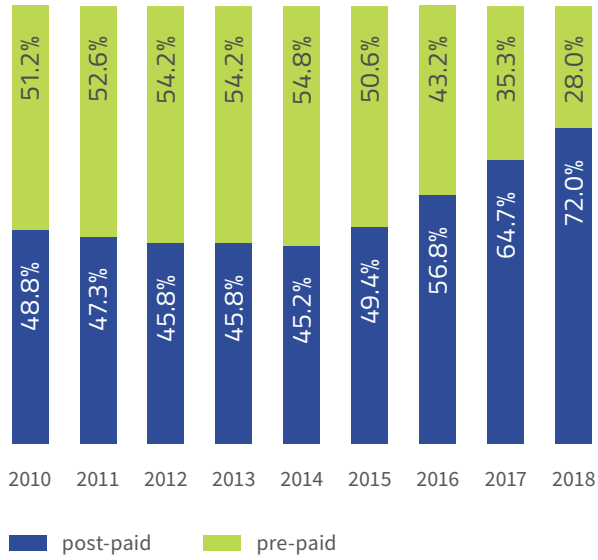
mobile telephony services penetration

In connection with the introduction of the obligation to register pre-paid cards in 2016, there is a significant decrease in the number of pre-paid users in favour of subscribers. At the end of 2018, the number of pre-paid SIM cards decreased by almost 24%, compared to 2017 – to the level of 13.5 million. Pre-paid users accounted for only 28% of all mobile telephony users.

According to Analysys Mason[4], the average penetration of mobile telephony services in the European Union is 131.1% and it is by 1.2 pp. higher than last year. This rate for Poland is above the EU average and amounts to 135%. Among the EU countries, the highest penetration rates are observed in Finland (175.9%), Portugal (168.4%) and Austria (158.5%).

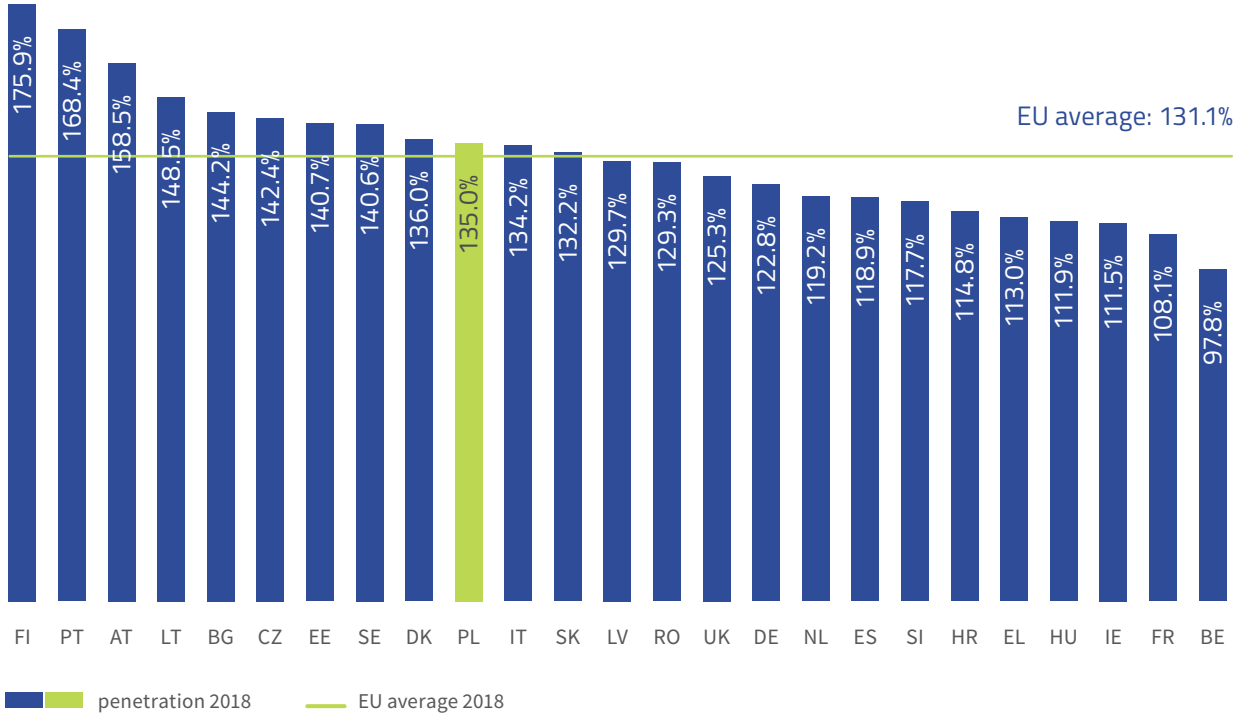
[4] An analytical company specializing in the telecommunications market.

CHART 19. **SHARE OF PRE-PAID AND POST-PAID CUSTOMERS IN THE TOTAL NUMBER OF SUBSCRIBERS**



Source: UKE

CHART 20. **MOBILE TELEPHONY MARKET PENETRATION IN SELECTED EUROPEAN COUNTRIES IN 2018**



Source: UKE based on the Telecom Market Matrix database, Analysys Mason

2.2. REVENUES

In 2018 a declining trend in revenues from mobile telephony services was maintained. Total receipts of operators amounted to PLN 13.8 billion and were by 8% lower than a year earlier.

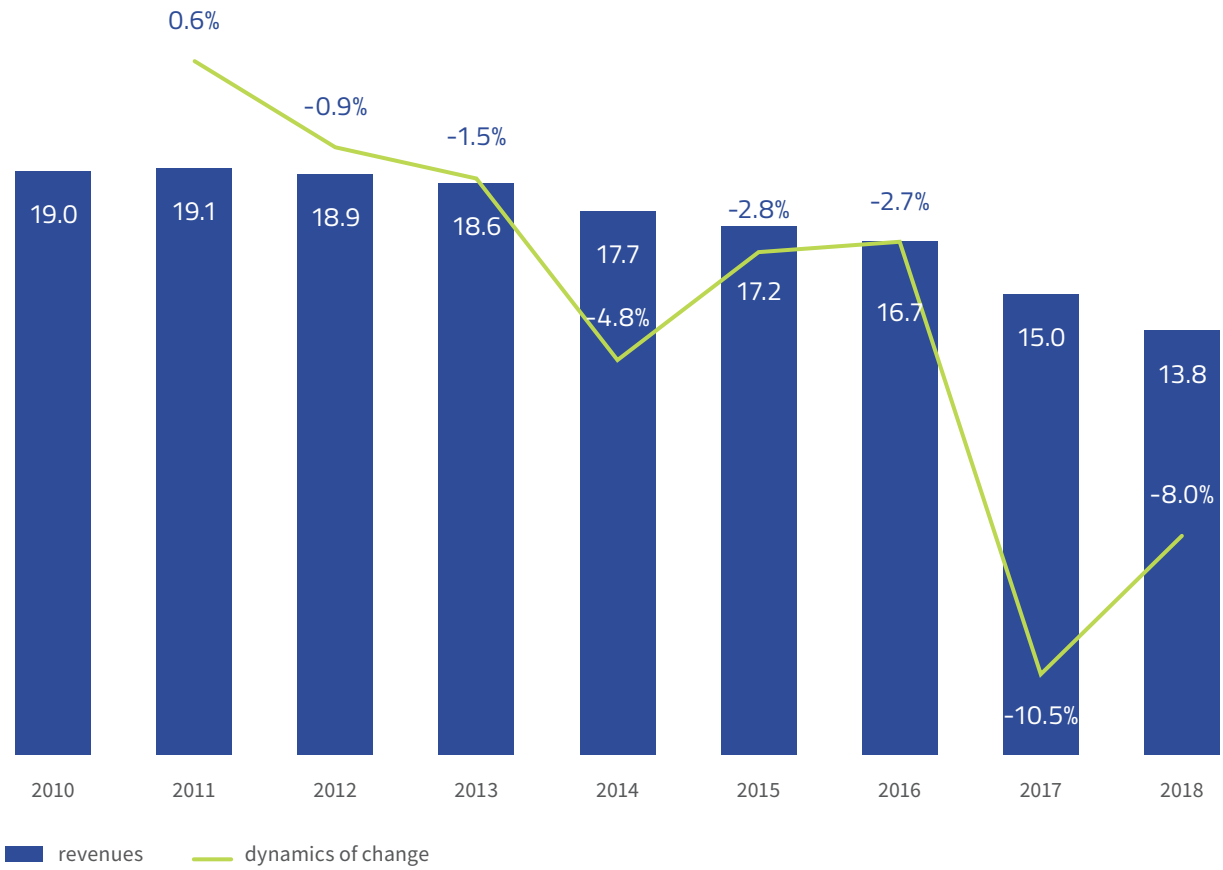
A decrease in revenues was recorded for almost all types of mobile telephony services. Receipts from subscription fees fell by 12%, while revenues from voice calls decreased by 13%. This is a slightly smaller decrease in revenues from voice calls than the one that was recorded in the previous reporting period (decrease by 17%). In turn, in the case of SMS revenues were lower by almost 9%, and the MMS service generated a decrease of more than 27%. A slight decrease in revenues from data transmission (2%) and outbound roaming (by 1.5%) was also demonstrated. Higher revenues than a year earlier were obtained from inbound roaming (increase by 21%).

Despite the decline in the value of the mobile telephony market by approximately PLN 1.2 billion, in 2018 it was still a very important area of telecommunications activity. This market generated over 35% of revenues in the entire telecommunications market in Poland.

35%

share of mobile telephony in revenues of the telecommunications market

CHART 21. **REVENUES FROM MOBILE TELEPHONY SERVICES (PLN BILLION) AND DYNAMICS OF CHANGE**



Source: UKE

2.3. SHARES OF OPERATORS

As in 2017, the leading position in terms of the number of mobile telephony users was held by P4 with a share of 29%. The second position was taken by Orange Polska with 27% of users. It's the same result as last year. The third position belonged to Polkomtel, which was the only one of the 4 largest companies to gain market share. At the end of 2018, its users accounted for 21% of all mobile telephony users. T-Mobile took the fourth position with a share of 18.6%.

The positions of the four largest companies in terms of market share in relation to 2017 did not change. Only Polkomtel recorded an increase in the number of users by 7.8%. The number of SIM cards operated by Polkomtel at the end of 2018 was over 10 million. The remaining three largest companies recorded a decline of 4.4% for Orange Polska, 6.9% for T-Mobile and 7.9% for P4. In comparison to 2017, the market share of other operators increased by 7.8%.

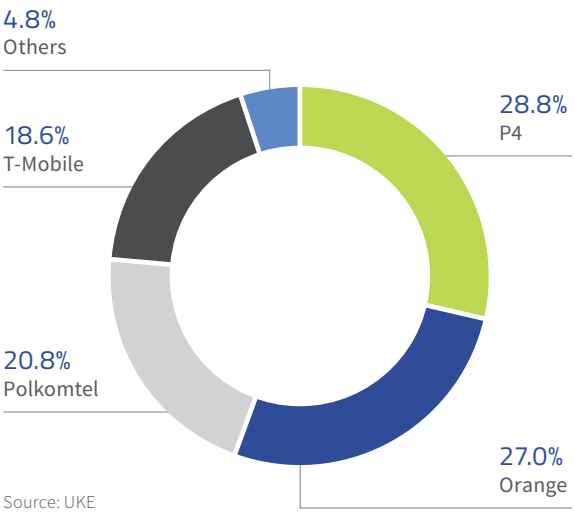
The first position in terms of revenues in 2018 was taken by P4 with a share of 26.1%. This is an advancement from the third position in 2017. The second position was taken by last year's leader in this ranking, namely Polkomtel (25.1%). Orange Polska obtained 24.5% of total revenues from mobile telephony, and T-Mobile came fourth with 21.1% of the market share.

Compared to 2017, both in the case of Polkomtel and Orange, there was a significant decrease in the obtained revenues. It was 16.3% and 15.1%, respectively. A slight decrease in revenues was also attributable to T-Mobile and amounted to 1.3%. Revenue increase of 2.5% was recorded by P4. The remaining entrepreneurs, apart from the four largest ones mentioned above, gained revenues higher by 6.3%.

In 2018, the largest percentage of revenues from SMS sent on mobile networks was held by T-Mobile. This share accounted for 28.5% of this market, by 5.6 percentage points more than in 2017. This company was the only one to record an increase in revenues from this service. Polkomtel took the second position with 26.6% of shares (decrease by 0.3 pp.), followed by Orange Polska (22.8%) and P4 (21.4%). Orange's revenues from the SMS sent fell by 4.6 pp., while in the case of P4 – by 1 pp. Other operators had only a 0.7% share in revenues in this category of services. Compared to the previous year, they obtained revenues higher by 0.3 pp.

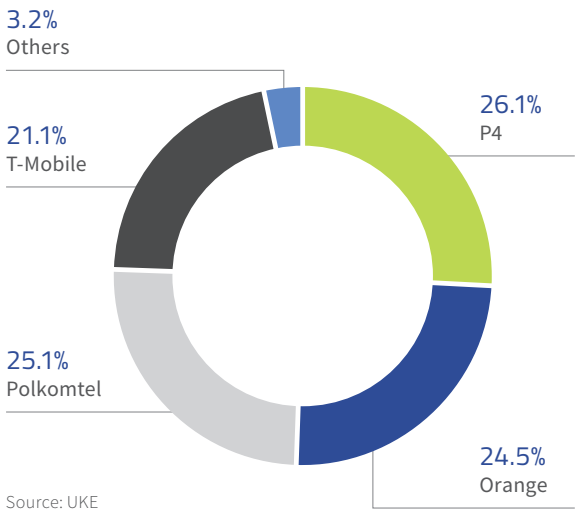
In terms of revenues from domestic data transmission in mobile networks, the dominant position in 2018 was retained by Orange Polska – with over 40% of shares. Subsequent positions were taken by T-Mobile (26.2%) and P4 (26%). Polkomtel had a 7% market share in this type of services. Other entrepreneurs obtained only 0.4% of revenues from data transmission. Compared to 2017 there were slight changes in terms of market shares (from 2.3 pp increase for T-Mobile to 1.7 pp decrease for Polkomtel).

CHART 22. **SHARES OF OPERATORS IN TERMS OF THE NUMBER OF USERS IN 2018**



Source: UKE

CHART 23. **SHARES OF OPERATORS IN TERMS OF REVENUES GENERATED IN 2018**



Source: UKE

2.4. VOLUMES OF SERVICES PROVIDED

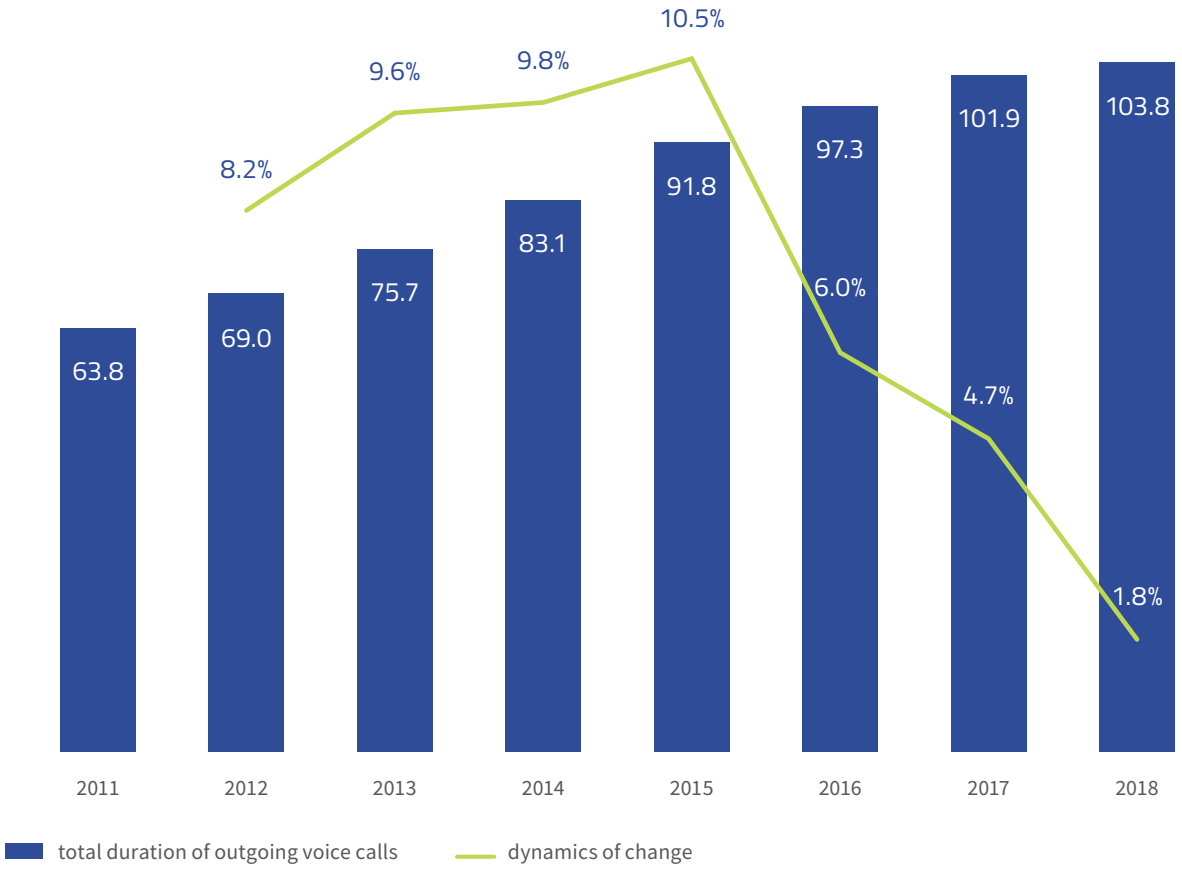
In 2018, the duration of outgoing calls in mobile telephony increased by 1.8%. Same as in the previous three years, growth dynamics turned out to be significantly smaller than in 2011-2015. Customers of mobile telephony made calls with a total duration of 103.8 billion minutes. Statistically, for every inhabitant of Poland this was 2,702 minutes in a year, which turned out to be 50 minutes more than in 2017. The average duration of calls was 2 minutes and 20 seconds and was longer by 2 seconds, compared to 2017.

Considering the average duration of voice calls per one active user in a month in 2018 Poland was slightly above the value for the European Union. The Polish mobile subscriber talked for about 168 minutes in a month, or 6 minutes longer than the average for the EU. These values are similar to those for 2017.

2,702 minutes

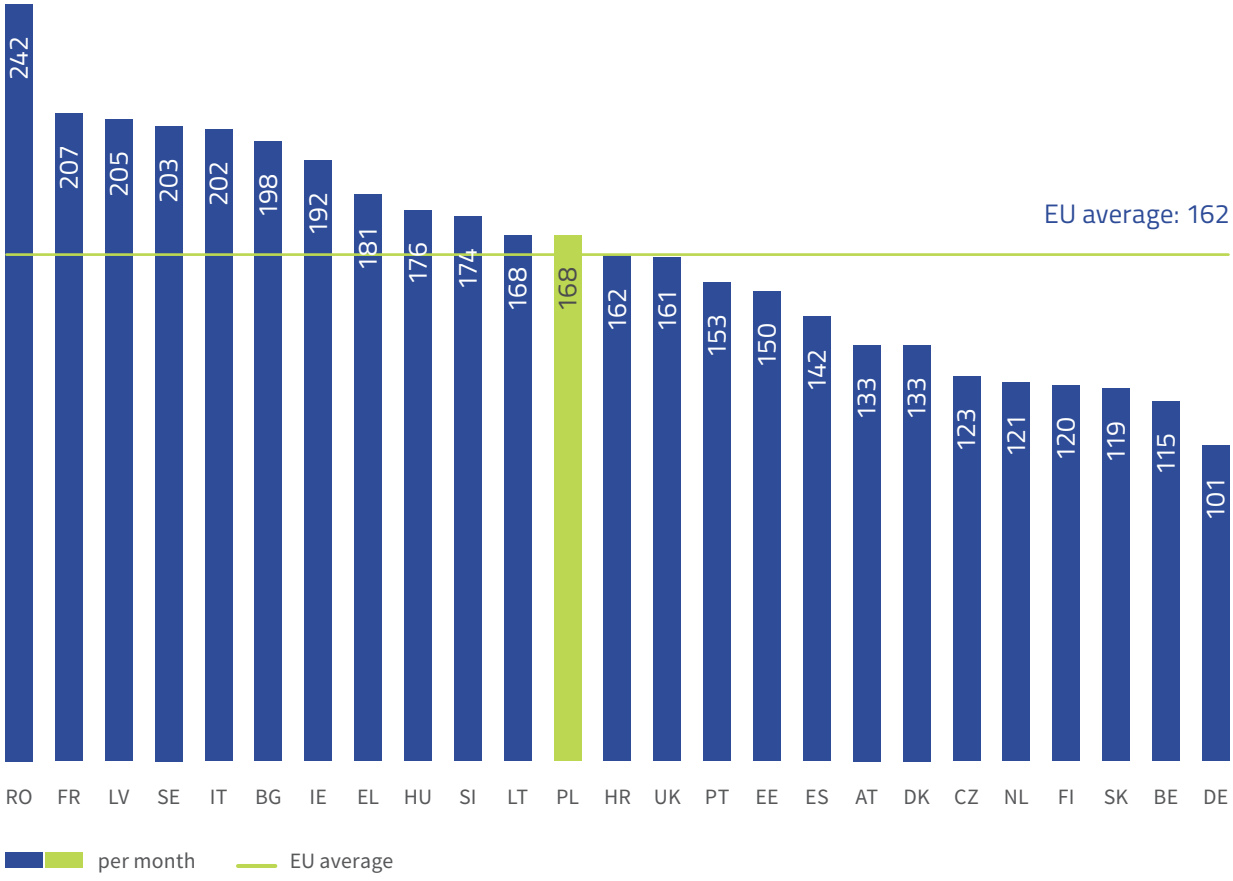
average length of calls during the year

CHART 24. **TOTAL DURATION OF OUTGOING VOICE CALLS (BILLION MINUTES) AND THE DYNAMICS OF CHANGE**



Source: UKE

CHART 25. **AVERAGE DURATION OF VOICE CALLS PER ACTIVE USER PER MONTH IN 2018 IN SELECTED EU COUNTRIES (MINUTES)**

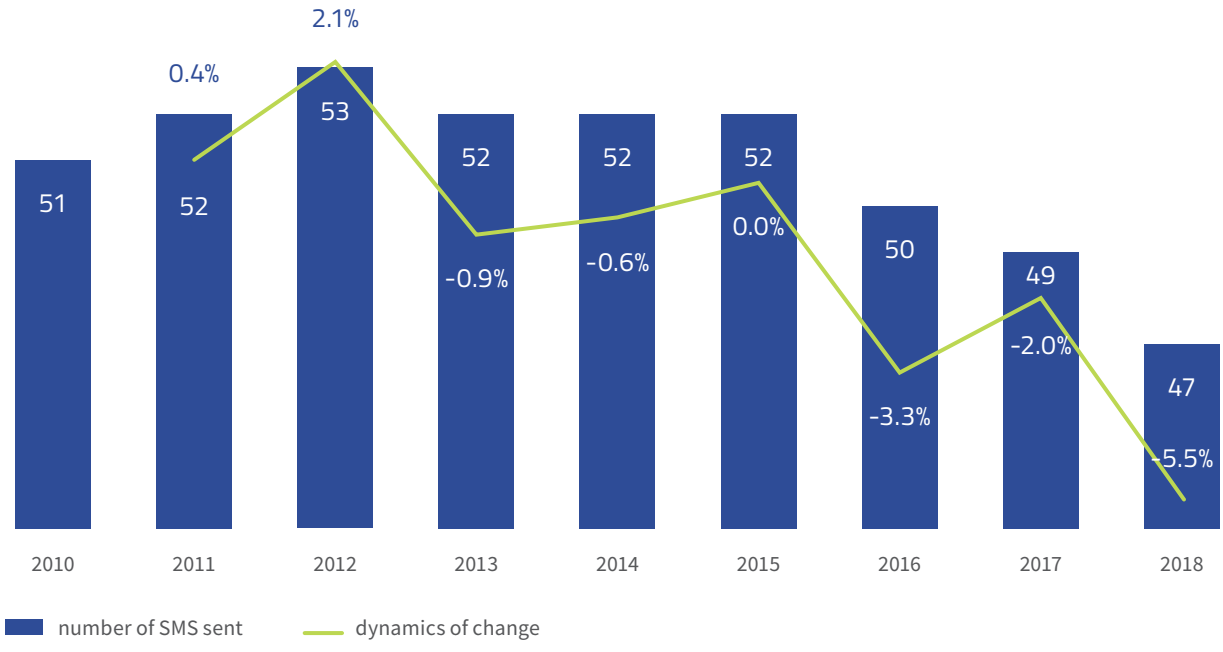


Source: Office of Electronic Communications, based on the Telecom Market Matrix database, Analysys Mason

In turn, the number of SMS sent in 2018 decreased compared to 2017 by 5.5%. The downward trend had been continuing since 2012. In 2018, 46.5 billion SMS were sent in total, or 2.7 billion less than a year earlier. This means that statistically in 2018 each Pole sent more than 100 text messages per month. The obtained data indicates that traditional SMS is replaced with messages sent via other messengers or websites.

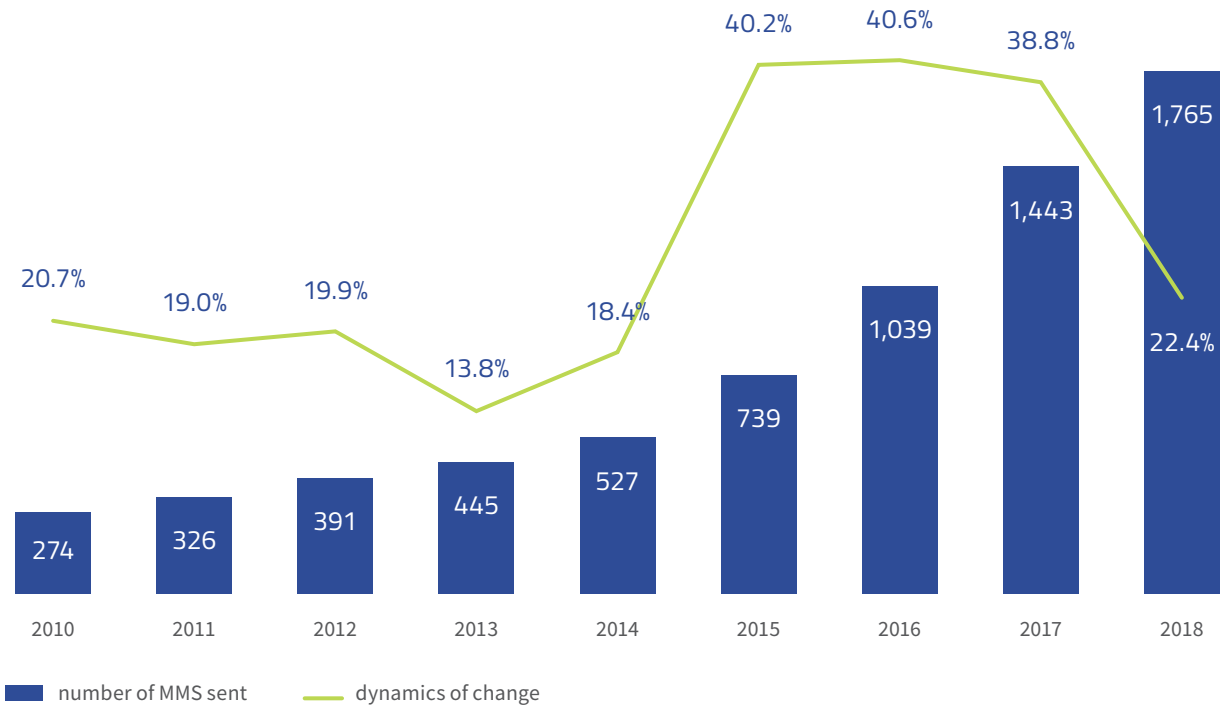
MMS messages are also popular among users. In 2018, 1.8 billion of such messages were sent. This was over 20% more than the year before. Statistically, there were 46 MMSs sent per capita, i.e. by 8 messages more than in 2017.

CHART 26. **NUMBER OF SMS MESSAGES SENT (BILLION) AND DYNAMICS OF CHANGE**



Source: UKE

CHART 27. **NUMBER OF MMS SENT (MILLION) AND DYNAMICS OF CHANGE**



Source: UKE

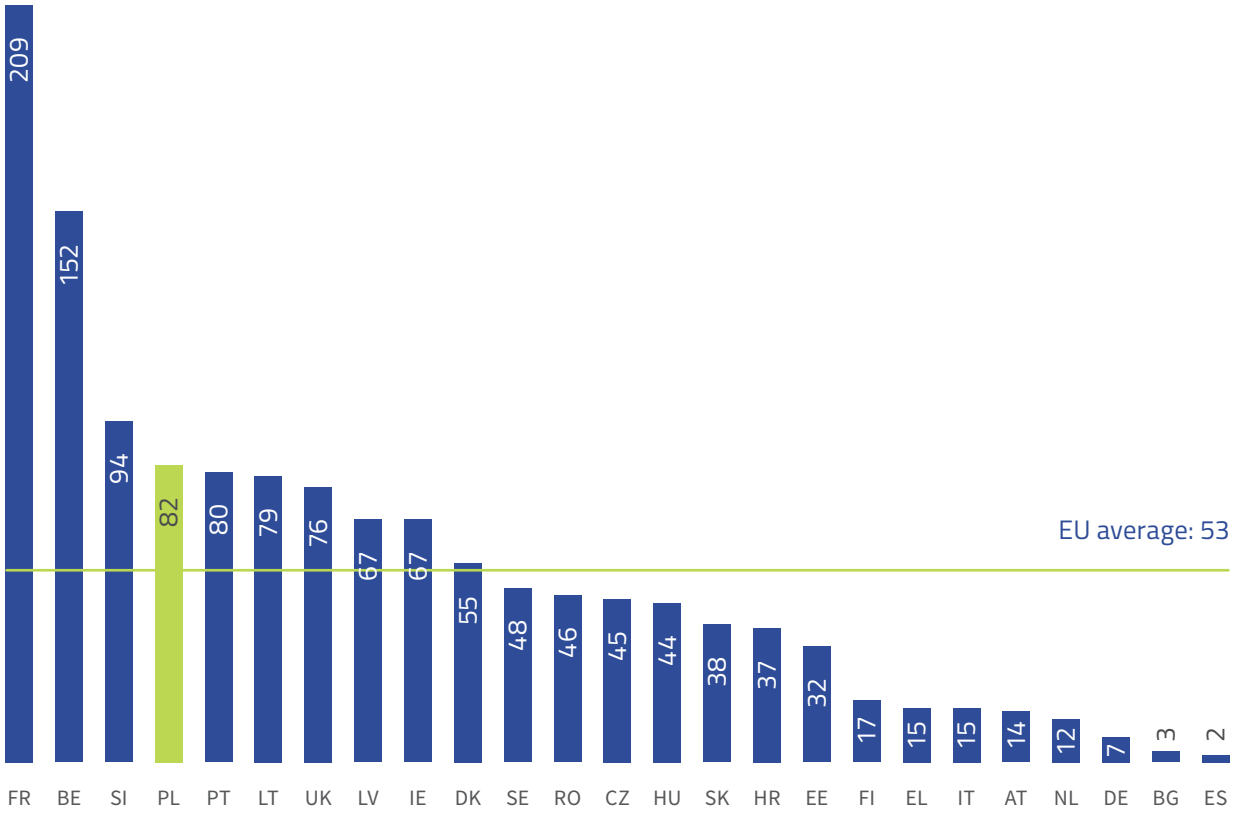
When comparing data on the number of SMS/MMS messages sent per one active user, it should be noted that Poland with the result of 82 messages is well above the EU average, which is 53 SMS/MMS. In comparison with 2017, one active mobile user in Poland sent on average 5 SMS/MMS more per month. By contrast, the EU average fell by 6 messages.

Data transmission in mobile networks has been the most dynamically developing service for several years, and a total of 3,098 PB of data was sent via mobile networks. This is a result by almost 47% better than the year before, though since 2017 we have observed that the increases are falling year on year. In statistical terms, there was an average of 84.6 GB per one Pole in 2018. This means a growth by 57.8% compared to 2017.

47%

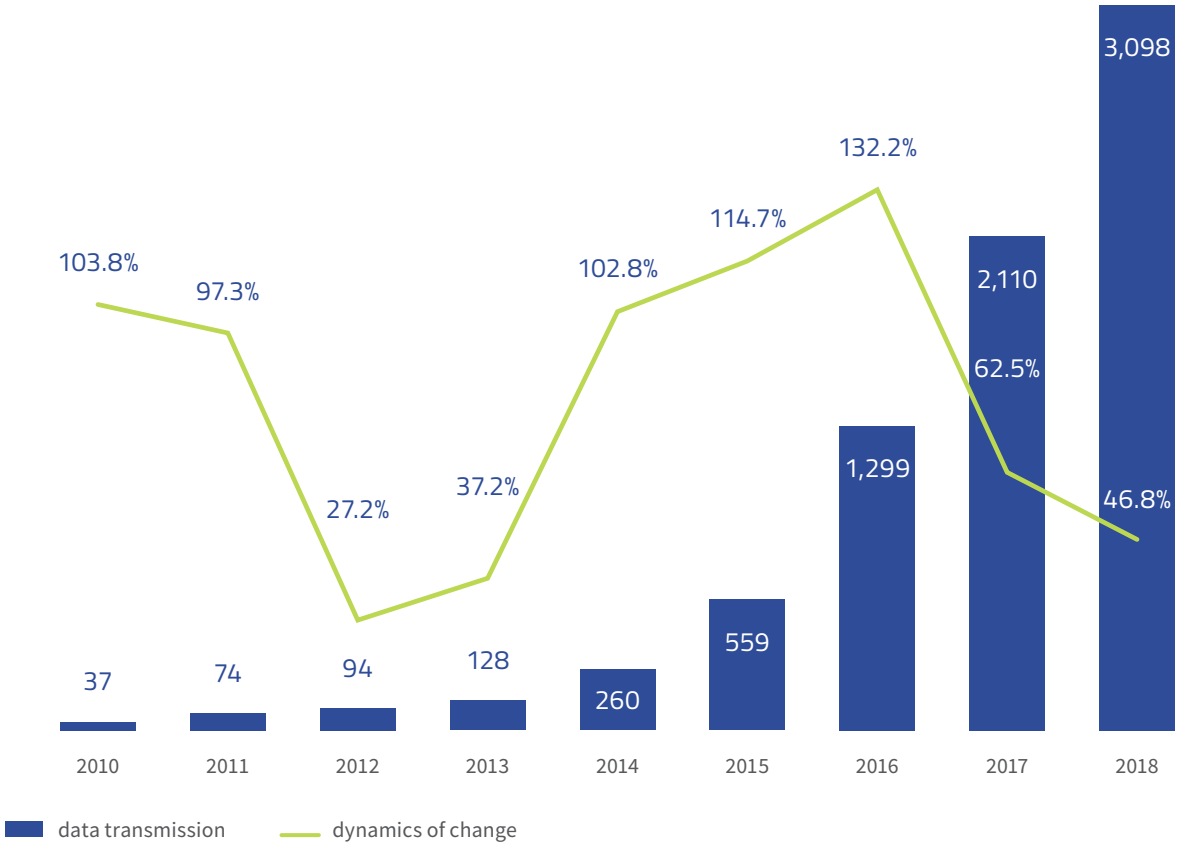
increase in the amount of data transferred

CHART 28. **AVERAGE NUMBER OF SMS/MMS SENT IN A MONTH PER ONE ACTIVE USER IN SELECTED EU COUNTRIES IN 2018**



Source: UKE based on the Telecom Market Matrix database, Analysys Mason

CHART 29. **VOLUME OF DATA TRANSMISSION (PB) AND DYNAMICS OF CHANGE**



Source: UKE

The mobile services market is steadily growing, although the growth rate is decreasing, which is the result of high penetration of mobile services in Poland. However, there are new provisioning ways and types of services, such as those based on increasingly digitalised relations with the client, which will stimulate further market growth. The changes are possible thanks to the "update" of the law, which tries to keep up with the habits or new needs and comfort of consumers, but also thanks to new technological and service opportunities. The changes are also important for the market not to be left behind other sectors or public administration which is becoming more and more digital in its relation to the client/citizen.

Andrzej Dulka, President of PIIT

2.5. 3G AND 4G/LTE NETWORK COVERAGE

The rates of coverage of the territory of Poland by the mobile network are gaining increasingly higher values. According to operators' reports, 98.8% of our country is covered by 3G network and 98% by 4G/LTE networks.

The highest 3G network coverage indicators are declared by two MNOs. The lowest coverage ratio for this type of network in 2018 was 93%. Considering the percentage of population in the range of the two networks it should be noted that the coverage of 3G and 4G/LTE networks is 100% of the population of our country. The lowest declared percentage of population in the range of 3G networks is 98% (increase by 3.3 pp. compared to 2017), while for 4G/LTE networks it is 90% (increase by 0.1 pp.).

Mobile operators were preparing for 5G by conducting first tests and educational activities. In practice, the operators experienced limitations resulting from the lack of harmonization of EMF standards in Poland with European standards, which may significantly limit development of infrastructure in the future.

Stefan Kamiński, President of KIGEiT

TABLE 1. **PERCENTAGE OF POPULATION WITHIN 3G COVERAGE IN 2018**

Operator	% of population within 3G coverage
Operator 1	100.0%
Operator 2	100.0%
Operator 3	99.8%
Operator 4	99.8%
Operator 5	98.0%

Source: UKE

Comment: Operators appear in descending order

The order in Table 1 does not have to be equivalent to the order in Table 2

TABLE 2. **PERCENTAGE OF POPULATION WITHIN 4G/LTE COVERAGE IN 2018**

Operator	% of population within 4G/LTE coverage
Operator 1	100.0%
Operator 2	99.7%
Operator 3	99.7%
Operator 4	96.7%
Operator 5	90.0%

Source: UKE

Comment: Operators appear in descending order

The order in Table 1 does not have to be equivalent to the order in Table 2

2.6. COST OF USING MOBILE TELEPHONY SERVICES

The comparison of the costs of using mobile telephony services in Poland and other European Union countries was carried out on the basis of data from the OECD Mobile Voice Price Benchmarking price database[5]. The applied methodology is authorized by OECD and provides the basis for official statistics of this organization on the prices of services.

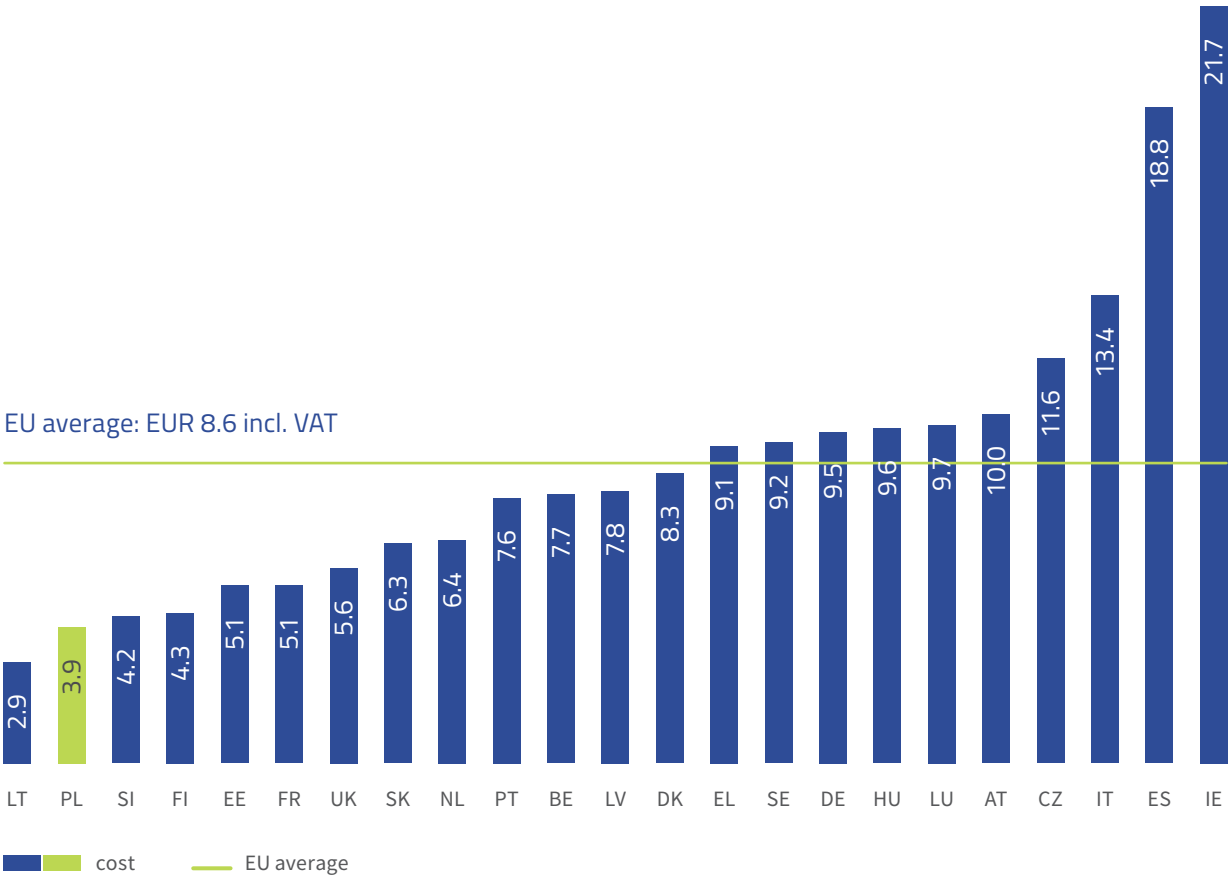
The benchmark takes into account monthly cost of services provided to individual users, characterized by low, moderate and high use of mobile telephony services. The cheapest offer was chosen for each basket and country as of November 2018.

The analysis shows that in Poland, the value of the basket of mobile telephony services is one of the lowest in Europe. This is especially visible for moderate and intensive use of services.

In the case of occasional use of mobile telephony, the customer of the Polish network bears the monthly cost of EUR 3.9. This means that the offer is cheaper than the EU average of EUR 8.6. The analysis includes a service consisting of 30 minutes of calls and not containing a data package.

[5] The database developed by the analytic company Strategy Analytics

CHART 30. **AVERAGE MONTHLY COST OF USING MOBILE SERVICES WITH LOW USAGE OF SERVICES IN 2018 (EUR WITH VAT)**

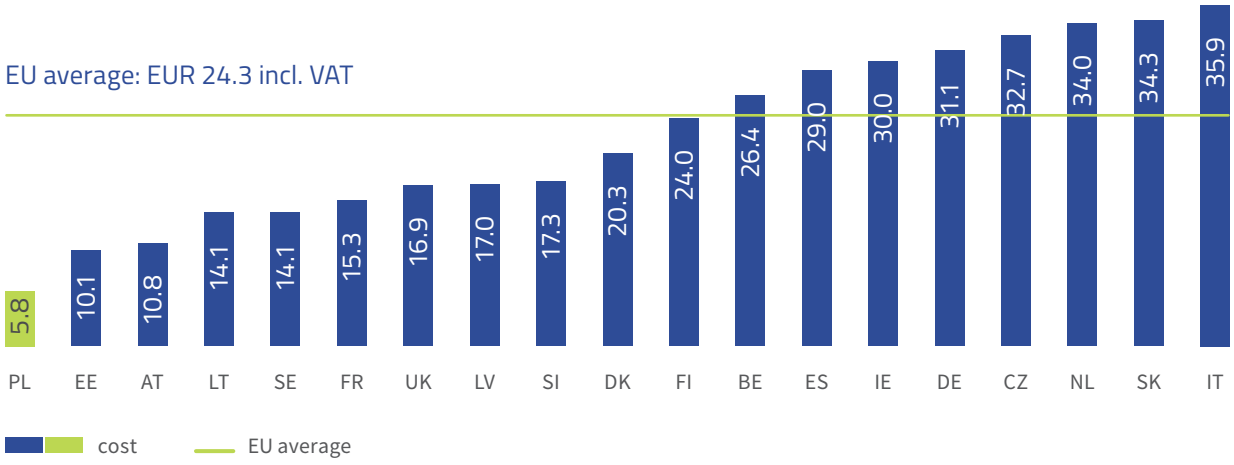


Source: UKE based on OECD Mobile Voice Price Benchmarking

If we consider the average use of mobile telephony services, in 2018 the cost of such services in Poland was EUR 5.8. However, according to data for selected European countries, an average of EUR 24.3 was paid. A service consisting of unlimited calls and a 5 GB data package was selected for the analysis.

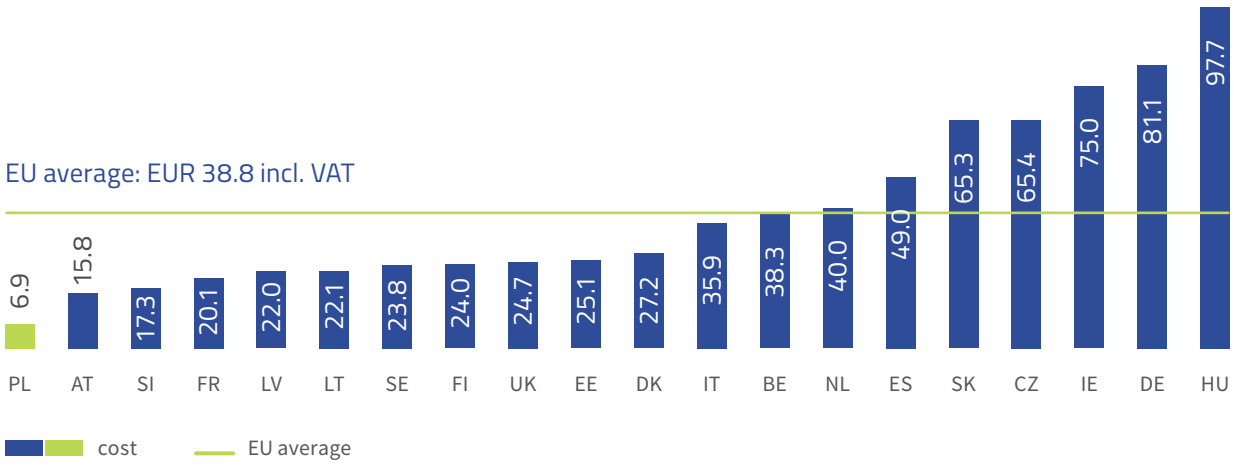
In the case of very active users in Poland, we bear the lowest costs of mobile telephony services. Intensive use of this type of services was associated with a fee of EUR 6.9, more than five times less than the European average. The analysis took into account the services consisting of unlimited calls and a data package of at least 20 GB.

CHART 31. **AVERAGE MONTHLY COST OF USING MOBILE SERVICES WITH MODERATE USAGE OF SERVICES (EUR WITH VAT)**



Source: UKE based on OECD Mobile Voice Price Benchmarking

CHART 32. **AVERAGE MONTHLY COST OF USING MOBILE SERVICES WITH HIGH USAGE OF SERVICES (EUR WITH VAT)**



Source: UKE based on OECD Mobile Voice Price Benchmarking

2.7. ROAMING

In 2018, as in the previous year, we observed a large impact of the introduction of the "Roam Like At Home" principle on the use of mobile telephony services by Poles. The use of the same rates for voice calls, text messages and data transmission in Poland and other EU countries meant that Poles abroad used their mobile phones more often.
The total duration of voice calls made (originated) by Poles outside the country as part of roaming in 2018 amounted to 4.3 billion minutes. In comparison to the previous year, this is an increase by almost 32%.

32%

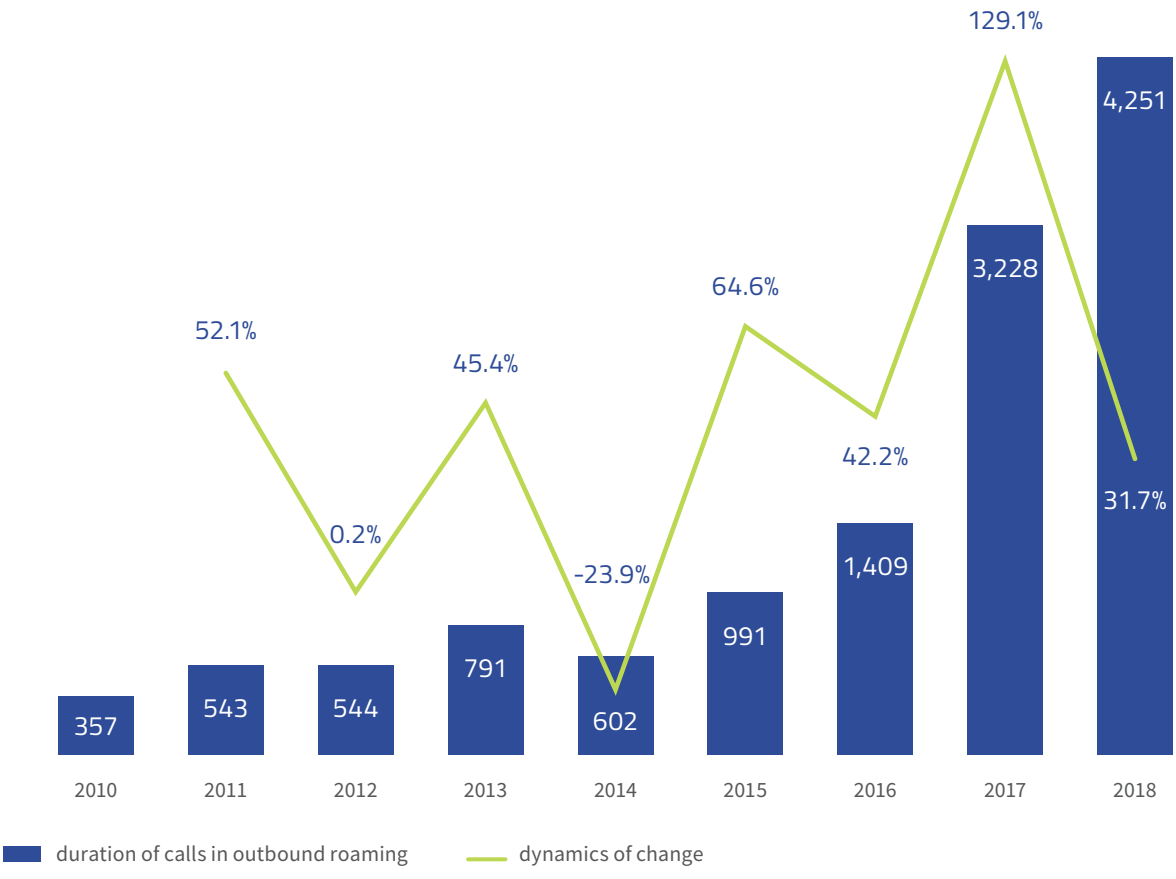
increase in the duration of voice calls in roaming

Also, the number of SMS messages sent by Poles abroad in roaming increased in 2018 compared to 2017. The increase was 24% and was smaller than in the previous reporting period (increase by 64%). Subscribers of Polish mobile networks sent over 1.3 billion roaming SMS.

24%

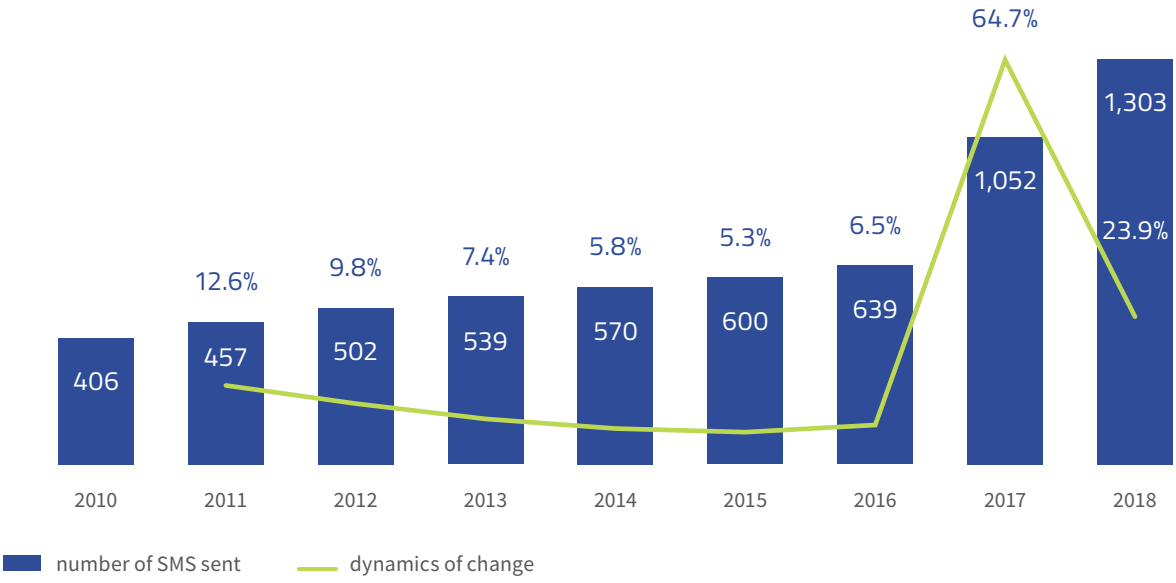
increase in the number of SMS sent in roaming

CHART 33. **TOTAL DURATION OF OUTGOING VOICE CALLS IN OUTBOUND ROAMING (MILLION MINUTES)**



Source: UKE

CHART 34. **TOTAL NUMBER OF SMS SENT IN OUTBOUND ROAMING (MILLION)**

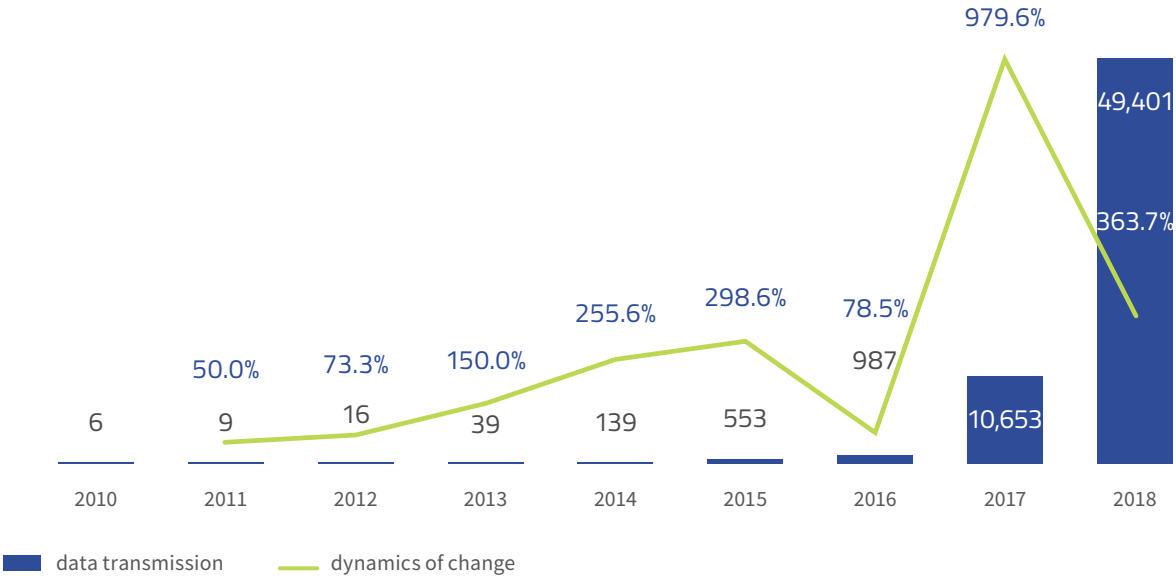


Source: UKE

The largest dynamics of change in outbound roaming services was recorded in the field of data transmission. This transmission was more than 4.6 times greater than a year earlier.

4.6-fold
increase in data roaming

CHART 35. **TOTAL DATA TRANSMISSION VOLUME IN OUTBOUND ROAMING (MILLION MB)**



Source: UKE

3. BUNDLED SERVICES

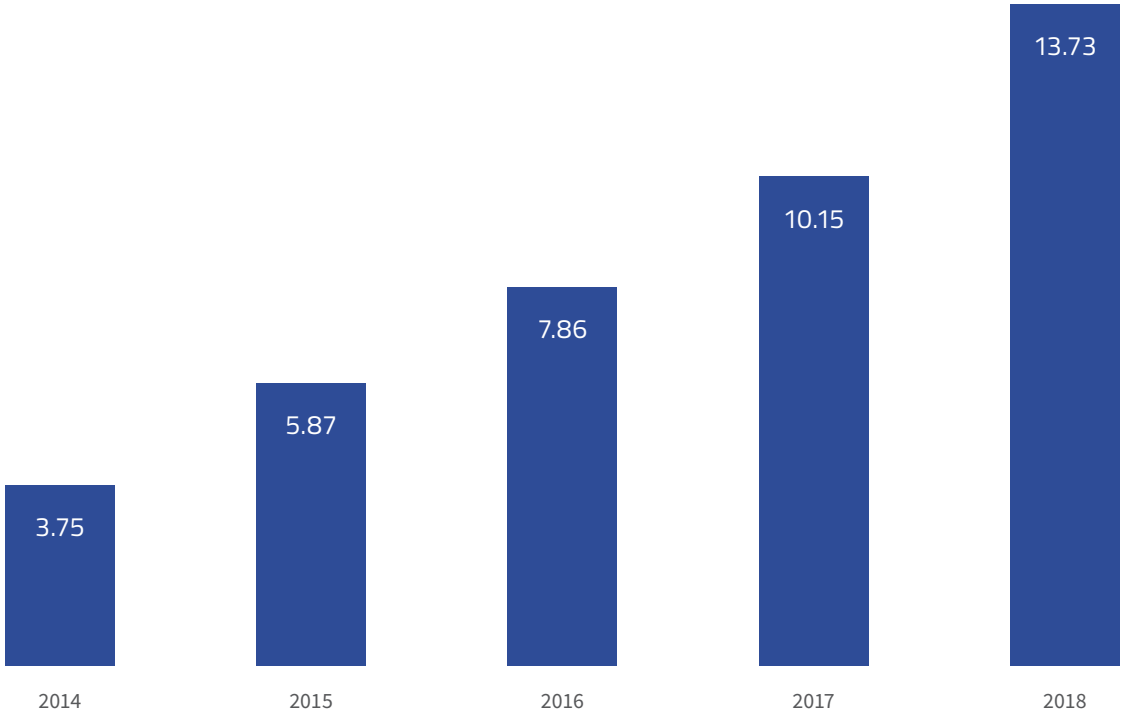
3.1. GENERAL INFORMATION

Bundled services are still one of the most dynamically developing segments of the telecommunications market. The average increase in the number of users over the past 5 years reached the level of 39%.

Converged services continued to grow. Noteworthy is the range of services offered in 2018, as a result of the acquisition of Netia by Cyfrowy Polsat. It includes television, fixed-line internet, mobile telephony, but also services from outside the telecommunications market, such as energy, banking services, insurance, media and other services from the FMCG area.

Stefan Kamiński, President of KIGEiT

CHART 36. **NUMBER OF USERS OF BUNDLED SERVICES (MILLION)**



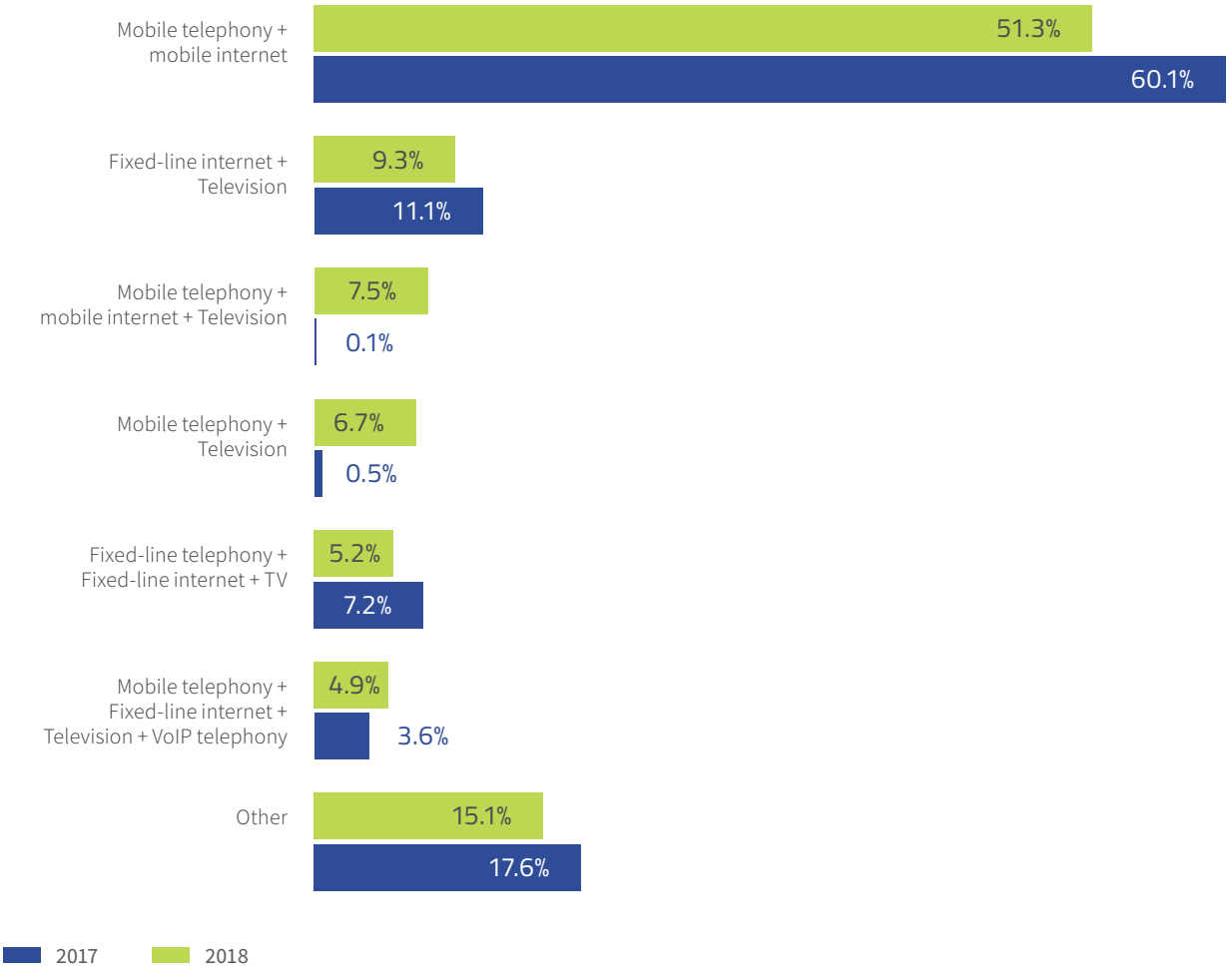
Source: UKE

The popularity of convergent services among telecommunications undertakings is constantly growing, which is not only a consequence of their striving to stand out in the market, but also a response to the expectations of customers who want to receive a package of services from one supplier. The portfolio includes not only fixed-line services (mainly access to the internet) and mobile services, but also banking and energy services. The fact that telecommunications undertakings perceive the potential in bundled services is confirmed by their strategic decisions, such as the takeover of Netia by the Cyfrowy Polsat Group, the decision of T-Mobile to provide broadband services or UPC on the provision of mobile services in the virtual operator model.

Andrzej Dulka, President of PIIT

In 2018, the most popular service bundles were the "Mobile telephony + mobile internet" (51.3%) and "Fixed-line internet + Television" (9.3%). In both cases there was a decrease compared to 2017, respectively by 8.8 pp. and 1.8 pp. On the other hand, customers' interest in the service bundles of "Mobile telephony + mobile internet + TV" (7.5%) and "Mobile telephony + Television" (6.7%) increased.

CHART 37. **MOST POPULAR BUNDLES**



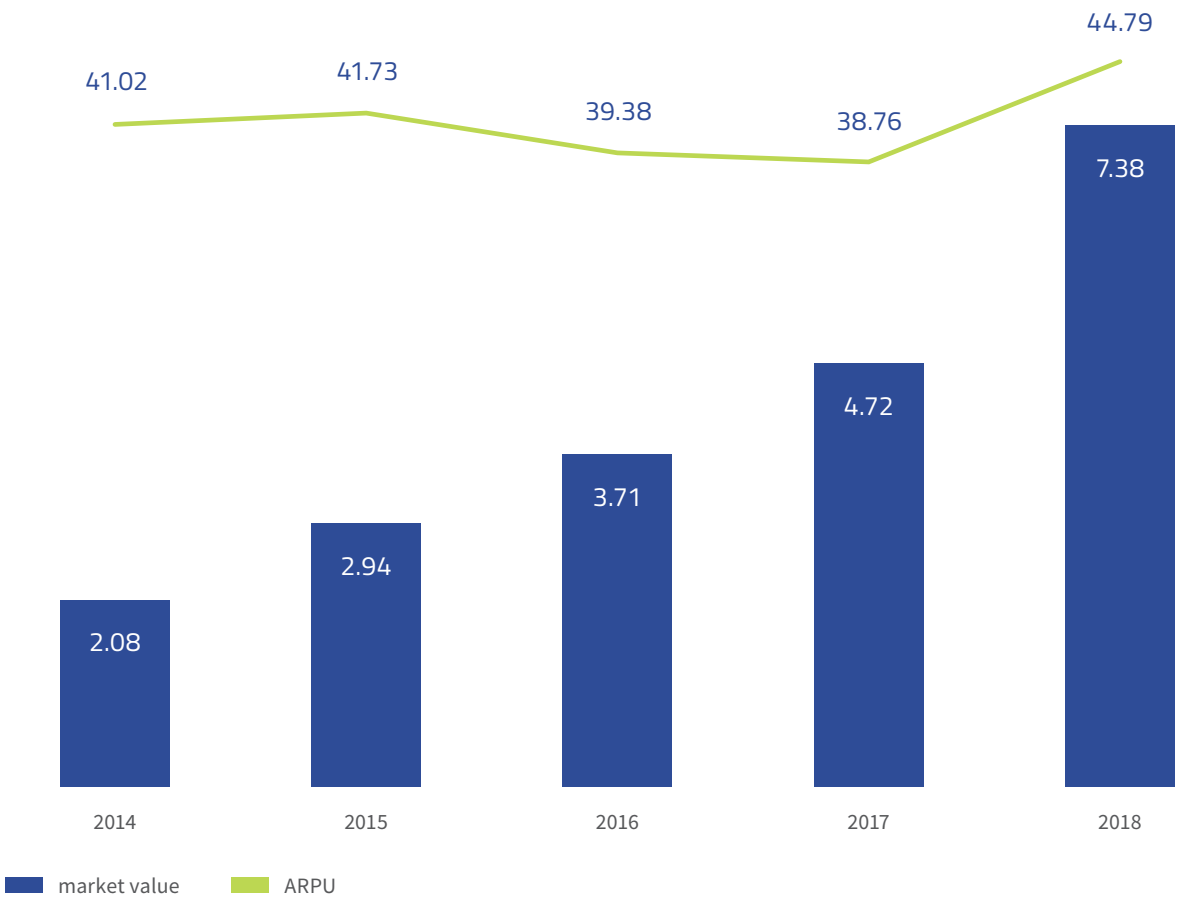
Source: UKE

3.2. REVENUES

The value of the bundled services market in comparison to 2017 increased by 56% and amounted to PLN 7.38 billion. The average monthly revenue per user in 2018 was around PLN 45, which is just over PLN 6 more than in 2017.

PLN 7.38 billion
value of the bundled services market

CHART 38. **VALUE OF THE MARKET (PLN BILLION) AND AVERAGE MONTHLY REVENUE PER USER (ARPU IN PLN)**



Source: UKE

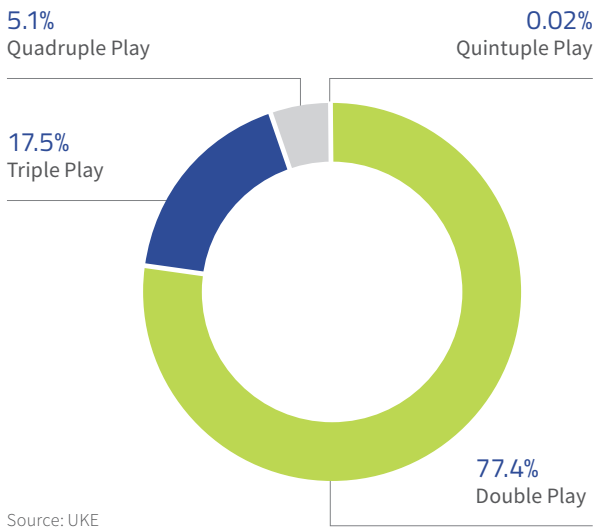
3.3. SUBSCRIBERS

Over 77% of bundled services users chose Double Play packages. Compared to the data collected in 2017, you can see that users were switching to Triple Play (17.5%) and Quadruple Play packages (5.1%).

77.4%
users choose Double Play bundles

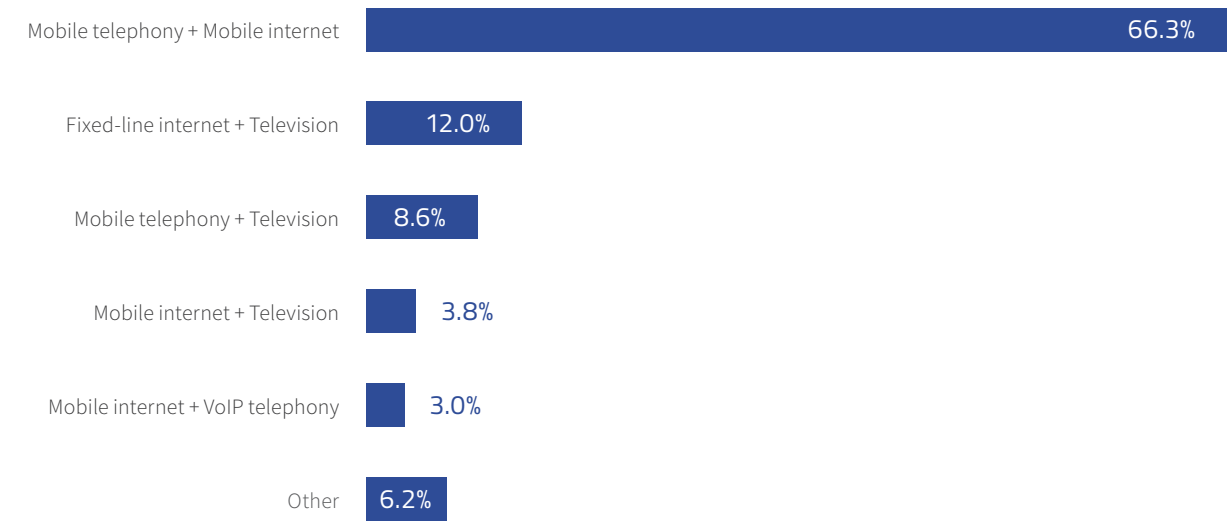
Among bundles composed of two services, the vast majority of users chose the "Mobile telephony + mobile internet" package (66.3%). The second most frequently chosen bundle was "Fixed-line internet + Television" (12%). The third position among the Double Play services was taken by the "Mobile telephony + Television" (8.6%) bundle.

CHART 39. **SHARES OF BUNDLES IN TERMS OF NUMBER OF USERS**



Source: UKE

CHART 40. **SHARE OF INDIVIDUAL DOUBLE PLAY BUNDLES IN TERMS OF NUMBER OF USERS**



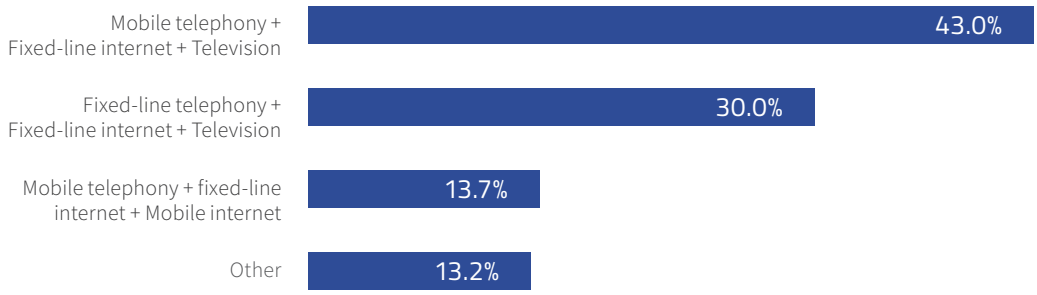
Source: UKE

Among the Triple Play services, the shares of individual bundles are more evenly distributed than in the case of other bundled services. The first position, with the result of 43%, was taken by the "Mobile telephony + Fixed-line internet + Television" bundle. The second position, with the share of 30%, was taken by the "Fixed-line telephony + Fixed-line internet + Television" bundle.

In the case of the number of users of bundles consisting of four services, the "Mobile telephony + Fixed-line internet + Television + VoIP telephony" bundle definitely dominates. About 95% of users of Quadruple Play opted for it. The second position was taken by the "Fixed-line telephony + Fixed-line internet + Mobile internet + Television" service with the result of 3%.

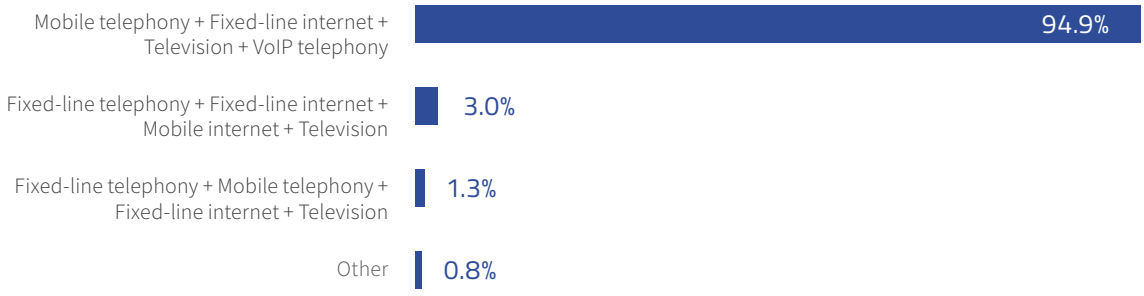
98% of the market of bundled services consisting of five elements is the "Fixed-line telephony + Mobile telephony + Fixed-line internet + Mobile internet + Television" service.

CHART 41. **SHARES OF INDIVIDUAL TRIPLE PLAY BUNDLES IN TERMS OF NUMBER OF USERS**



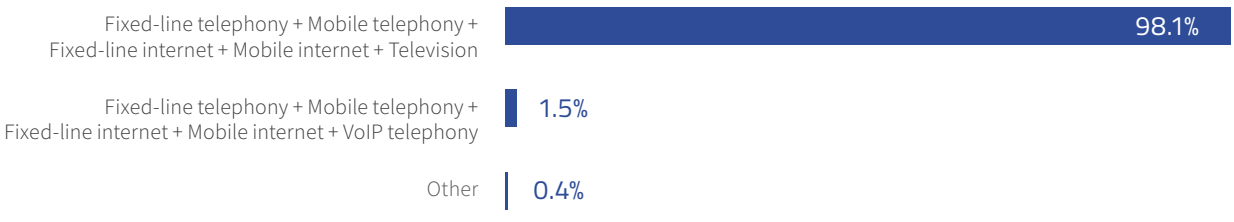
Source: UKE

CHART 42. **SHARES OF INDIVIDUAL QUADRUPLE PLAY BUNDLES IN TERMS OF NUMBER OF USERS**



Source: UKE

CHART 43. **SHARES OF INDIVIDUAL QUINTUPLE PLAY BUNDLES IN TERMS OF NUMBER OF USERS**

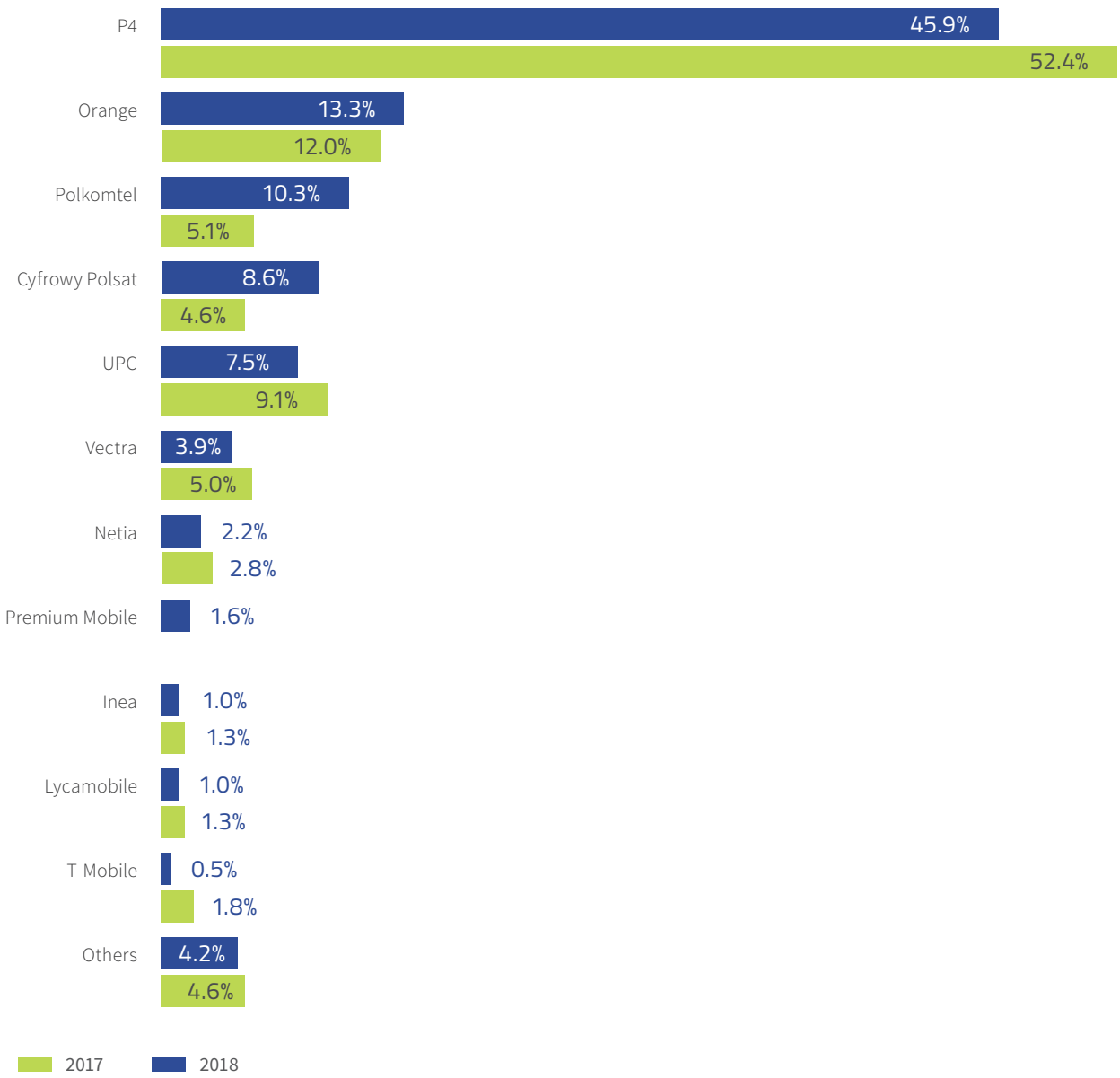


Source: UKE

3.4. MARKET STRUCTURE

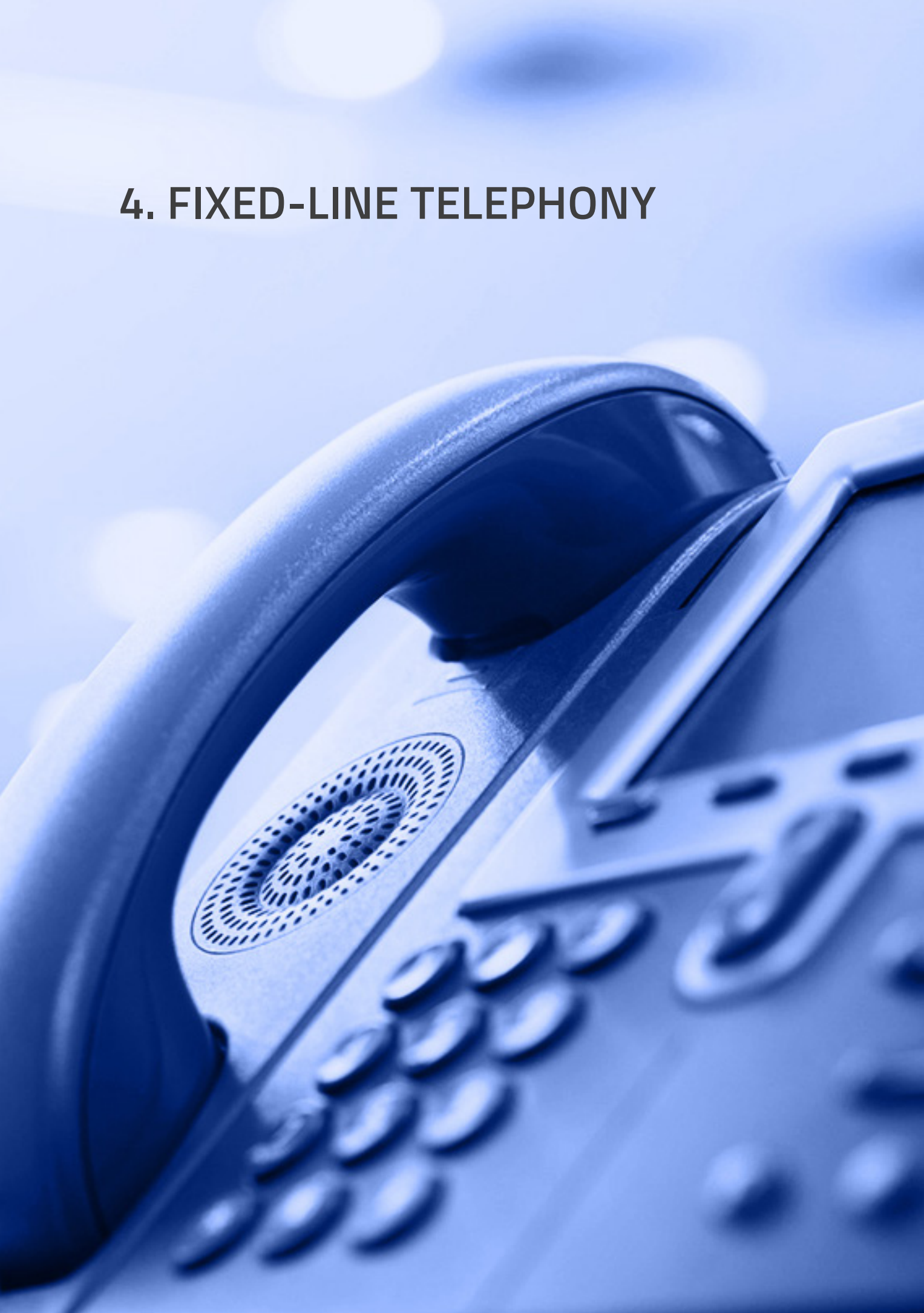
Invariably for several years, the operator attracting the largest group of bundled services clients (around 46%) is P4. In comparison to 2017, it is a 6.5 pp decrease. Orange managed to gather more than 13% of users of bundled services. Polkomtel recorded an increase in users of bundled services by 5.2 pp.

CHART 44. **SHARES OF OPERATORS IN TERMS OF NUMBER OF BUNDLED SERVICES USERS**



Source: UKE

4. FIXED-LINE TELEPHONY



4.1. GENERAL INFORMATION

In 2018, almost 4.1 million users used fixed-line telephony services in Poland. The value of the fixed-line telephony market amounted to PLN 1.9 billion. In comparison to last year, the value decreased by almost 16%.

4.1 million

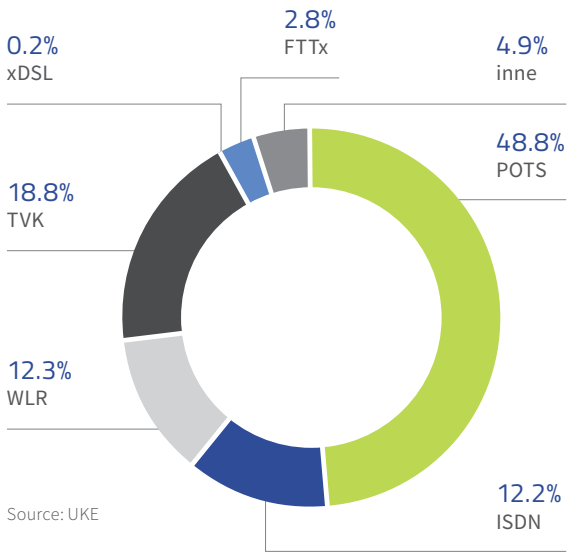
users of fixed-line telephony in Poland

The largest number of proprietary subscriber lines, almost half (48.8%) of all fixed lines, were POTS lines. Clear growth, in relation to the previous period, was recorded in relation to cable TV connections which became the second technology used by fixed-line telephony operators in terms of number of lines (18.8%) in Poland. In the third place (12.3%), there was WLR followed by ISDN (12.2%). The latter, along with development of NGA, are losing their current position among the most popular technologies.

1.9 billion

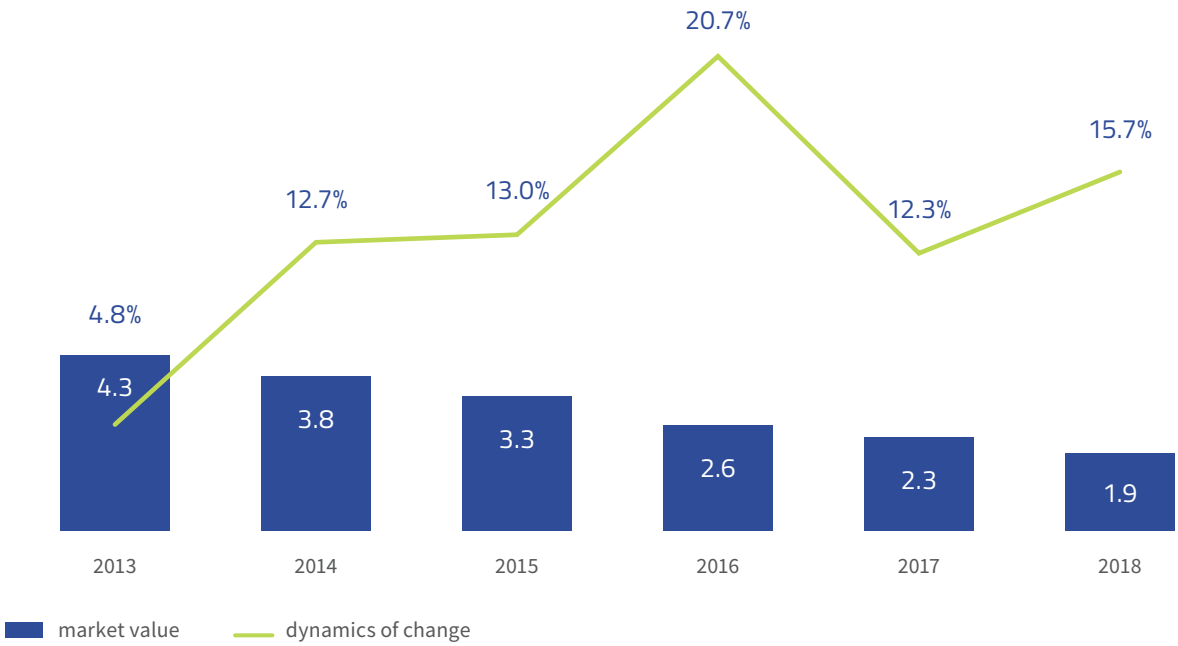
value of the fixed-line telephony market in Poland

CHART 46. **PERCENTAGE SHARE OF TYPES OF LINES IN THE TOTAL SHARE OF SUBSCRIBER LINES**



Source: UKE

CHART 45. **VALUE OF THE FIXED-LINE TELEPHONY MARKET (PLN BILLION) AND DYNAMICS OF CHANGE**



Source: UKE

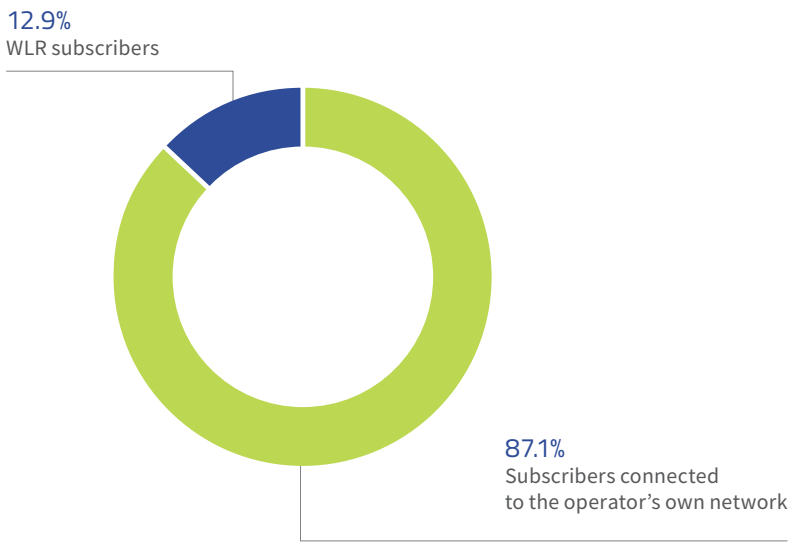
4.2. REVENUES

The value of the fixed-line telephony market in Poland has been declining for 5 years. In 2018, the revenues of fixed-line telephony operators amounted to PLN 1.9 billion.
In comparison to the previous year, there was a decrease by approx. 16%.

The main source of revenues for operators providing fixed-line telephony services was the revenues from subscribers connected to the operator's own network. Only about 13% constituted the revenues from WLR subscribers.

16%
decrease in revenues from fixed-line telephony

CHART 47. **STRUCTURE OF REVENUES IN TERMS OF THE TYPE OF SUBSCRIBER LINES USED**



Source: UKE

4.3. SUBSCRIBERS

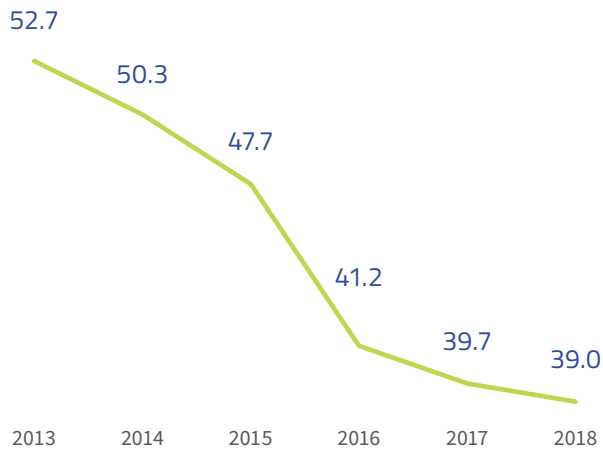
Since 2013, the number of subscribers to the fixed-line telephony service has been steadily decreasing. Compared to 2017, this number fell by over 14%.

14%

decrease in the number
of fixed-line telephony subscribers

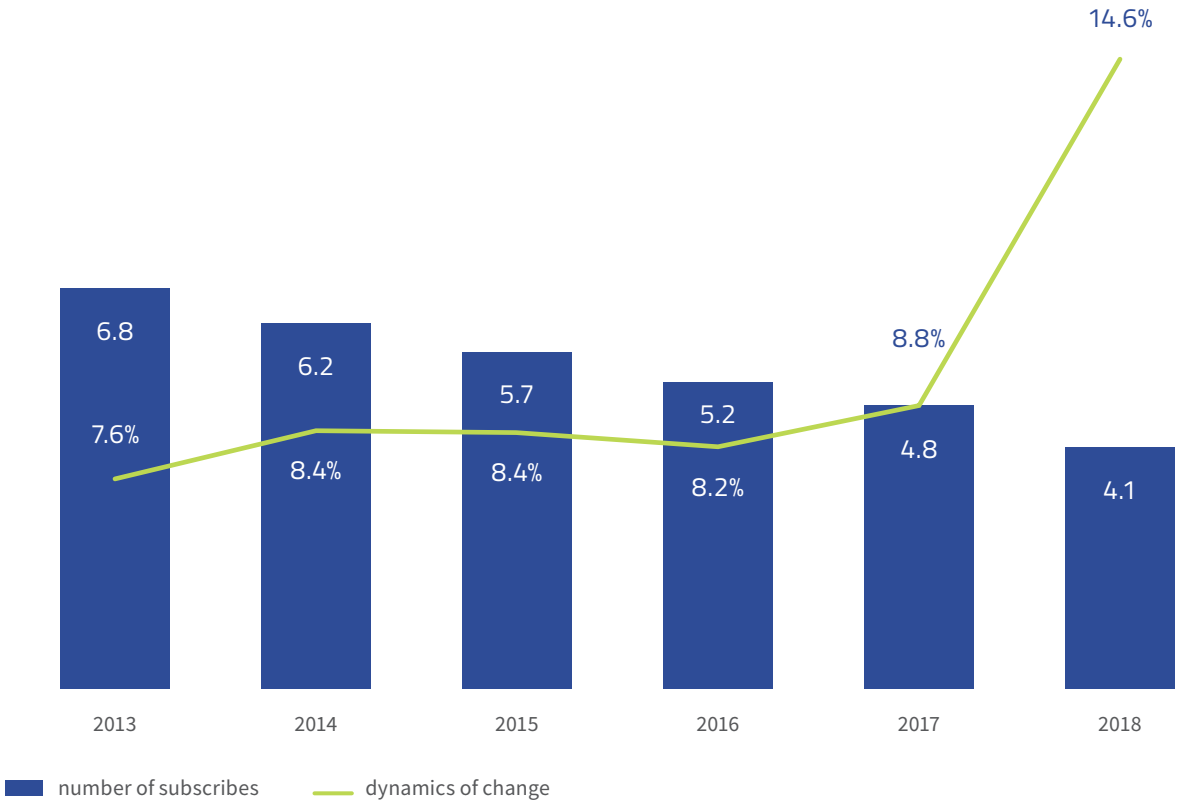
The downward trend in the fixed-line telephony market also translated into a drop in the average revenues of telecommunications operators per user (ARPU). This indicator was at the level of PLN 39.

CHART 49. **DYNAMICS OF ARPU CHANGES (PLN)**



Source: UKE

CHART 48. **NUMBER OF SUBSCRIBERS (MILLION) AND DYNAMICS OF CHANGE**

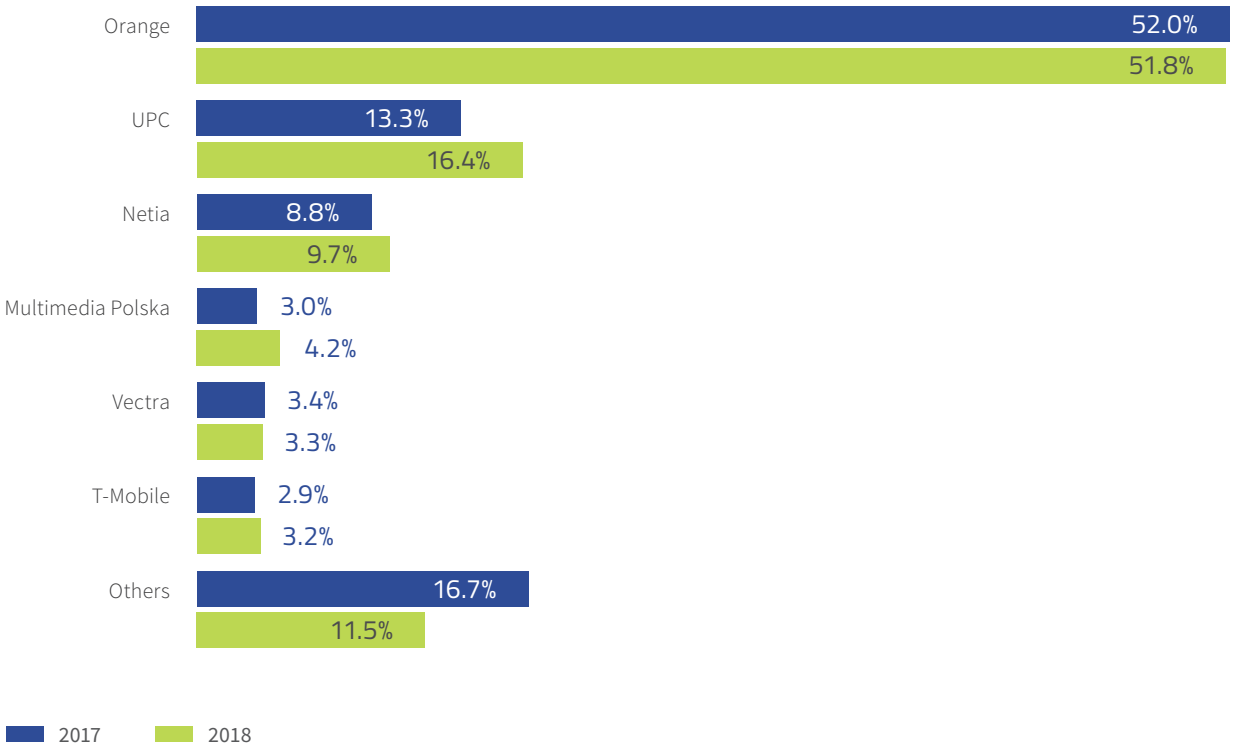


Source: UKE

4.4. MARKET STRUCTURE

In 2018, Orange Polska (51.8%) still had more than half of the market share in the fixed-line telephony market in terms of number of users. UPC took the second place (16.4%), followed by Netia (9.7%), Multimedia Polska (4.2%), Vectra (3.3%) and T-Mobile (3.2%), respectively. The share of other operators in the market decreased by more than 5 pp.

CHART 50. **SHARES OF OPERATORS IN TERMS OF NUMBER OF SUBSCRIBERS**

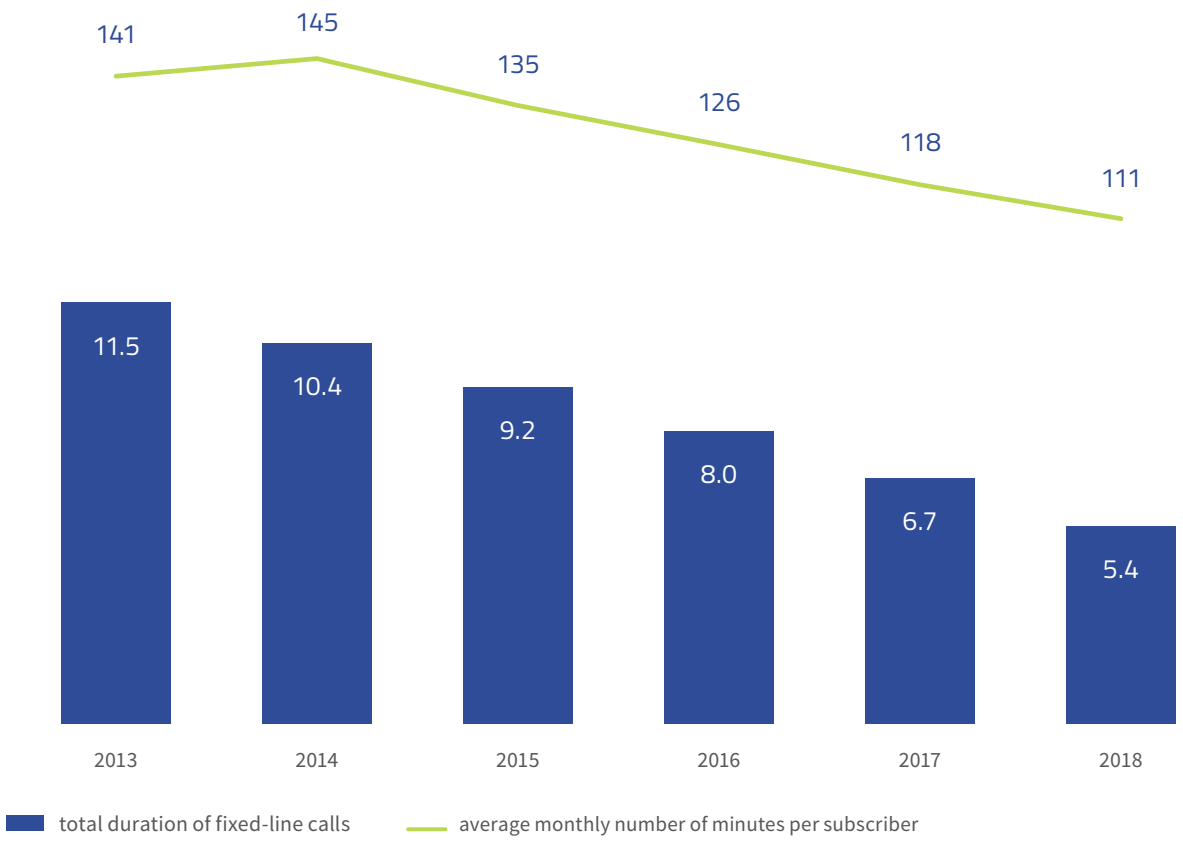


Source: UKE

4.5. TRAFFIC VOLUME

The fixed-line telephony market has been recording a systematic decrease in the volume of traffic over the last 6 years. Total duration of fixed-line calls was 5.4 billion minutes in 2018. With reduced duration of calls, the number of minutes per one subscriber also decreased. In 2018, it amounted to 111 minutes. The volume of calls consisted primarily of domestic calls (92.5%). Only 7.5% of the traffic was the result of international calls.

CHART 51. **TRAFFIC VOLUME (BILLION MINUTES) AND AVERAGE MONTHLY NUMBER OF MINUTES PER SUBSCRIBER**



Source: UKE

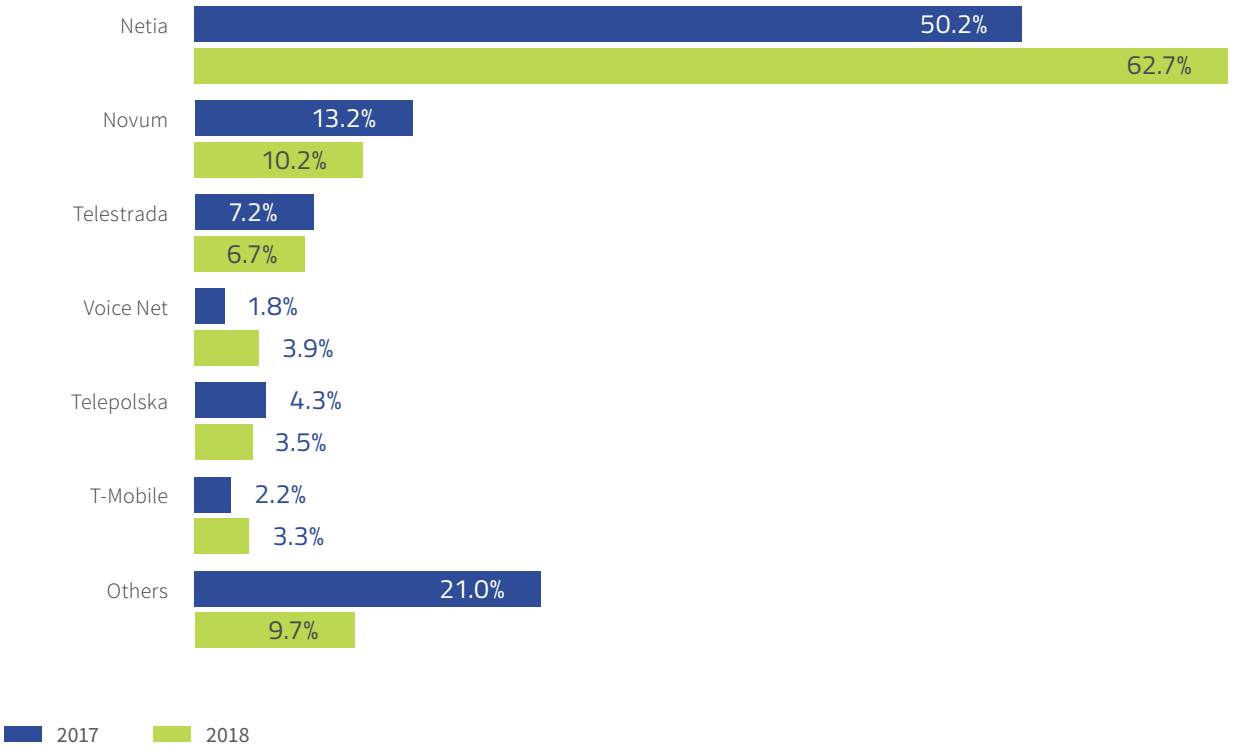
4.6. WHOLESALE LINE RENTAL (WLR)

Revenues from Wholesale Line Rental amounted to PLN 0.242 billion in 2018. In comparison to the previous year, the value decreased by PLN 0.043 billion.

Among the operators operating in the WLR market, Netia had the largest share in revenues (62.7%). Novum (10.2%) and Telestrada (6.7%) reported significantly lower revenues.

In 2018, the total of WLR subscriber lines amounted to 0.58 million. Compared to the previous year, this number decreased by 5%.

CHART 52. **SHARES IN REVENUES FROM THE PROVISION OF WLR SERVICES**



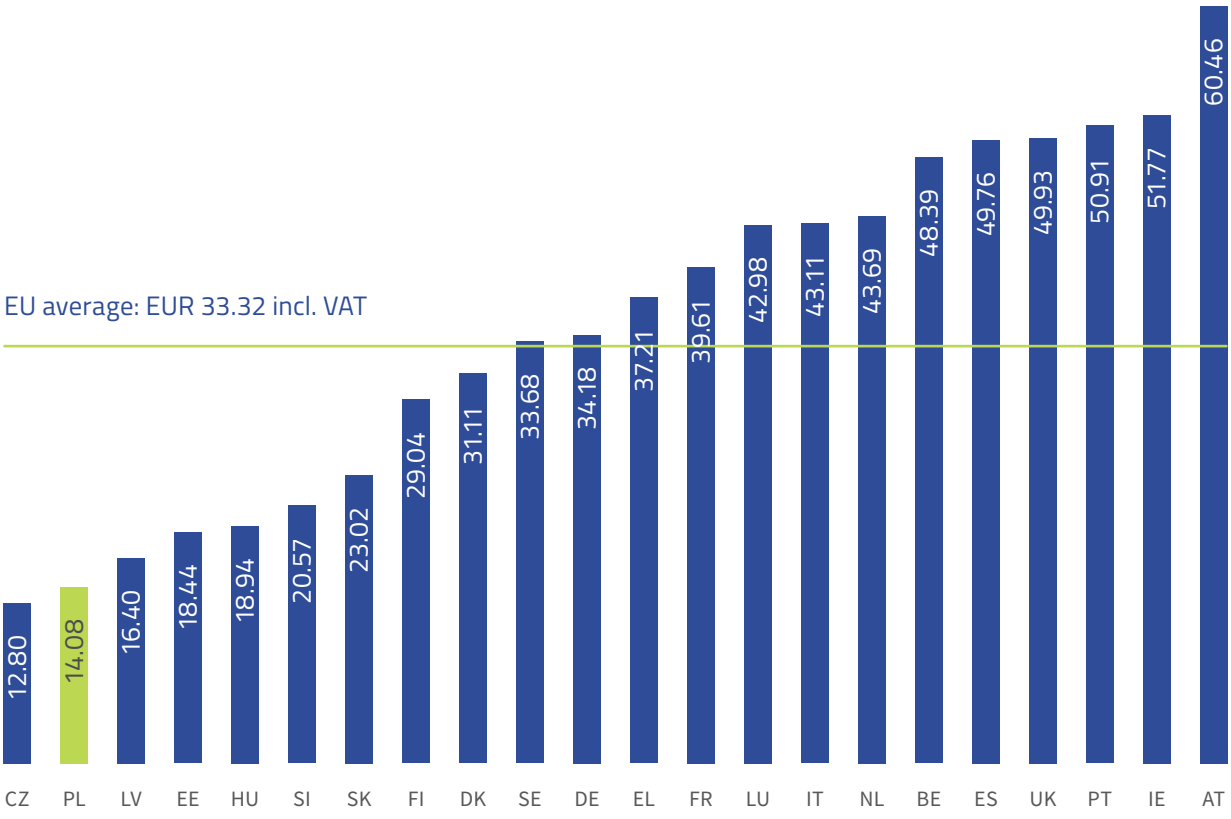
Source: UKE

4.7. PRICES OF FIXED-LINE TELEPHONY SERVICES

The price analysis was made on the basis of the OECD *Fixed Voice Price Benchmarking* database. As part of the database, the price lists of the largest telecommunications operators in selected European and world countries were collected. For the purpose of this study, the medium usage basket was used.

At the end of 2018, the average price of fixed-line telephony services in selected EU countries was EUR 33.32. The lowest costs were paid by users from the Czech Republic (EUR 12.80), and the highest by the inhabitants of Austria (EUR 60.47). The costs that a fixed-line telephone user had to incur in Poland amounted to EUR 14.08 and were lower by more than EUR 19 than the average price of selected countries in the ranking. Among the countries included in the list, prices in Poland were the second cheapest right after the Czech Republic.

CHART 53. **MONTHLY BASKET VALUES FOR A MODERATELY ACTIVE USER IN SELECTED EU COUNTRIES (EUR WITH VAT)**



Source: OECD Fixed Voice Price Benchmarking

5. VOIP TELEPHONY

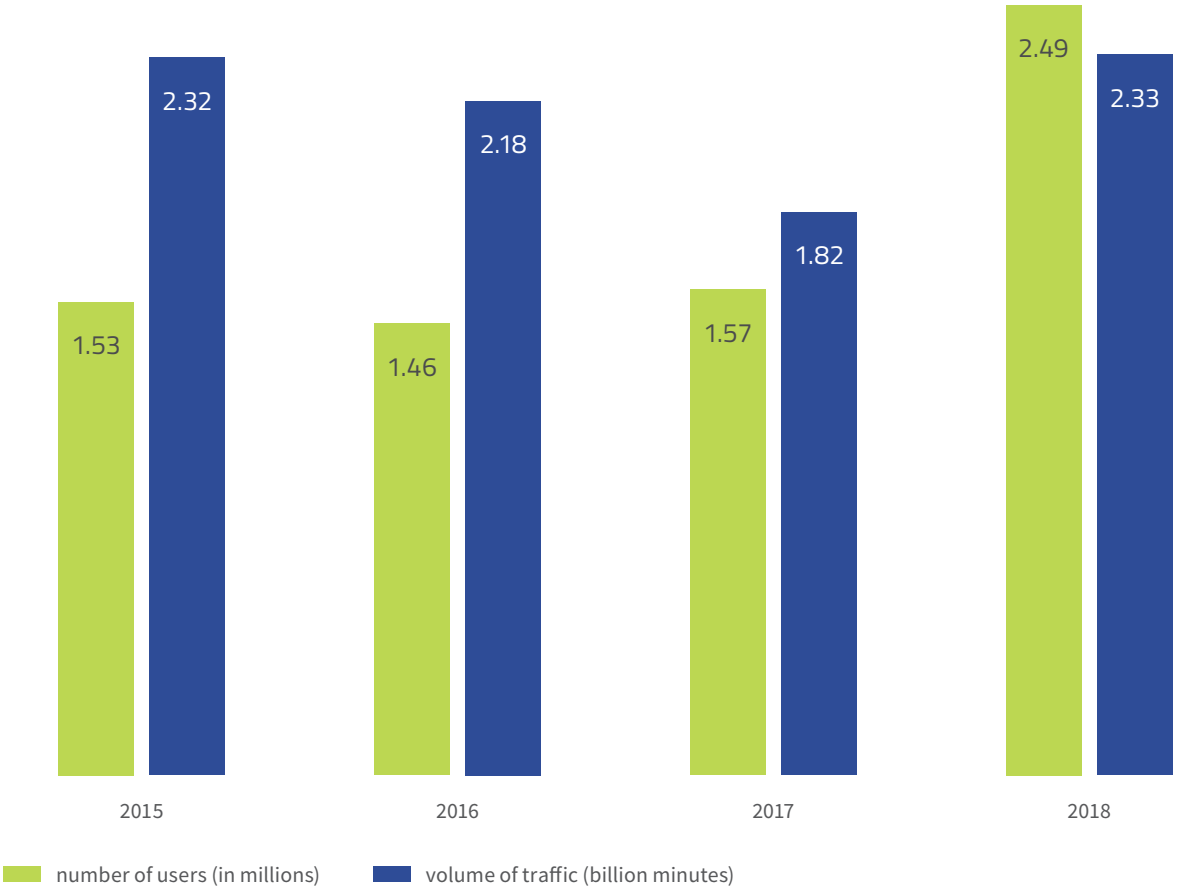
5.1. NUMBER OF USERS AND TRAFFIC VOLUME

In 2018, an increased interest of users in VoIP telephony services could be noticed (about 59% of increase compared to 2017). The increase in the number of subscribers resulted in longer duration of outgoing calls by 28%.

59%
increase in the number of VoIP users

28%
increase in VoIP traffic

CHART 54. **NUMBER OF USERS AND TRAFFIC VOLUMES FOR VOIP SERVICES**



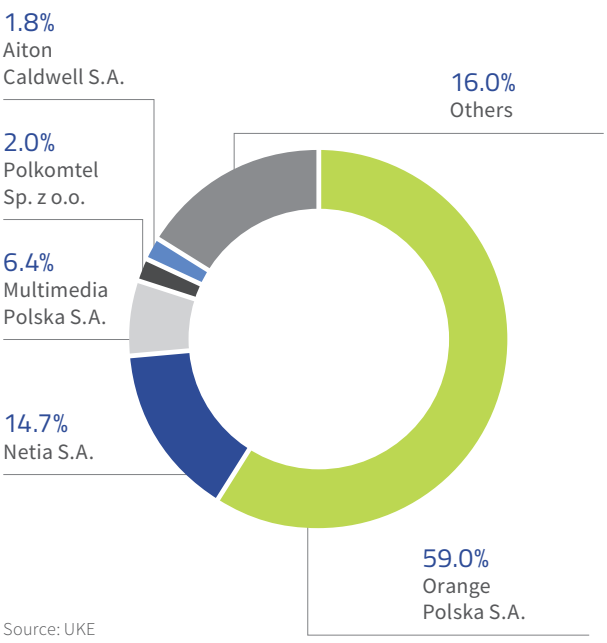
Source: UKE

5.2. MARKET STRUCTURE

The operator with almost 60% of users of VoIP telephony services, excluding services provided with the use of pre-paid scratch cards, was Orange Polska. Netia located in the second place with almost 15% of users. The third position was taken by Multimedia Polska S.A. with the share of approx. 6.5% of subscribers.

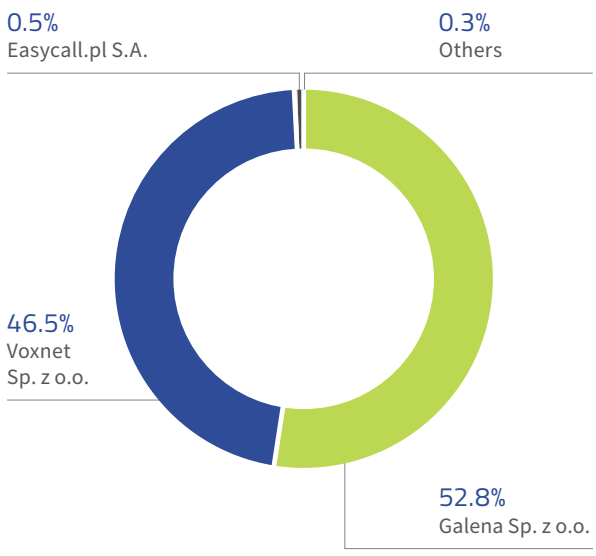
In the case of entities providing VoIP telephony services using pre-paid scratch cards, we are dealing with a completely different structure. Galena, the operator of the "Telegrosik" service, was the leader with almost 53% of shares. Voxnet (46.5%) has approx. by 6.3% fewer users in their customer base.

CHART 55. **SHARES OF OPERATORS IN TERMS OF NUMBER OF USERS OF VOIP TELEPHONE SERVICES, EXCLUDING SERVICES PROVIDED WITH THE USE OF PRE-PAID SCRATCH CARDS**



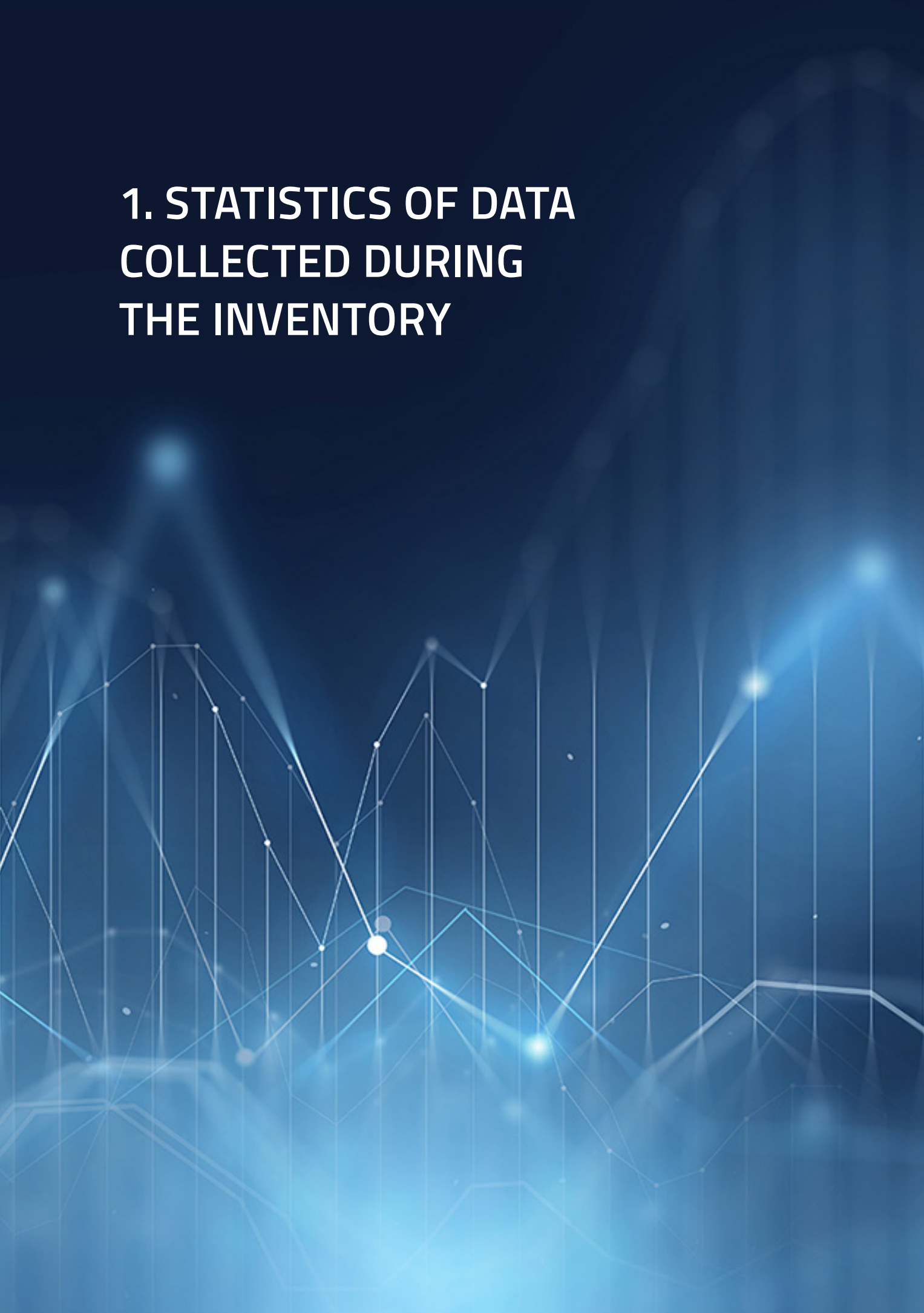
Source: UKE

CHART 56. **SHARES OF OPERATORS IN TERMS OF NUMBER OF USERS OF VOIP TELEPHONE SERVICES PROVIDED USING THE PRE-PAID SCRATCH CARDS**



Source: UKE

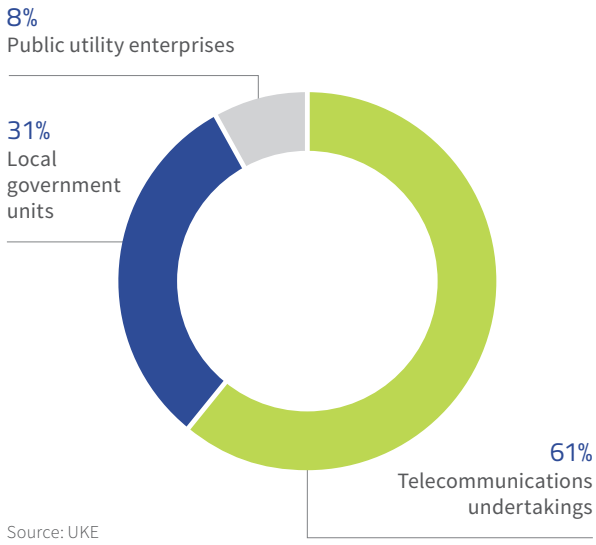
1. STATISTICS OF DATA COLLECTED DURING THE INVENTORY



In the Information System on Broadband Infrastructure (SIIS), used to provide data as part of the annual inventory of telecommunications infrastructure and services, a total of 8,956 entities were included (by 404 fewer than in the previous year). The difference in the number of entities that were included in the SIIS in the previous inventory results, among others, from:

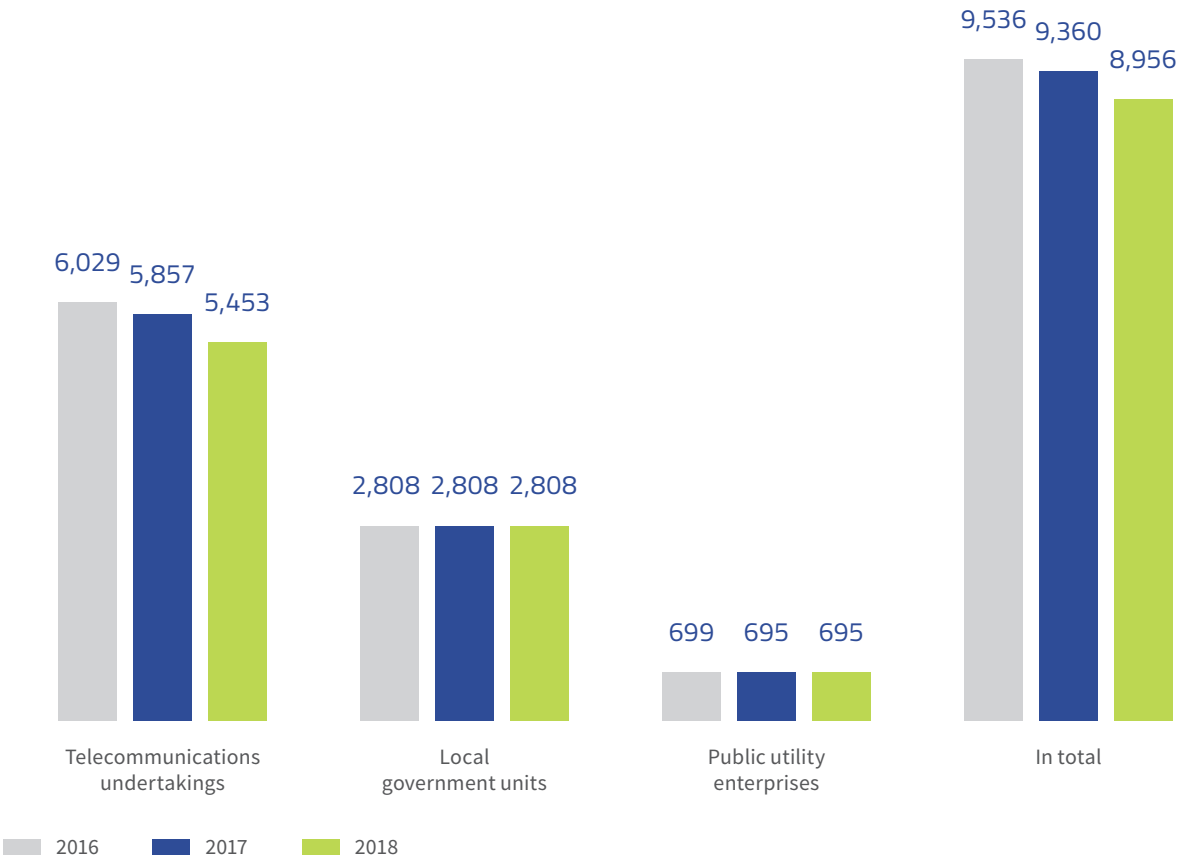
- removing 129 enterprises from the Register of Telecommunications Undertakings following their deletion from the CEIDG and 58 entities following their deletion from the National Court Register,
- making entries and deletions from the Register at the request of telecommunications undertakings.

CHART 1. **PERCENTAGE DISTRIBUTION OF ENTITIES IN SIIS IN 2018**



Source: UKE

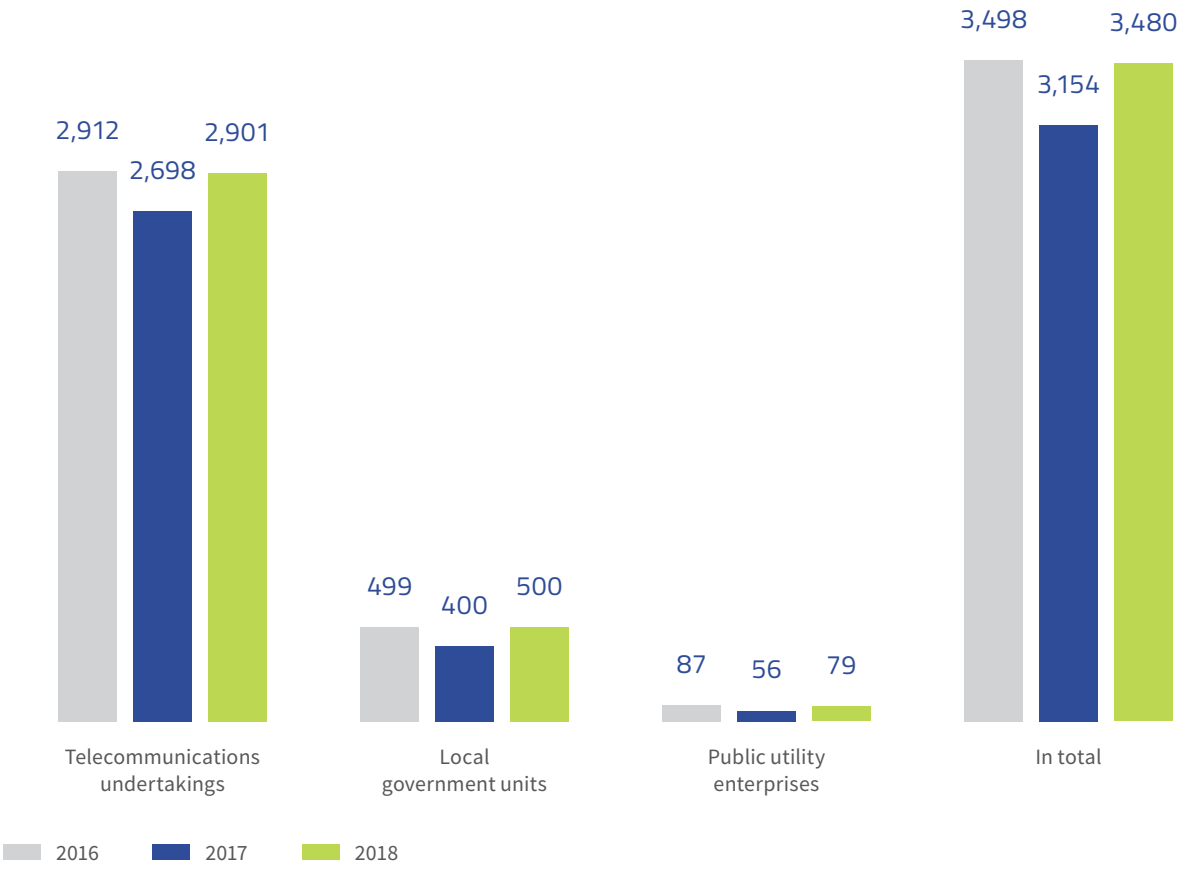
CHART 2. **NUMBER OF ENTITIES IN SIIS DURING THE INVENTORY FOR 2016-2018**



Source: UKE

Data for 2018 was submitted to the SIIS system by 3,480 entities. The increase in the number of entities whose data was entered in the system as part of the inventory for 2018 was recorded in all categories of entities. This is probably related to the administrative proceedings conducted in 2018 by UKE to impose a fine on entities which did not fulfil their obligation to provide information as part of the annual inventory of telecommunications infrastructure and services in 2014-2018.

CHART 3. **NUMBER OF ENTITIES THAT PROVIDED DATA AS PART OF THE INVENTORY FOR 2016-2018**

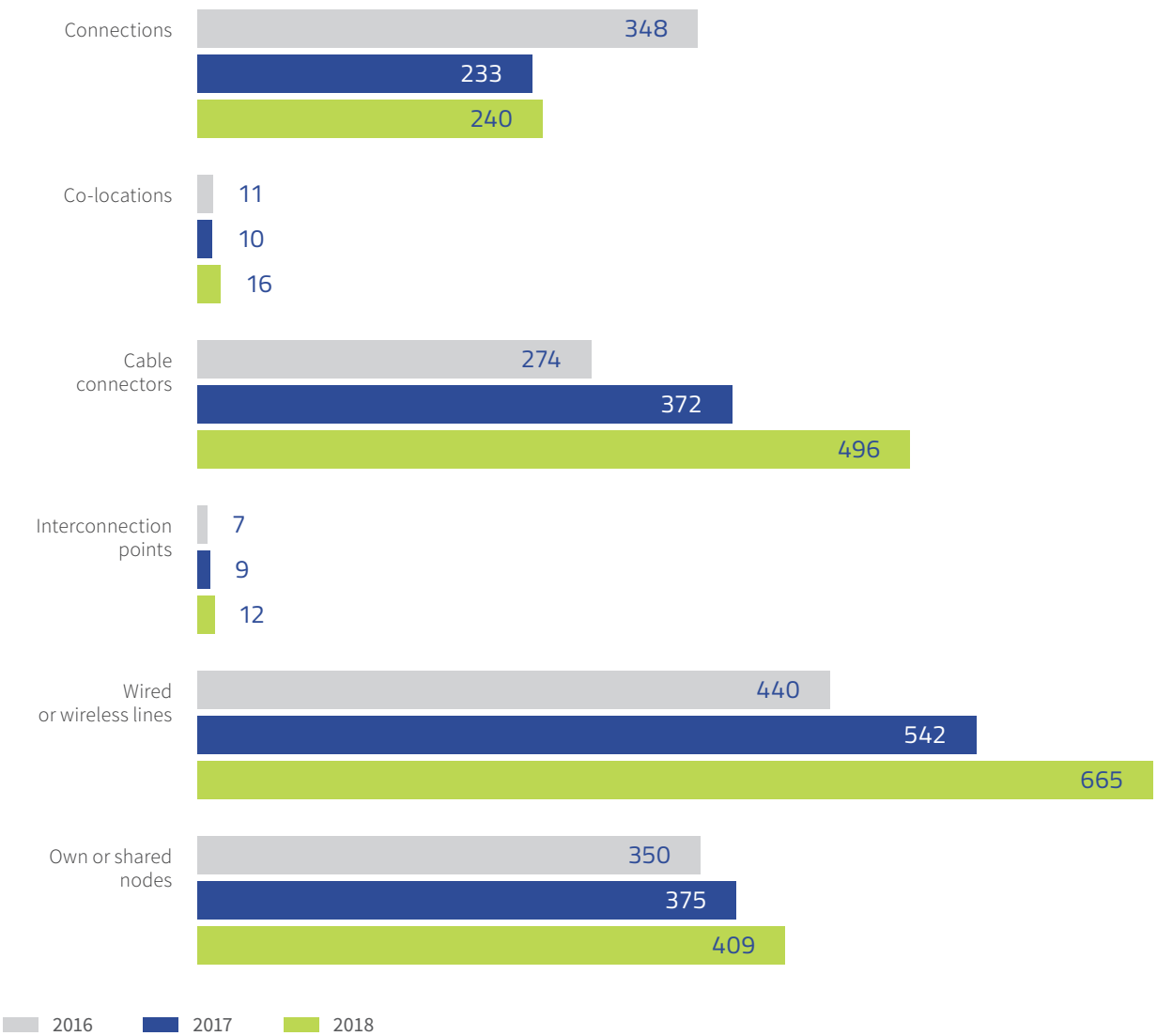


Source: UKE

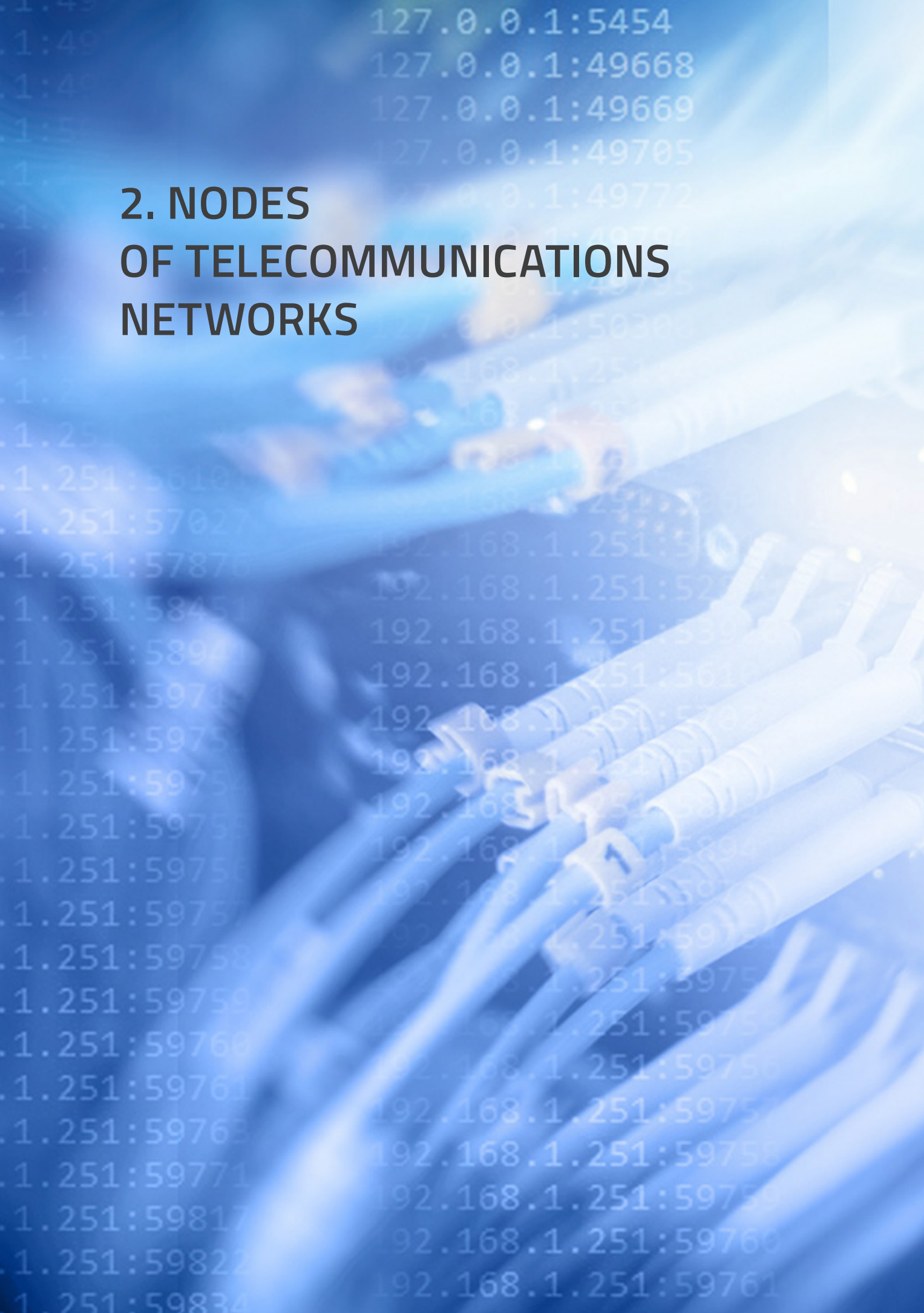
With the increase in the number of contributors, there was an overall increase in the number of data loaded to the SIIS, from several percent to 18% for the number of lines and 25% for the number of cable connectors.

The number of network termination points transferred during this year's inventory amounted to 44.6 million in 2019 (most of which are mobile network termination points). A large number of buildings within the network coverage – several times exceeding the number of buildings in Poland – results from the fact that each mobile operator declared most buildings to be within its mobile network coverage.

CHART 4. **NUMBER OF INFRASTRUCTURE ELEMENTS (IN THOUSANDS) ENTERED INTO SIIS**



Source: UKE



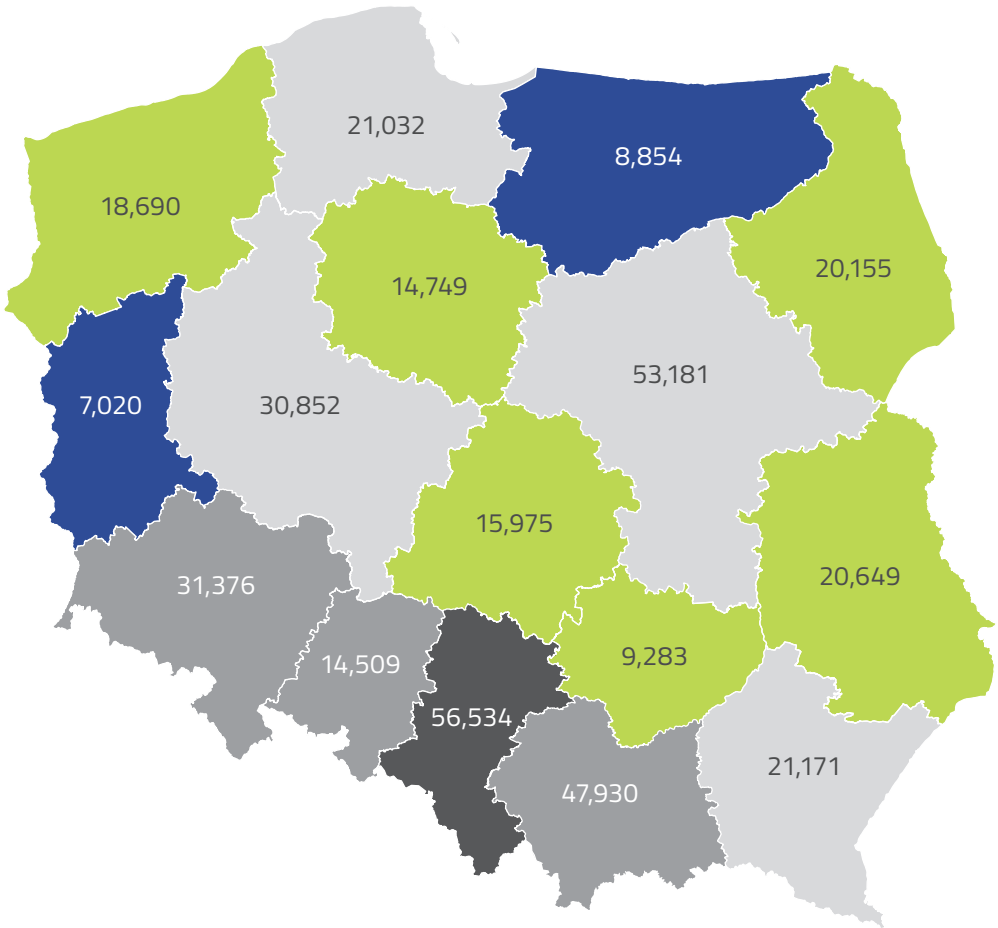
2. NODES OF TELECOMMUNICATIONS NETWORKS

2.1. OWN NODES

As part of this year's inventory, entities reported 391,960 own nodes (excluding virtual nodes), which is an increase of over 30,000 compared to the 2017 data.

Map 1 shows the density and number of own nodes in individual regions. As always, the Silesian region stands out, where the largest number of nodes are located within a relatively small area – this situation is the result of a high level of urbanization of this area. The Lesser Poland region is also characterized by high density of the nodes (more than 3 nodes per km^2). In the area of the two regions there are almost 30% of all nodes in the country. An average density of nodes is characteristic of the following regions: Lower Silesia, Opole, Masovia, Subcarpathia, Pomerania and Greater Poland. At the other end of the list you can find Warmia-Masuria and Lubusz in which there is one telecommunications node per 3 km^2.

MAP 1. **OWN NODES IN REGIONS**



Density of own nodes (number/km^2)

0.36 – 0.50 | 0.51 – 1.00 | 1.01 – 1.50 | 1.51 – 3.50 | 3.51 – 4.58

Source: UKE

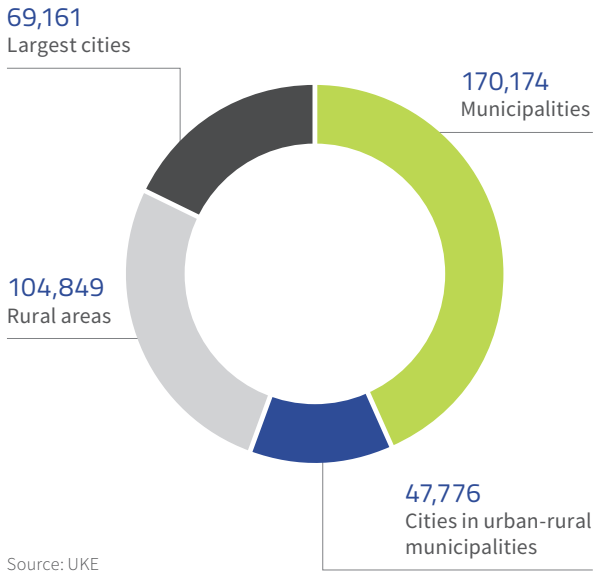
TABLE 1. **NUMBER OF NODES IN LOCALITIES OF DIFFERENT SIZE CATEGORIES**

Size of a locality	Number of nodes	Percentage of the number of nodes in the total number of nodes
more than 100,000	164,674	42.01
50,001 – 100,000	31,516	8.04
20,001 – 50,000	42,717	10.90
5,001 – 20,000	41,706	10.64
1,001 – 5,000	45,180	11.53
501 – 1,000	25,559	6.52
101 – 500	34,266	8.74
up to 100 residents	6,342	1.62

Source: UKE

As shown in Table 1, more than half of the nodes are located in cities with population of over 50,000. In turn, 27% of nodes are located in rural areas (Chart 5).

CHART 5. **NUMBER OF OWN NODES**



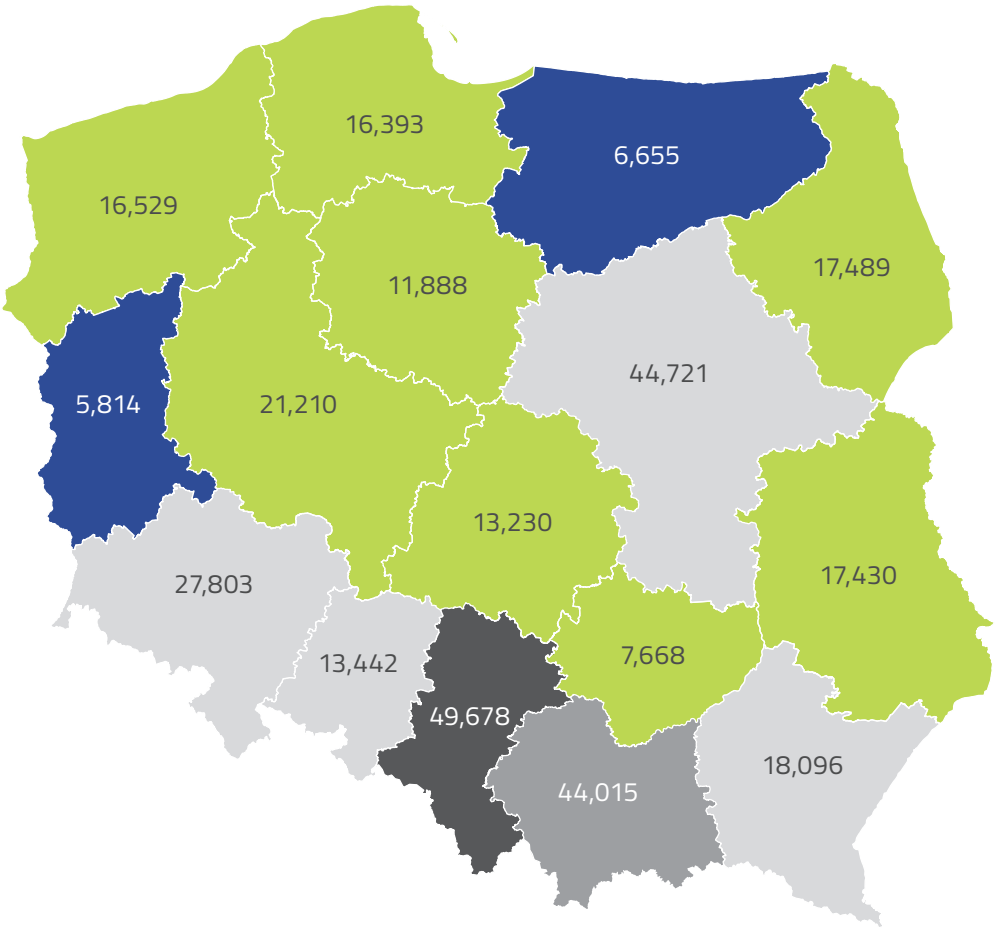
Source: UKE

2.2. ACCESS NODES

332,061 access nodes were reported in the last inventory. The density and number of such nodes are shown on Map 2. As in the past year and as in the case of own nodes, the highest density of access nodes is characteristic of the Silesia and Lesser Poland regions.

The similarity with respect to analogous data for operators' own nodes is also noticeable when comparing the percentage of access nodes in localities of different size categories – more than half of the nodes are located in cities with population of more than 50,000 (Table 2).

MAP 2. **ACCESS NODES IN REGIONS**



Density of access nodes (number/km²)

0.27 – 0.50 | 0.51 – 1.00 | 1.01 – 1.50 | 1.51 – 3.50 | 3.51 – 4.02

Source: UKE

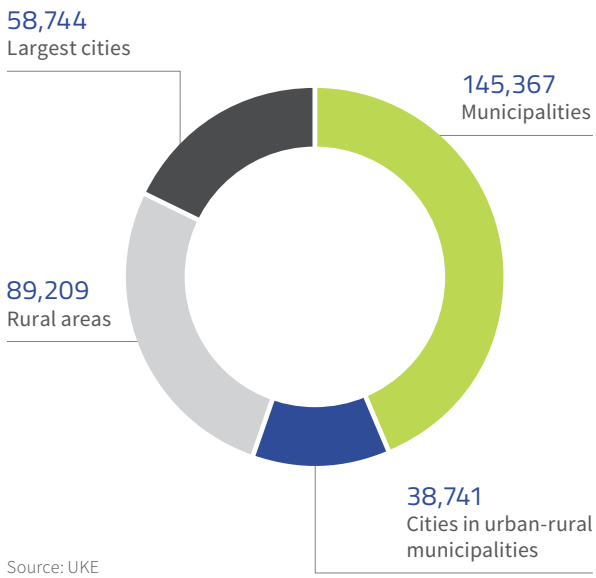
TABLE 2. **NUMBER OF ACCESS NODES IN LOCALITIES OF DIFFERENT SIZE CATEGORIES**

Size of a locality	Number of nodes	Percentage of the number of nodes in the total number of nodes
more than 100,000	141,649	42.66
50,001 – 100,000	27,037	8.14
20,001 – 50,000	35,227	10.61
5,001 – 20,000	33,887	10.21
1,001 – 5,000	38,499	11.59
501 – 1,000	22,232	6.70
101 – 500	28,204	8.49
up to 100 residents	5,326	1.60

Source: UKE

Chart 6 presents the distribution pattern of access nodes in relation to the degree of urbanization in various areas. Comparison with the values in Chart 6 Number of access nodes allows us to conclude that 85% of own nodes located in rural areas are access nodes.

CHART 6. **NUMBER OF ACCESS NODES**



Source: UKE

Table 3 and corresponding Chart 7 present the number of localities (regardless of their type and size) in which entities declared the presence of their own access nodes (all technologies). Relatively fewest localities without access nodes are located in Lesser Poland and Subcarpathian regions (less than 25%). These regions, as well as the Silesia region, are also characterized by the largest number of localities with three or more operators (over 30%).

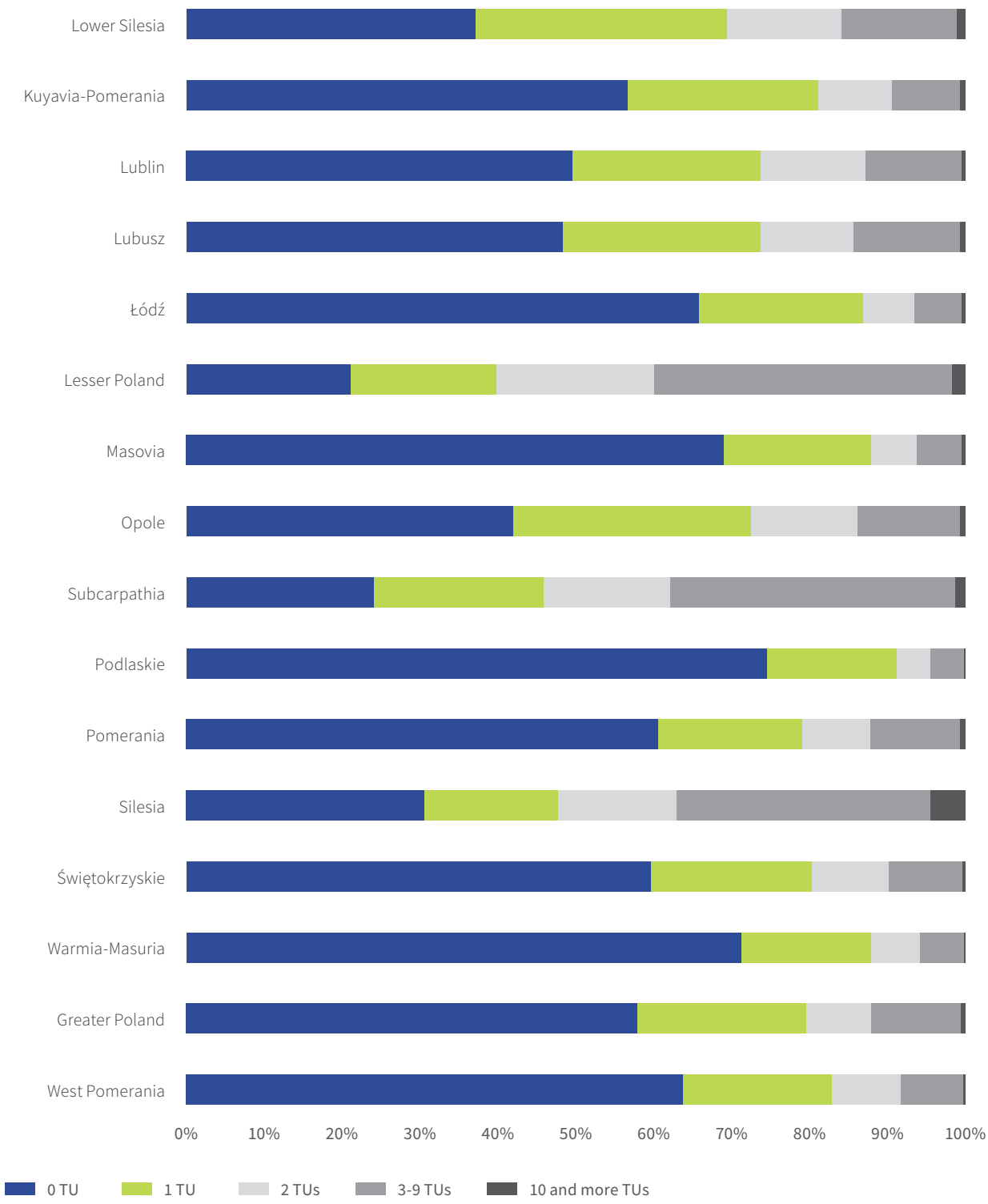
Most cities without access nodes are located in the Podlaskie (75%) and Warmia-Masuria (71%) regions. Comparing the data from 2017 and 2018, it should be noted that as a result of the telecommunications market development and efficient investments supported from public funds, the number of localities without their own access nodes decreased in almost all regions.

TABLE 3. **NUMBER OF LOCALITIES BY REGIONS IN WHICH ENTITIES DECLARED THE EXISTENCE OF THEIR OWN TELECOMMUNICATIONS NETWORK ACCESS NODES**

Region	Number of localities in total	0 TU	1 TU	2 TUs	3-9 TUs	10 or more TUs
Lower Silesia	2,618	970	845	386	387	30
Kuyavia-Pomerania	3,632	2,056	888	345	317	26
Lublin	4,087	2,026	983	554	503	21
Lubusz	1,336	645	340	159	182	10
Łódź	5,049	3,318	1,066	335	304	26
Lesser Poland	2,013	424	377	407	770	35
Masovia	8,617	5,942	1,629	504	501	41
Opole	1,203	504	368	164	158	9
Subcarpathia	1,721	413	376	279	630	23
Podlaskie	3,800	2,831	632	167	162	8
Pomerania	2,919	1,768	537	256	338	20
Silesia	1,365	417	233	208	445	62
Świętokrzyskie	2,519	1,500	522	248	238	11
Warmia-Masuria	3,924	2,793	657	245	218	11
Greater Poland	5,572	3,225	1,205	468	636	38
West Pomerania	3,081	1,964	586	273	249	9

Source: UKE

CHART 7. **SHARE OF LOCALITIES BY REGIONS IN WHICH THE ENTITIES DECLARED THE EXISTENCE OF OWN TELECOMMUNICATIONS NETWORK ACCESS NODES**



Source: UKE

The analysis of data on the number of localities by size category of localities in which the entities declared the presence of their own access nodes (Table 4, Chart 8) allows us to conclude that nodes of at least 3 entities are located in all localities with population of at least 5,000.

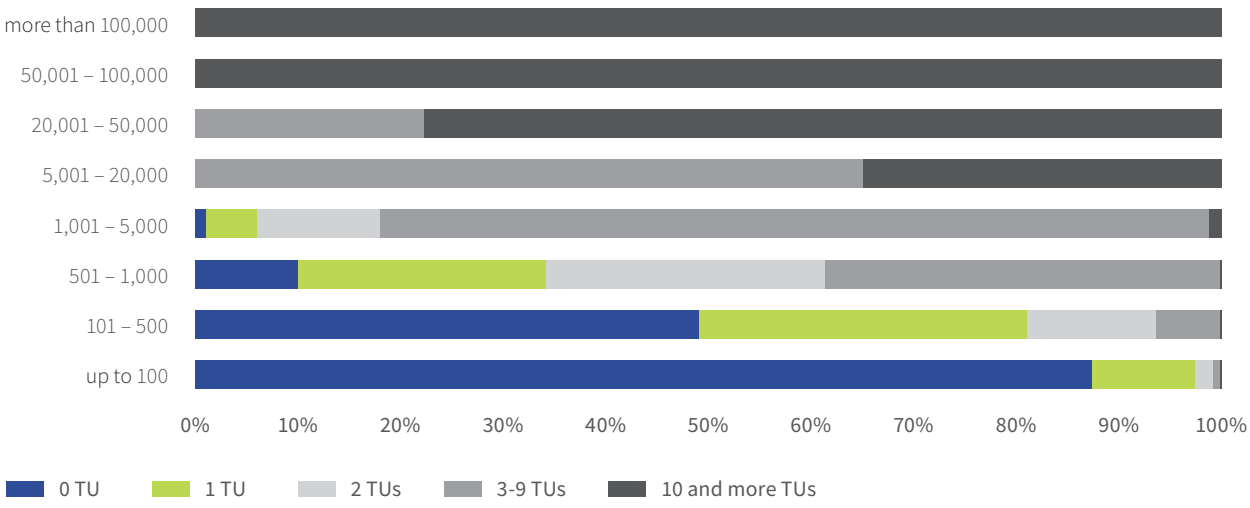
In all medium and large cities (with at least 50,000 inhabitants), there are nodes of at least 10 entities. The largest number of localities without access nodes are small and very small localities with up to 500 residents.

TABLE 4. **NUMBER OF LOCALITIES BY SIZE CATEGORY OF LOCALITIES IN WHICH THE ENTITIES DECLARED THE EXISTENCE OF OWN TELECOMMUNICATIONS NETWORK ACCESS NODES**

Size of a locality	Total number of localities	0 TU	1 TU	2 TUs	3-9 TUs	10 or more TUs
more than 100,000	2,618	970	845	386	387	30
50,001 – 100,000	3,632	2,056	888	345	317	26
20,001 – 50,000	4,087	2,026	983	554	503	21
5,001 – 20,000	1,336	645	340	159	182	10
1,001 – 5,000	5,049	3,318	1,066	335	304	26
501 – 1,000	2,013	424	377	407	770	35
101 – 500	8,617	5,942	1,629	504	501	41
up to 100 residents	1,203	504	368	164	158	9

Source: UKE

CHART 8. **NUMBER OF LOCALITIES BY SIZE CATEGORY OF LOCALITIES IN WHICH THE ENTITIES DECLARED THE EXISTENCE OF OWN TELECOMMUNICATIONS NETWORK ACCESS NODES**



Source: UKE

2.3. FIBRE NODES

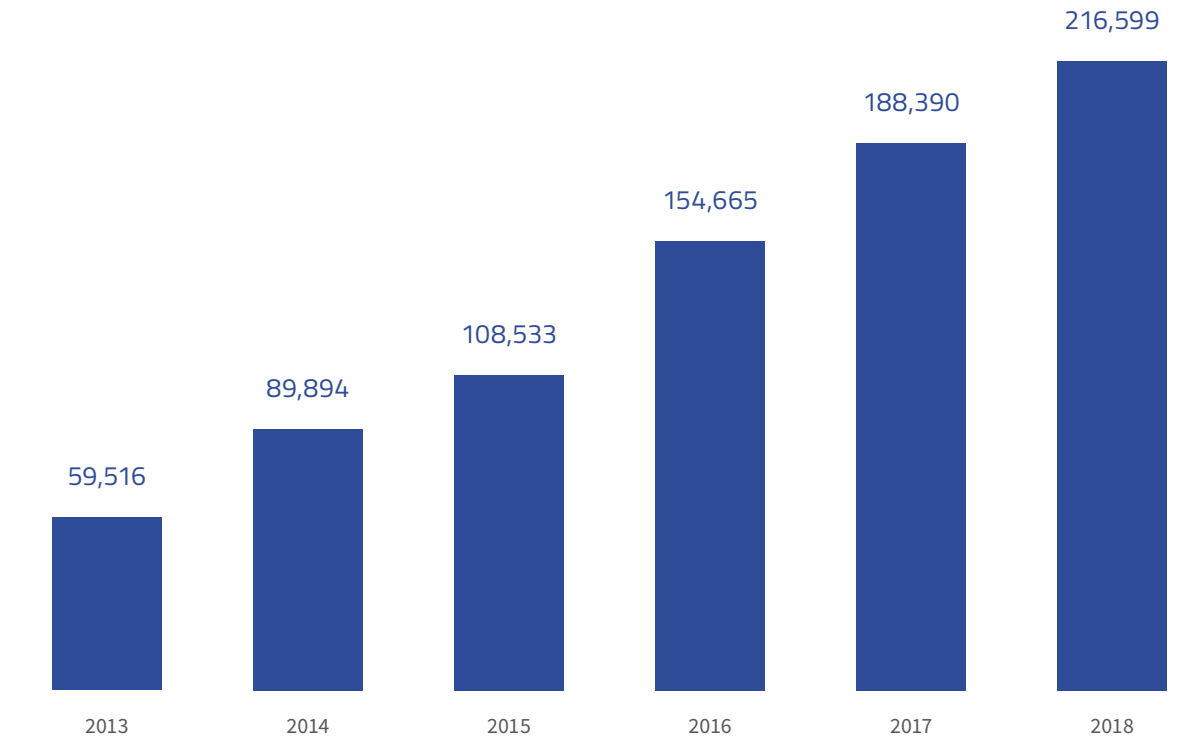
Data inventory for 2018 reported 216,599 fibre nodes. The number of such nodes increased by 28,000 compared to 2017 and almost four times compared to 2013 (Chart 9). The largest share of nodes with fibre interfaces is characteristic of the Podlaskie region – as many as 76% of nodes in this region have interfaces of this type. On the other hand, only 30% of nodes in the Opole region are nodes with fibre interfaces. On average, every second node in Poland is equipped with fibre interfaces (Table 5). The largest share of fibre nodes is characteristic of localities with population of more than 20,000 up to 50,000. On average, the lowest numbers of such nodes are recorded in very small localities – up to 100 residents (Table 6).

TABLE 5. **NUMBER OF NODES IN INDIVIDUAL REGIONS BY TECHNOLOGY**

Region	Number of nodes	Number of fibre nodes	Number of wired nodes	Number of radio nodes
Lower Silesia	31,376	16,464	21,454	7,333
Kuyavia-Pomerania	14,749	7,070	10,114	4,573
Lublin	20,649	12,419	7,541	6,873
Lubusz	7,020	3,260	4,550	2,291
Łódź	15,975	8,631	9,024	5,198
Lesser Poland	47,930	27,968	21,643	10,905
Masovia	53,181	35,983	30,897	8,948
Opole	14,509	4,312	12,080	2,111
Subcarpathia	21,171	10,468	8,330	8,573
Podlaskie	20,155	15,385	9,128	2,760
Pomerania	21,032	11,831	12,795	5,611
Silesia	56,534	29,056	35,799	10,041
Świętokrzyskie	9,283	5,488	3,949	3,041
Warmia-Masuria	8,854	4,448	5,530	3,177
Greater Poland	30,852	15,853	16,702	8,318
West Pomerania	18,690	7,963	13,539	4,424

Source: UKE

CHART 9. **NUMBER OF FIBRE NODES IN INDIVIDUAL YEARS**



Source: UKE

TABLE 6. **NUMBER OF NODES IN LOCALITIES OF DIFFERENT SIZE CATEGORIES**

Size of a locality	Number of nodes	Number of fibre nodes	Number of wired nodes	Number of radio nodes
more than 100,000	164,674	93,534	112,789	18,095
50,001 – 100,000	31,516	18,521	19,971	4,263
20,001 – 50,000	42,717	25,686	23,530	7,931
5,001 – 20,000	41,706	23,970	22,572	10,822
1,001 – 5,000	45,180	24,711	18,297	17,764
501 – 1,000	25,559	14,803	8,565	10,423
101 – 500	34,266	13,262	14,688	20,636
up to 100 residents	6,342	2,112	2,663	4,243

Source: UKE

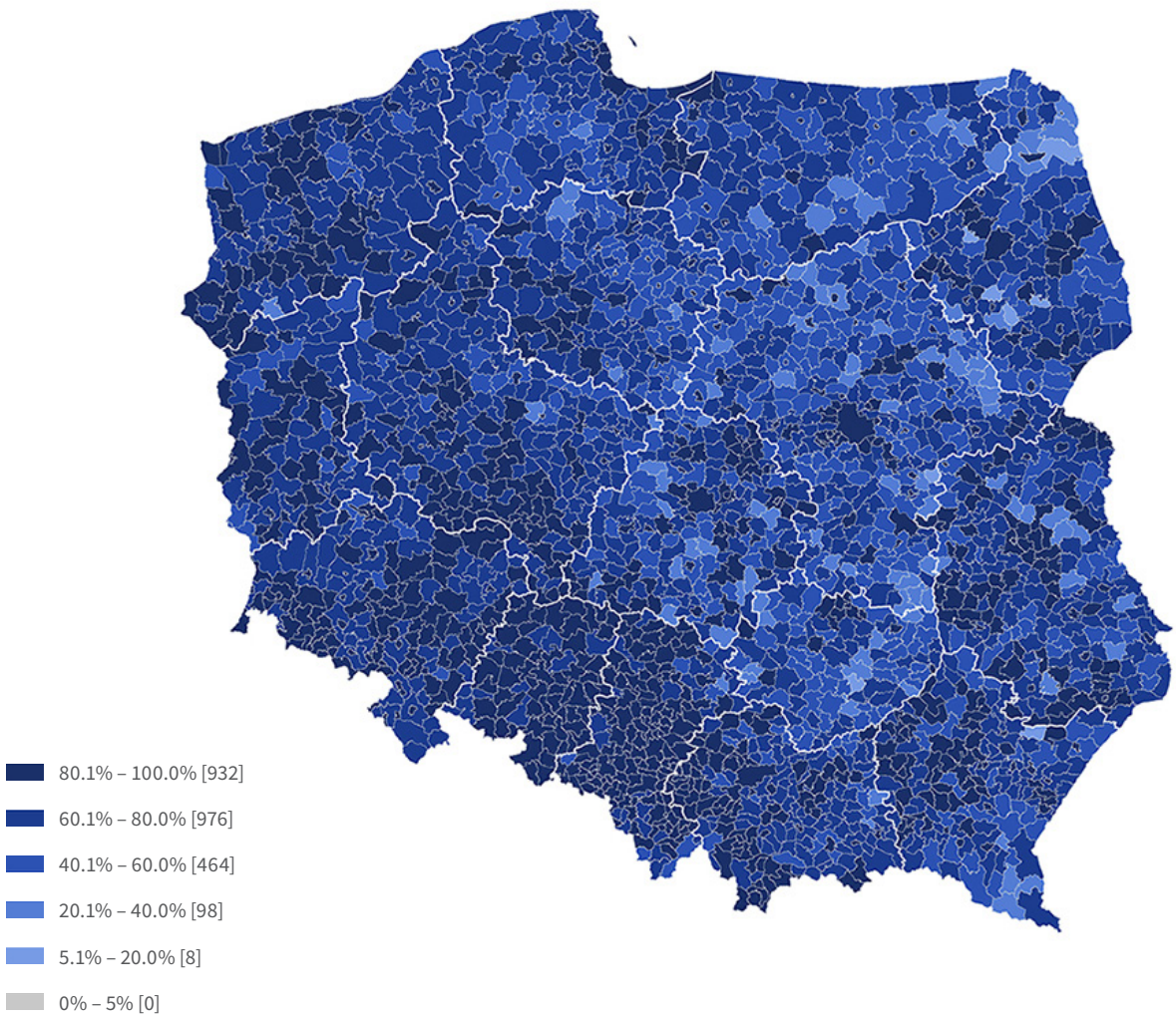
3. TELECOMMUNICATIONS NETWORK COVERAGE

3.1. BUILDING PENETRATION OF WIRED CONNECTIONS OR WIRELESS TERMINALS

In order to assess network availability, a building penetration indicator was used, understood as the ratio of the number of buildings within the network reach (they are buildings where operators declare the possibility of providing services) to the number of all buildings in the analysed area.

The average building penetration with fixed-line internet coverage at the end of 2018 was 77.3%. The following regions are characterized by the highest penetration (more than 80%): Silesia (approx. 90%), Opole, Lower Silesia and West Pomerania; the lowest penetration (less than 70%) is recorded in the following regions: Świętokrzyskie (approx. 64%) and Masovia. Map 3 presents the distribution pattern of access to fixed-line internet access in buildings in the areas of individual municipalities. The share of buildings with access to fixed-line internet in individual municipalities is spatially differentiated – it is higher in the western part of the country and within highly urbanized areas, and smaller in the central and eastern parts.

MAP 3. **TOTAL BUILDING PENETRATION WITH FIXED-LINE INTERNET COVERAGE**

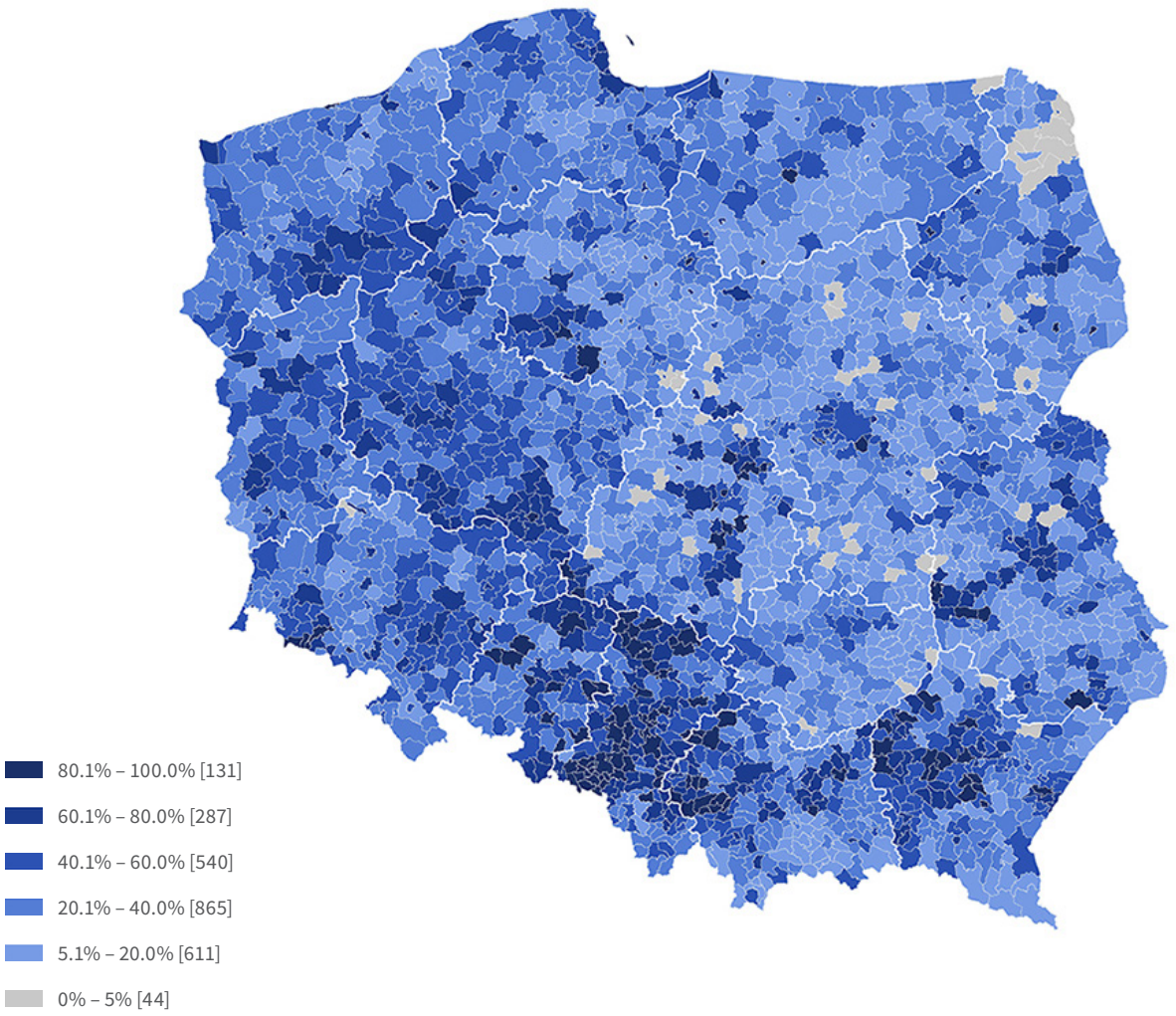


Source: UKE

Average building penetration with access to fixed-line internet services of at least 30 Mb/s for the entire country currently amounts to approx. 43.1%, compared to 33% in 2017. The highest penetration was recorded in the Silesia region (almost 68%) and in the Opole region (almost 52%), and the lowest – in the Świętokrzyskie region (about 25%). Among the municipalities, the highest building penetration of this type (97.5%) is characteristic of the city of Olsztyn in the Warmia-Masuria region.

The northern part of Podlaskie region and single municipalities in the regions of the central and eastern parts of the country are areas with extremely low penetration, i.e. less than 5% – the number of such municipalities decreased, however, compared to the previous year. The lowest penetration, where only two buildings within the range of fixed-line internet of at least 30 Mb/s were reported, were recorded in the rural commune of Przasnysz and in the commune of Wieniawa – in the Mazovia region.

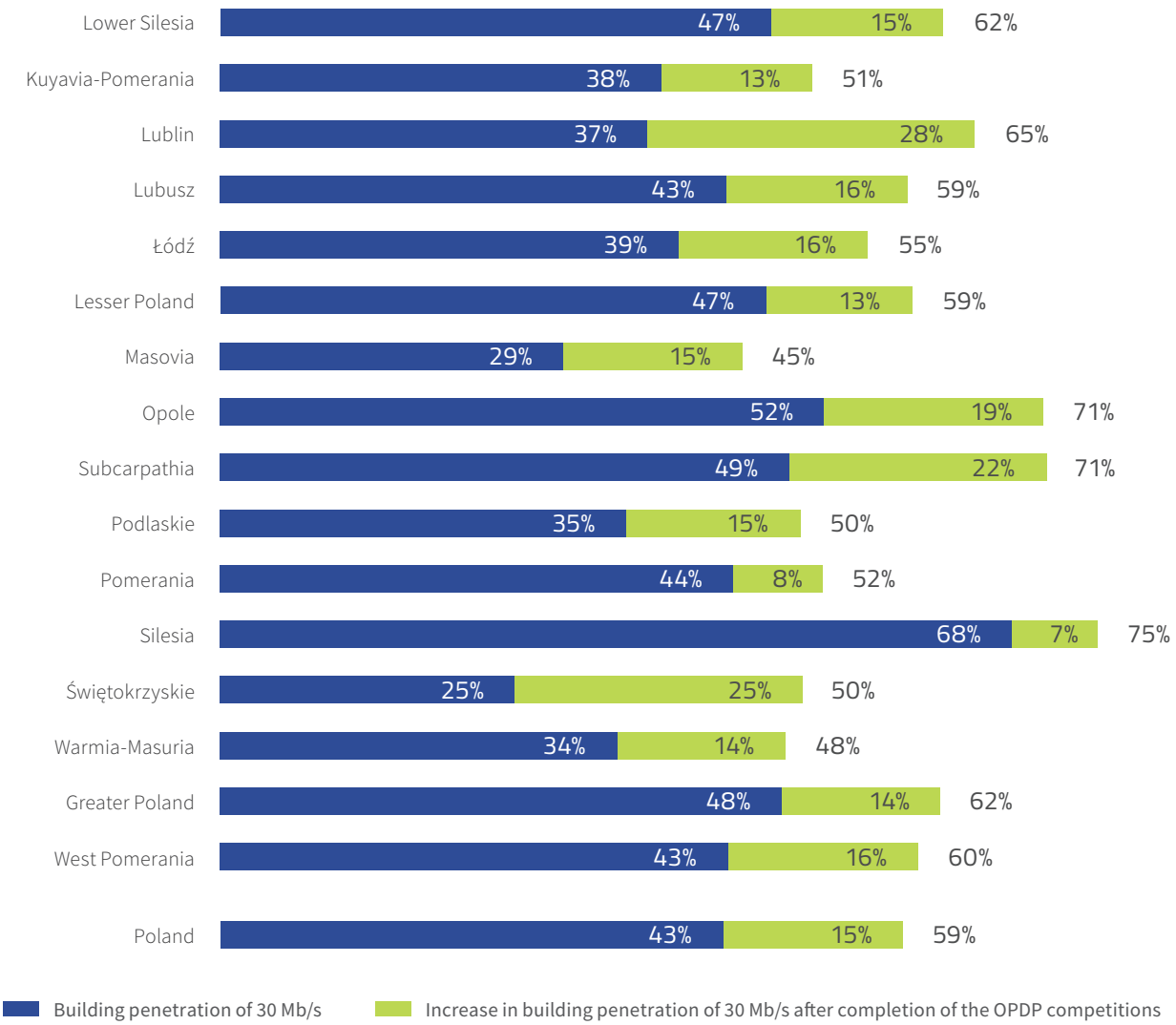
MAP 4. **BUILDING PENETRATION WITH FIXED-LINE INTERNET COVERAGE OF AT LEAST 30 Mb/s**



Source: UKE

The implementation of investment projects from the second and two rounds of the third call for proposals under the Operational Programme Digital Poland will allow to increase the average building penetration with fixed-line internet coverage of at least 30 Mb/s up to 59%.
The best results of the investment implementation should be expected in the Lublin and Świętokrzyskie regions (increase by 28 pp and almost 25 pp, respectively), while the worst in the Silesia and Pomerania regions, where the penetration will increase by less than 8 pp. Despite small scope of investments under the OPDP, the Silesia region will be characterized by the highest percentage of buildings within the coverage of services of at least 30 Mb/s after the implementation of projects co-financed from EU funds due to the already high percentage of such buildings in this area. In relation to the previous year, the prospects of the Opole region have significantly improved, where previously no investment projects were made under the OPDP. At present, in the Opole region one should expect the increase in the penetration of buildings with coverage of at least 30 Mb/s at the level of 19 pp (Chart 10).

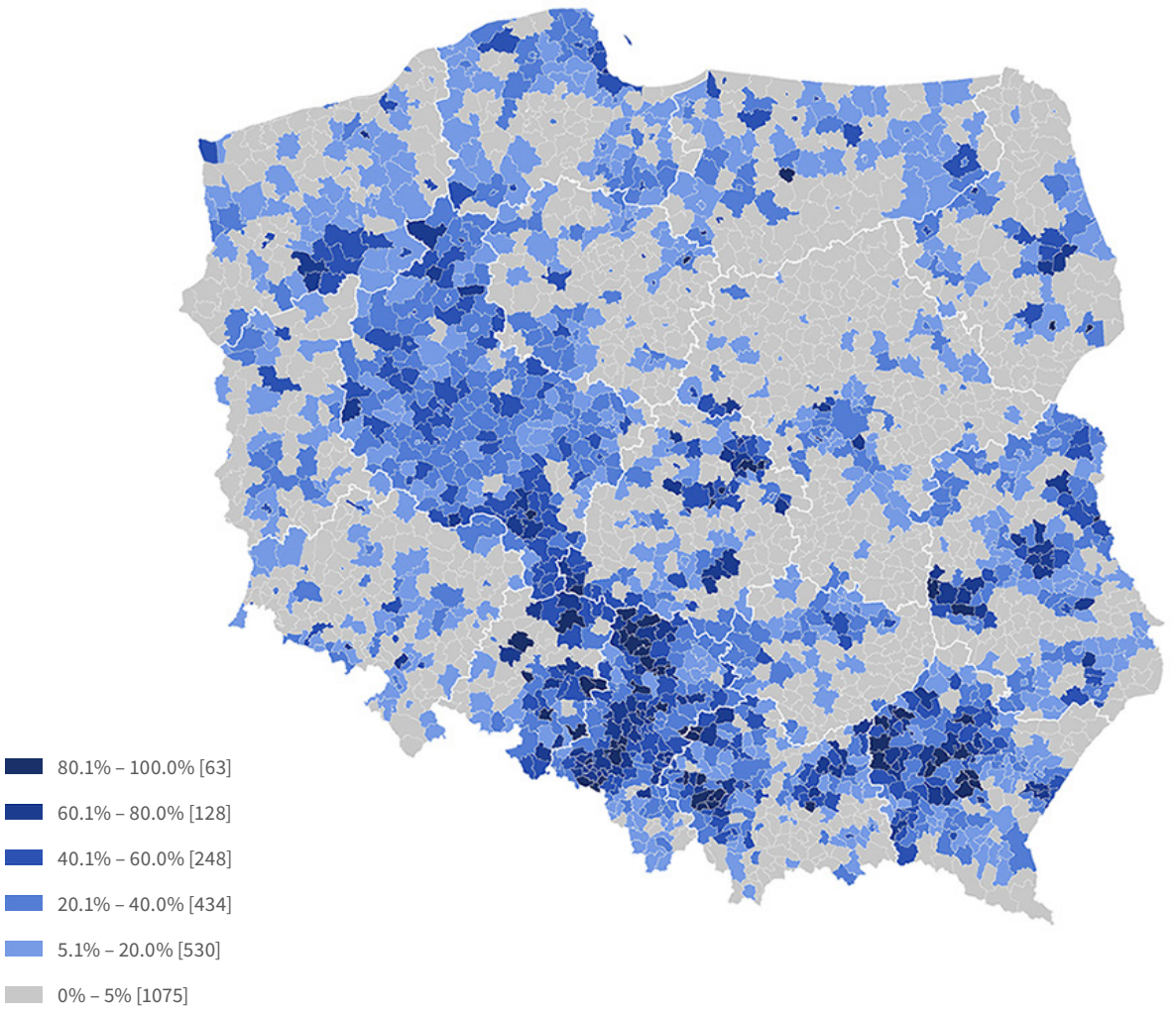
CHART 10. **BUILDING PENETRATION WITH FIXED-LINE INTERNET COVERAGE OF AT LEAST 30 Mb/s AFTER THE IMPLEMENTATION OF INVESTMENT PROJECTS WITHIN OPDP**



Source: UKE

Access to services of the highest speeds, at least 100 Mb/s, is provided for every fourth residential building in Poland – in 2017, 10% of buildings had such access. The regions characterized by the highest percentage of buildings within the reach of the internet with capacity of at least 100 Mb/s are Silesia (over 48%) and Subcarpathia (approx. 37%), while the situation is least favourable in the Masovia region, where access to fixed-line internet of at least 100 Mb/s is possible only in every eighth residential building (12.5%).

MAP 5. **BUILDING PENETRATION WITH FIXED-LINE INTERNET COVERAGE OF AT LEAST 100 Mb/s**

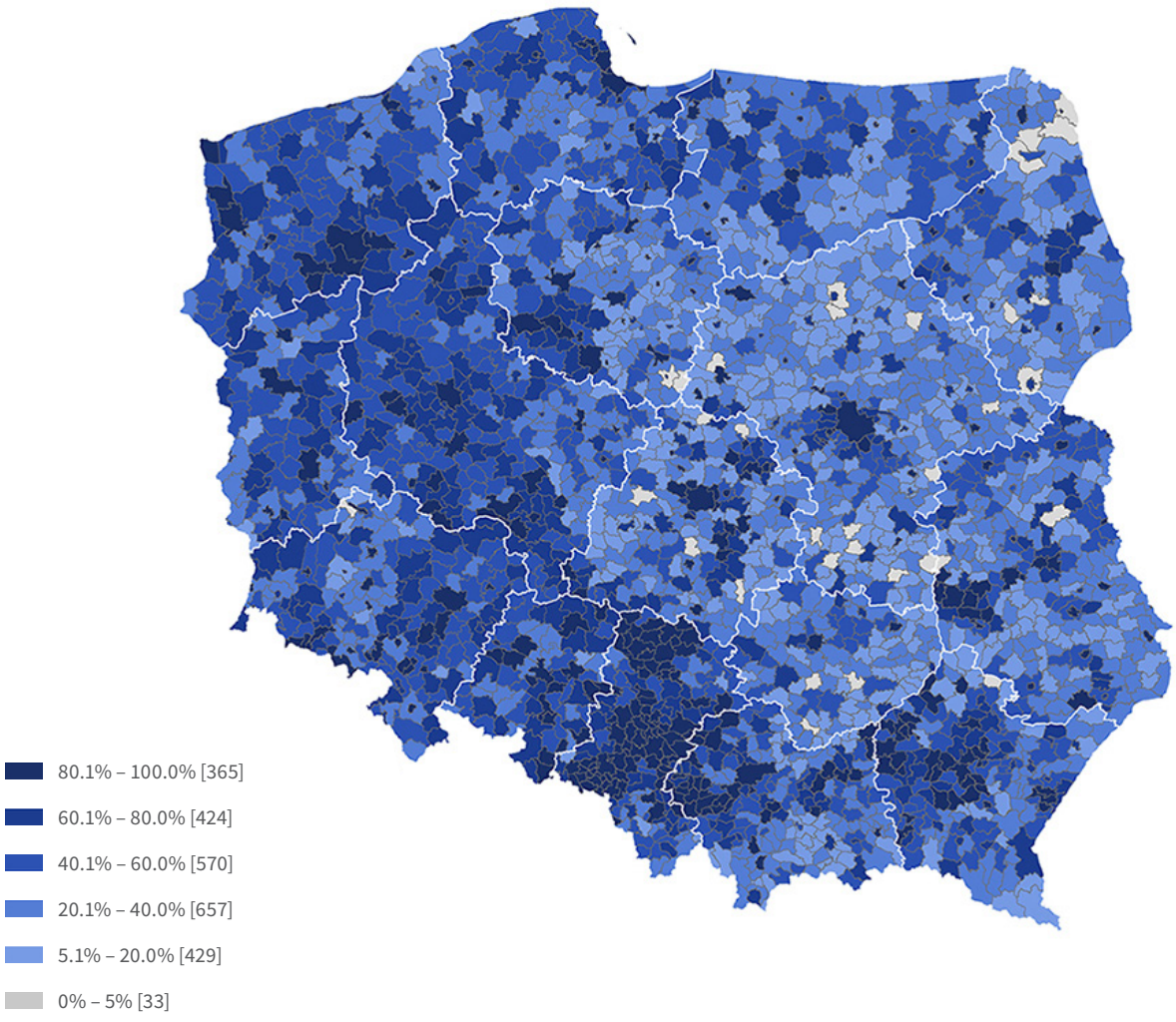


Source: UKE

3.2. HOUSEHOLD PENETRATION

An important objective of the European Digital Agenda (EDA) is to ensure that by 2020 all Europeans have access to the internet of at least 30 Mb/s. In order to assess the implementation of those objectives, a household penetration rate was used, understood as the ratio of the number of residential apartments within the reach of a network of at least 30 Mb/s (building in which operators declare the possibility of providing particular services) to the total number of residential apartments in the analysed area. The average household penetration with fixed-line internet coverage of at least 30 Mb/s amounts to 71.7% and in relation to the previous year it increased by almost 5 pp. The highest penetration is invariably characteristic of the Silesia region (almost 87%), while the lowest of the Świętokrzyskie region (about 50%).

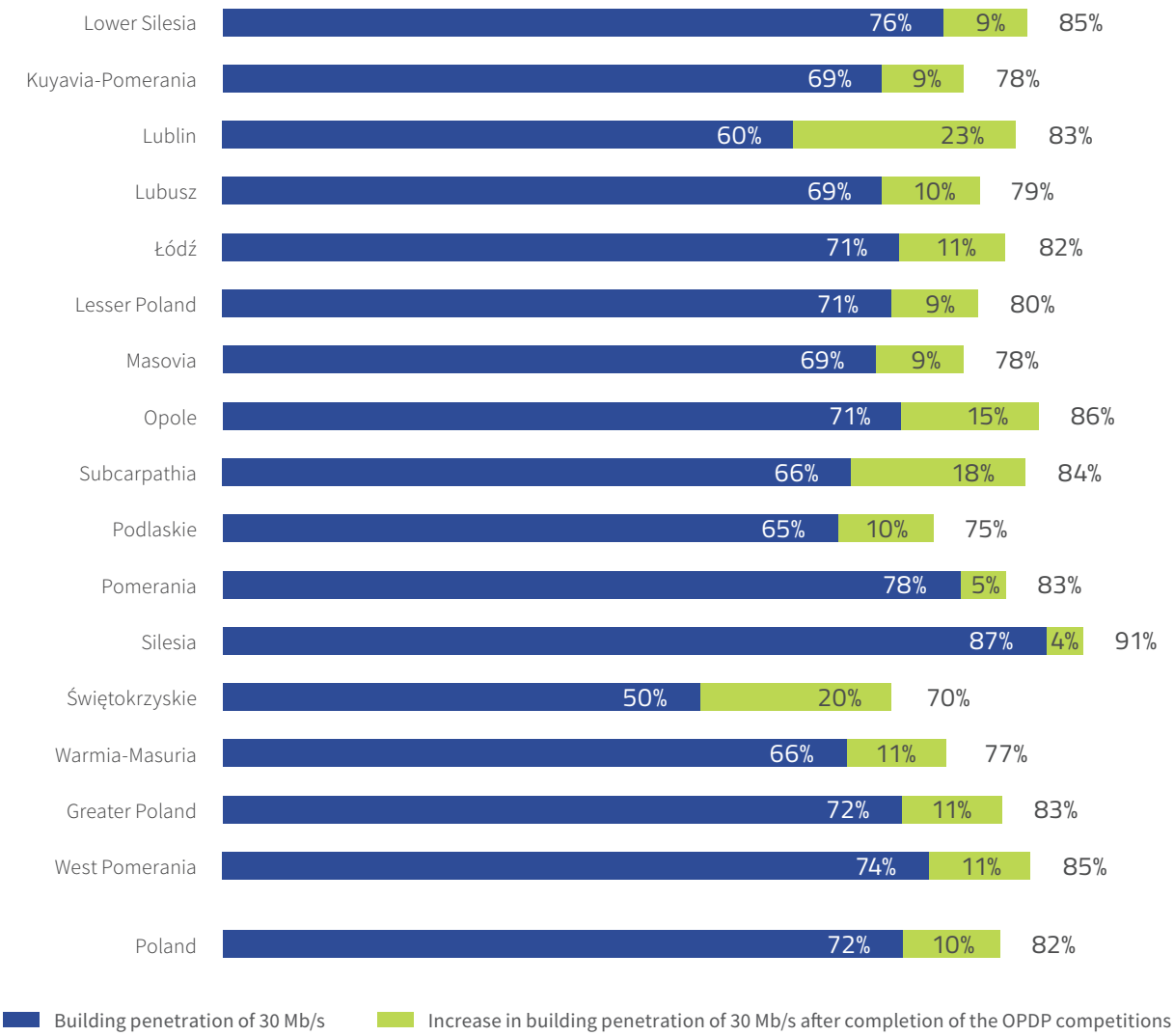
MAP 6. **HOUSEHOLD PENETRATION WITH FIXED-LINE INTERNET OF AT LEAST 30 Mb/s**



Source: UKE

The implementation of investment projects related to Measure 1.1 of the Operational Programme Digital Poland should result in an increase in household penetration to nearly 82%. The best results should be expected in the Lublin and Świętokrzyskie regions – an increase by 23 pp and 20 pp respectively (Chart 11).

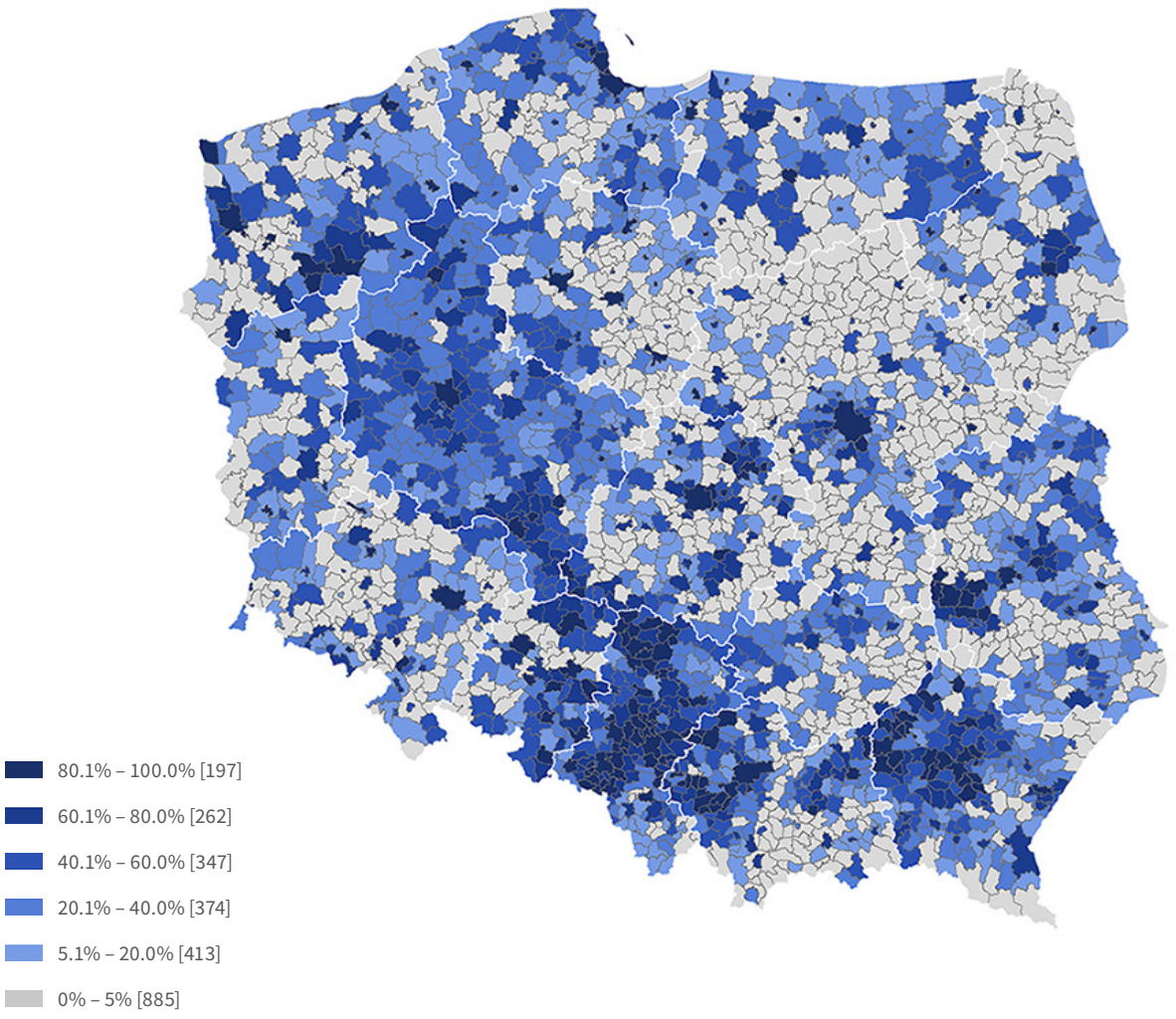
CHART 11. **HOUSEHOLD PENETRATION WITH FIXED-LINE INTERNET OF AT LEAST 30 Mb/s AFTER THE IMPLEMENTATION OF INVESTMENT PROJECTS WITHIN OPDP**



Source: UKE

Access to services with the highest speeds, at least 100 Mb/s, is available for almost 58.7% of all households (residential apartments). Increasingly, they are located not only in large cities, but also in rural areas. In this respect, the inhabitants of the Silesia region (76%) are in the best situation. The situation is the least satisfactory in the Świętokrzyskie region (less than 40%).

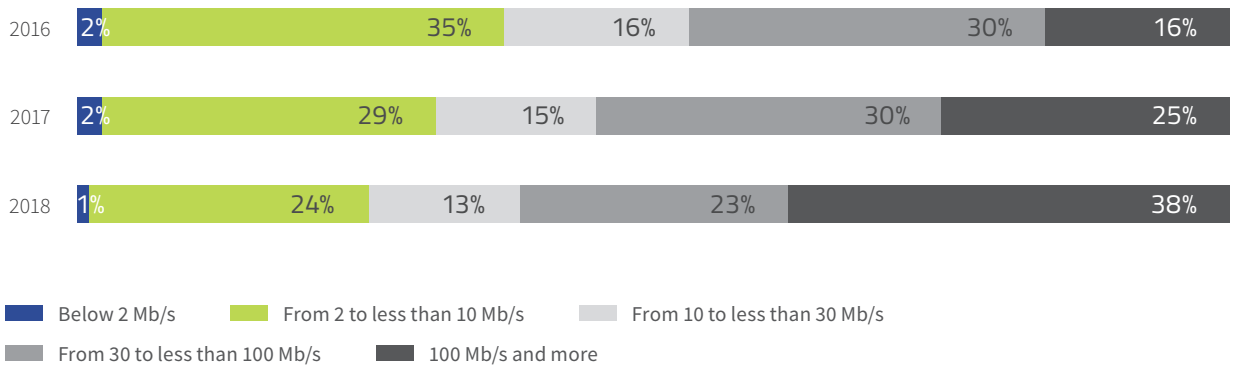
MAP 7. **HOUSEHOLD PENETRATION WITH FIXED-LINE INTERNET OF AT LEAST 100 Mb/s**



Source: UKE

Another objective of EDA is to achieve the use of internet access services with capacity of at least 100 Mb/s by 50% of households by the end of 2020. At the end of 2018, such services were used by 38% of households out of those which used fixed-line internet access (Chart 12). Over the past two years, the volume of such services has more than doubled with a relatively small increase in the total volume of fixed-line internet access, which indicates that consumers give up low-speed services in favour of those with better parameters. The level of usage for services with speeds exceeding 100 Mb/s in the total number of households in 2018 amounted to 19.3%.

CHART 12. **SHARE OF INDIVIDUAL SPEED CATEGORIES OF FIXED-LINE INTERNET ACCESS SERVICES IN THE TOTAL NUMBER OF SUCH SERVICES**



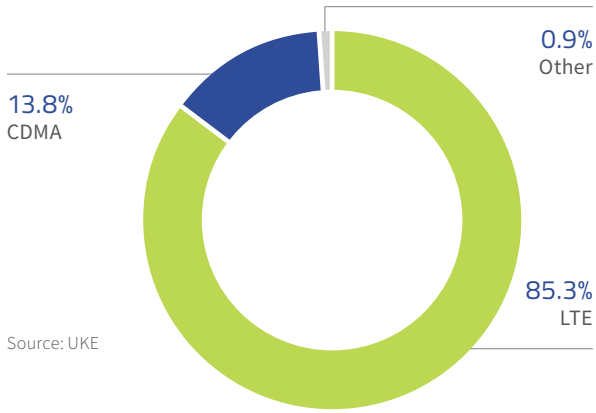
Source: UKE

3.3. MOBILE NETWORK COVERAGE

Contrary to the coverage of fixed-line networks, mobile internet coverage is reported by spatial indication of address points located in the technological range of base stations. The reports by operators for 2018 indicate that the LTE technology is steadily leading among mobile technologies, the share of which increased by approx. 1 pp. in relation to 2017 and amounted to over 85% in 2018 (Chart 13).

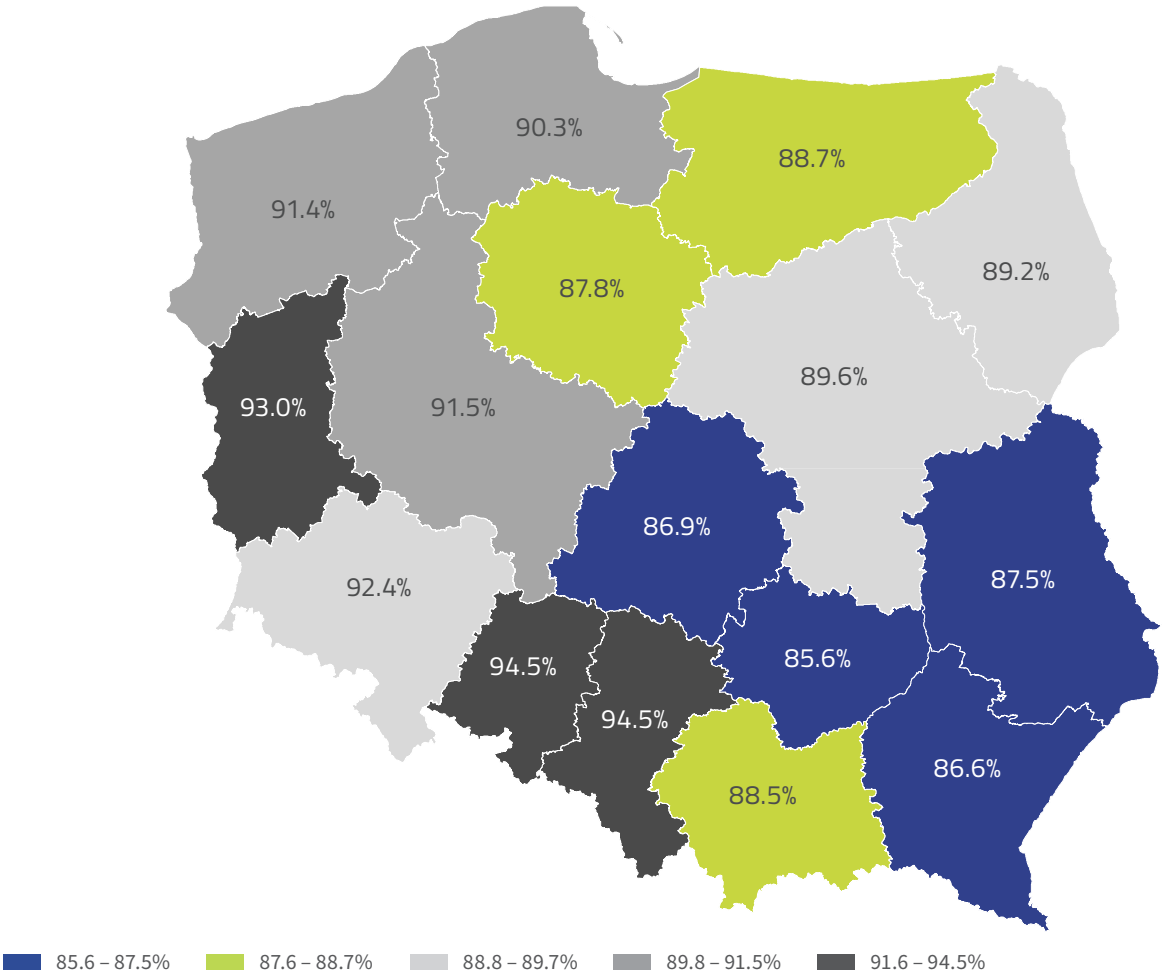
The reported data shows that about 10% of buildings in Poland are deprived of LTE internet access. It should be noted, however, that the buildings are located in localities that are very small settlements with several or a dozen or so buildings.

CHART 13. **SHARE OF INDIVIDUAL TECHNOLOGIES IN MOBILE INTERNET COVERAGE**



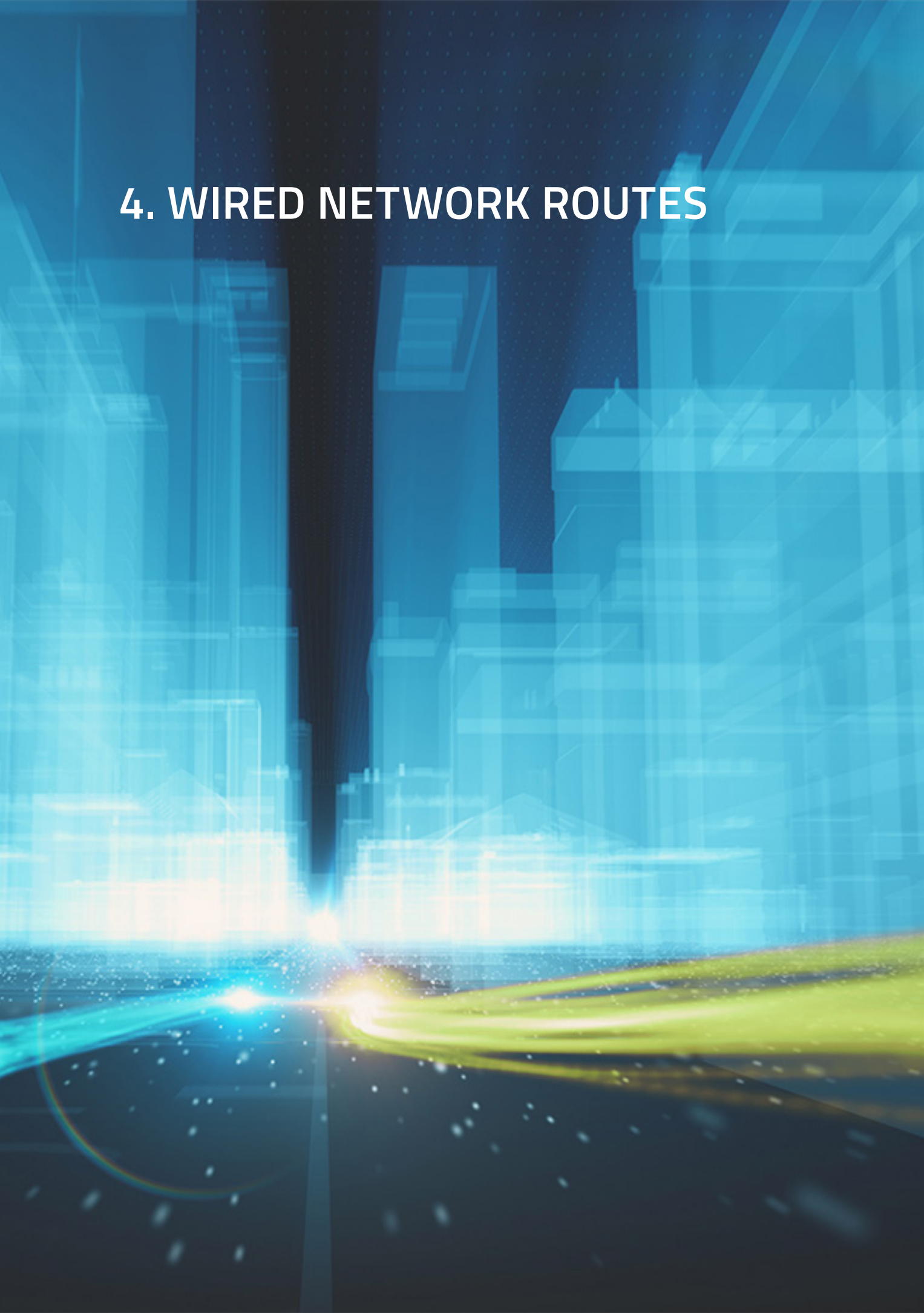
Source: UKE

MAP 8. **PERCENTAGE OF BUILDINGS WITH LTE TECHNOLOGY COVERAGE**



Source: UKE

4. WIRED NETWORK ROUTES

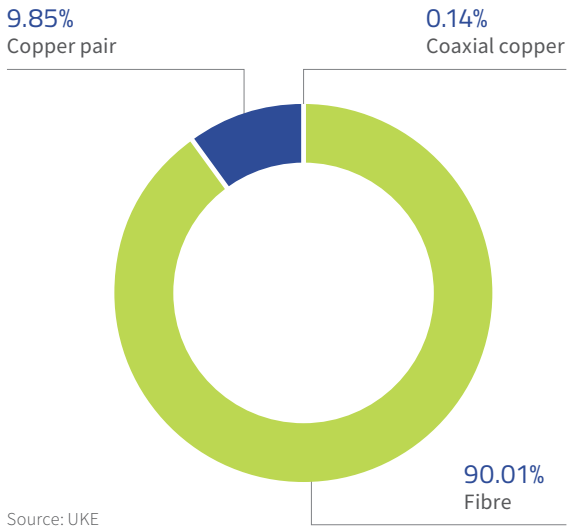


The length of wired telecommunications lines, estimated on the basis of information provided by the entities obliged to report, equals 452,000 km as at the end of 2018. This is an increase compared to the previous year by approx. 16,000 km.

Chart 14 presents the share of individual media in line infrastructure. The values are close to those of 2017, and fibre is by far the predominant one.

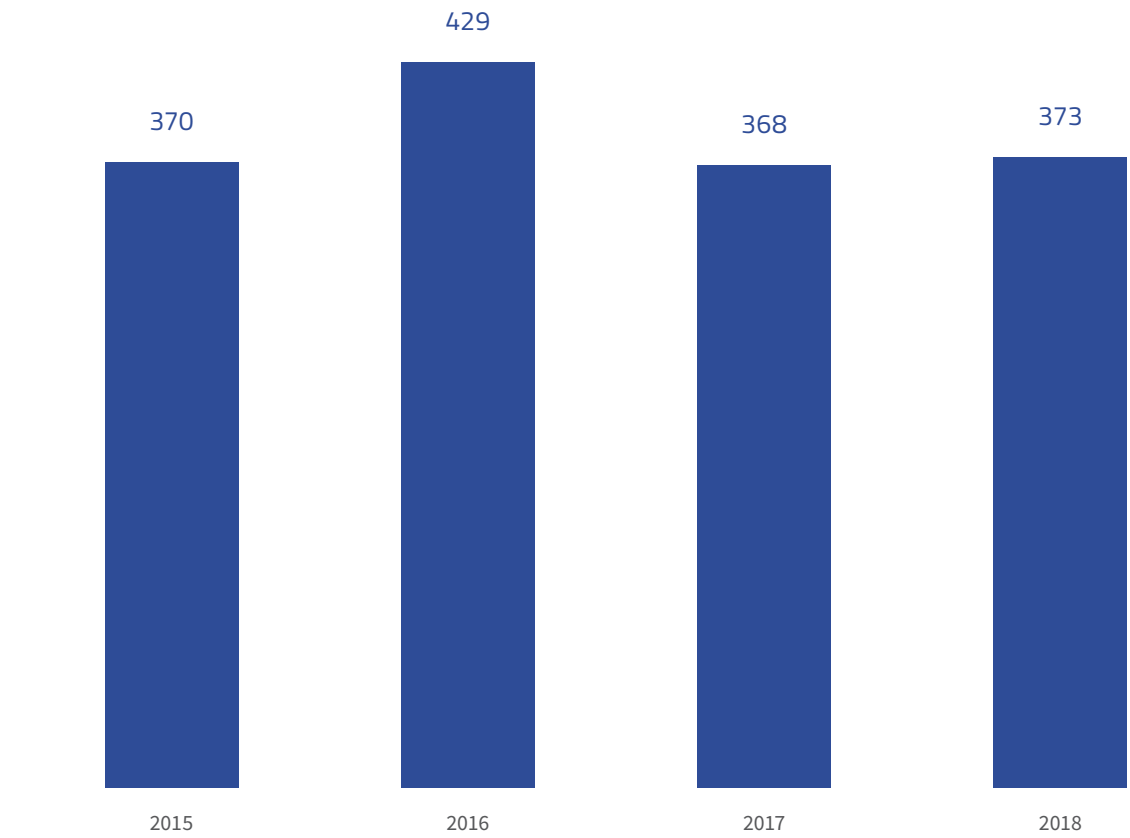
Chart 15 shows the change in the total length of fibre networks in individual years. In 2018 an increase in the length of fibre networks was recorded by 5,000 km. It is worth recalling that the decrease in the length of fibre networks between 2016 and 2017 resulted from more accurate submission of data to the SIIS by stakeholders. For example, in the case of only one entity, there was a decrease of approx. 72,000 km – from 76,724 km to 4,513 km.

CHART 14. **SHARE OF MEDIA IN LINE INFRASTRUCTURE**



Source: UKE

CHART 15. **LENGTHS OF FIBRE NETWORKS IN 2015 – 2018 (THOUSAND KM)**



Source: UKE

Map 9 presents the routes of fibre lines in Poland (straight interconnection of network nodes). Clearly increased density of fibre lines is associated with highly urbanized areas (the conurbations of Silesia, Tri-City, Warsaw, Poznan, Wroclaw, etc.) and connections between the main urban centres along inter-regional communication routes.

MAP 9. **FIBRE NETWORK ROUTES IN POLAND**

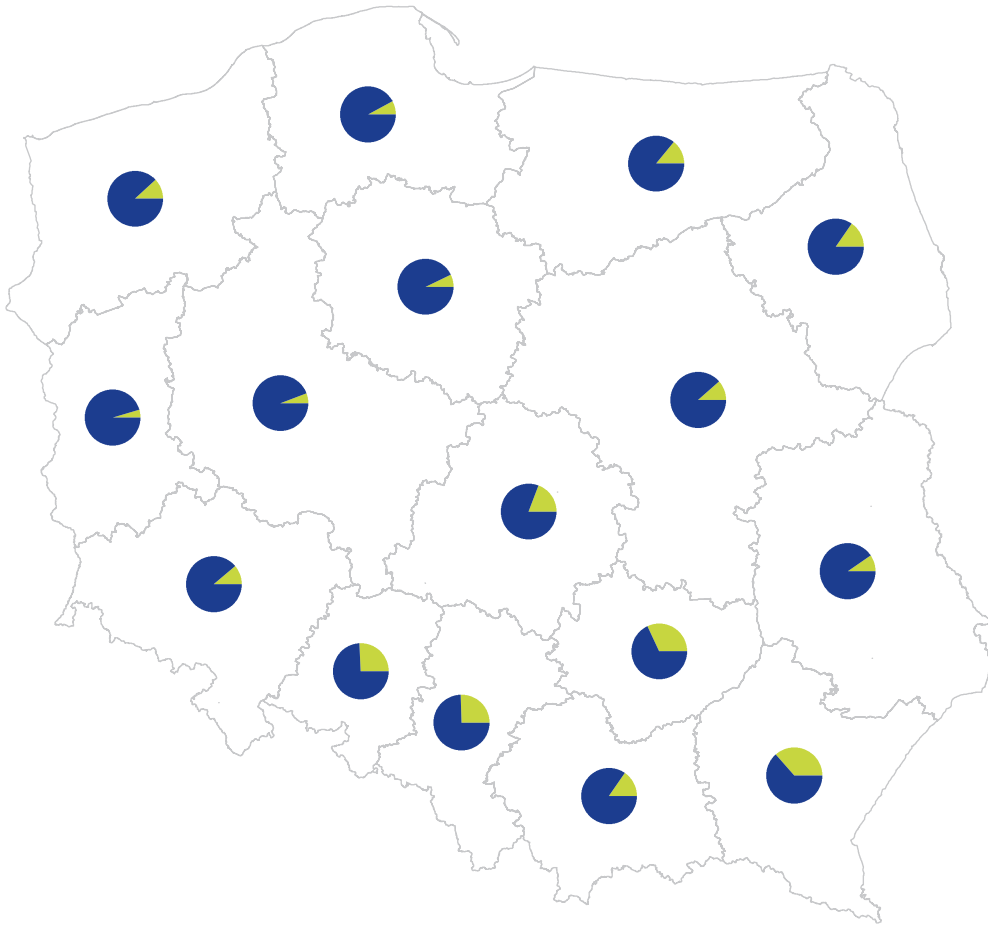
Source: UKE

The pie charts for individual regions on Map 10 show, on the other hand, shares of operators' own underground and overhead fibre network routes in the total length of fibre networks. The share of the overhead route, depending on the region, is 5 to 35 percent. The illustration shows a spatial relationship – regions located in the south of Poland are characterized by a higher share of the overhead network, which can result from natural conditions (including topography).

A similar relationship is observed in Eastern Poland, which is probably a consequence of lesser urbanization of these areas and the resulting lower profitability of investments in ducts.

As in previous years, there is a continuing relationship between the ratio of overhead infrastructure to underground infrastructure and the level of urbanization.

MAP 10. **SHARE OF ROUTES: UNDERGROUND AND OVERHEAD IN THE TOTAL LENGTH OF FIBRE NETWORKS**



Source: UKE

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