



Republic of North Macedonia

*Broadband Competence Office*

## Report

Implementation of the National Operational Broadband Plan

Broadband development in the country

(period May 2023 - September 2023)

Skopje, September 2023

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## Introduction

Pursuant to amendments to the Law on Electronic Communications (July 2019), the National Broadband Competence Office (NBCO) is defined as expert and advisory body for support of broadband network investments. Pursuant to the Law, NBCO is accountable before the minister of information society and administration for the operation thereof.

The National Broadband Competence Office (NBCO) was established in October 2019 upon decision of the minister of information society and administration and after the Parliament of the Republic of North Macedonia (PRNM) adopted amendments to the Law on Electronic Communications in July 2019 ("Official Gazette of the Republic of North Macedonia" no. 153/2019).

Pursuant to Article 71-a paragraph (2) of the Law on Electronic Communications, NBCO shall assume the following competences:

- Shall participate in the work of the broadband competence office network in the European Union and in the region,
- Shall issue opinions and proposals for faster development of electronic communications, and in particular of broadband in the country,
- Shall cooperate with state authorities, state administrative bodies, public enterprises, local self-government units, public institutions and legal entities with public authorizations and fully state-owned trade, and shall provide support for development plans/projects/studies related to broadband networks, as well as support in implementation thereof,
- Shall issue opinions and proposals for utilization and needed development of fibre-optic infrastructure that has been constructed or is to be constructed with public funds,
- Shall participate in the determination of target areas in which state aid will be used for the construction and development of broadband networks,
- Shall issue opinions and proposals during the construction of broadband networks using state aid for: possible technical solutions, investment and business models, conditions for selecting an operator, pricing policy and related issues,
- Shall participate in establishment of target areas that would use state aid in construction and development of broadband networks,
- Shall participate in public discussions and consultations related to construction of broadband networks with utilization of state aid,
- Shall participate in determining free WiFi internet access locations in municipalities,
- Shall participate, issue opinions and proposals in development of future national strategic documents and development plans related to broadband development,
- Shall monitor implementation of adopted national strategic document and plans for broadband development in the state, meeting national broadband targets set forth therein and shall issue opinions and proposals for review thereof,
- Shall, at least semi-annually, deliver a report to the minister of information society and administration on broadband development in the country related to development of broadband market in the European Union pursuant to DESI (The Digital Economy and Society Index), as well as report on implementation of adopted strategic documents and plans for broadband development in the country, meeting of national broadband goals set forth therein.

# Implementation of National Operational Broadband Plan in the period May 202 – September 2023

The National Operational Broadband Plan 2019-2029 (NOBP) was adopted on 01.04.2019 by the Government of RNM and is published on the designated website of the Ministry of Information Society and Administration (MISA): <https://mioa.gov.mk/?q=mk/node/2457><sup>1</sup>.

NOBP is aligned with strategic goals of the EU's initiative "Digital Agenda for Europe", as rooftop strategy for development of information society 2010 and EU's strategy "Towards a European Gigabit Society for 2025" from 2016.

NOBP was lodged to the European Commission and to the World Bank that have both issued positive opinions thereto.

## Activities conducted by the Government of the RNM and MISA in NOBP implementation

The Ministry of Information Society and Administration (MISA), as the leading beneficiary of the Feasibility Study project for the establishment of a National Optical Transport Network (NOTN), on June 21, 2023 held a kick-off meeting with the consulting company selected by the EU delegation in RNM for this project. The consultants prepared an Inception report in July 2023, on which the NBCO also expressed its opinion and remarks.

At the beginning of September 2023, on the ENER system, the MISA published a proposal for the Law on Digitalization and Security of Networks and Information Systems, which envisions the establishment of a new body - Agency for Security of Networks and Information Systems and Digital Transformation, which will be responsible for government network development, internet access, etc.

## Activities conducted by NBCO in NOBP implementation

Pursuant to Article 71-b of the Law on Electronic Communications, NBCO consists of seven members, one of whom is the president of the NBCO.

In the period from May 2023 to September 30th 2023, NBCO held a total of 6 meetings. Also, several meetings were held with relevant and concerned institutions in view of implementing the National Operational Broadband Plan (NOBP).

The NBCO sessions were attended by all members of the NBCO, independent experts (depending on the agenda), employees of the Communications Department, and representatives from the Cabinet of the Minister / Deputy Minister of MISA, as well as the State Secretary were also invited herein.

As before, depending on the NBCO meeting agenda, representatives from the EU Office in Skopje were invited, as well as representatives of other institutions, Agency for Electronic Communications, PE MRB etc.

The minutes of all sessions were regularly archived and published on the NBCO's website. Also, public announcements regarding NBCO's sessions and meetings with other institutions were regularly posted on the NBCO website.

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<sup>1</sup> eng: <https://mioa.gov.mk/?q=en/node/2459>

Technical and administrative support for NBCO's operation was continuously provided by the staff of the Communications Department. The employees of the Communications Department prepared the minutes, the announcements to the public, they were translated into Albanian, and then posted on NBCO's website(<https://bco.mioa.gov.mk/>).

During **May 2023**, one session was held (65<sup>th</sup> session).

Within the **65<sup>th</sup> session**, the National Broadband Competence Office analyzed and discussed the technical offer of the COWI consortium selected by the European Commission for the preparation of a Feasibility Study for the establishment of NTON, according to the NBCO. A chronological review/analysis of the content of the consortium's technical offer (key stakeholders, targets, risks and activities) was conducted.

Also, on the meeting were discussed activities for the preparation of a new Law on Digitalization and Security of Networks and Information Systems, which will encompass the establishment of the Agency for Digitalization.

During June **2023** two sessions were held (66<sup>th</sup> and 67<sup>th</sup> sessions).

Within the framework of the **66<sup>th</sup> session** the National Broadband Competence Office (NBCO), emphasized the updating of the content of Pillar 1 and the Action Plan from the National ICT Strategy, whereby the changes and amendment were aimed at aligning with the new concept for digital transformation in the public sector.

Among other topics, the meeting also discussed the preparation of the Law on Digital Transformation and Security of Networks and Information Systems, as well as the participation of members of NBCO in the process. The president of the NBCO informed that within the MISA, a Working Group has been formed to transpose the EU Directive 2016/1148 on measures for a high common level of network and information system security into the proposed law, taking into account its amendment in 2022, namely Directive 2022/2555.

Within the framework of the **67<sup>th</sup> session** the National Broadband Competence Office (NBCO), reviewed the Information regarding progress in the process of updating white, gray and black zones and preparation of the DESI Report.

The members of NBCO provided information regarding the activities for the preparation of the new DESI Report, which should cover the period from October 1, 2022, to April 30, 2023. They also informed about the activities of the Agency for Electronic Communications for collecting updated data from telecom operators. Additionally, a brief presentation was made on the Report on the mapping of existing and planned broadband networks of operators, as of the end of April 2023.

During **July 2023** one session was held (68<sup>th</sup> session).

Within the framework of the **68<sup>th</sup> session** the National Broadband Competence Office (NBCO) adopted the Seventh Broadband Development Report in the State (pursuant to DESI) and implementation of NOBP covering the period October 2022 - April 2023. Prior to the adoption of the report, there was a discussion regarding its content. In the part of the report from the conducted mapping of existing and planned broadband networks of operators, a key statistic stands out, the data according to which 88.8% of households in the country have access to high-speed broadband networks, while 73.67% of households have access to ultra-fast broadband, is characteristic. networks. Also, 15.3% of households are located in white zones, and 69.8% in black zones.

During August **2023** one session was held (69<sup>th</sup> session).

Within the framework of the **69<sup>th</sup> session** the National Broadband Competence Office (NBCO) adopted the Draft Inception Report - Feasibility Study for NODE and deployment of broadband developed by the COWI consortium.

Before the Draft Inception Report was adopted, a discussion took place. Members of the NCBC and others present at the session gave comments and suggestions for revising specific sections of the material, with the aim of improving the content of the report and aligning it with the Terms of Reference (ToR). Initially, comments were made about the content of the acronym list, which encompasses the entities (institutions and companies) included in the report.

Furthermore, a comment was made on clause 3.3, which covers the Methodology and the development of estimated costs for the implementation of the conceptual project for the National Optical Network (NBON). Specifically, the members of the body recommended that it be referenced in accordance with the objectives outlined in the ToR, particularly NBON, to be

designed in a way that will attract commercial operators to deploy access network in order to provide retail services to citizens, at prices determined in National Operational Broadband Plan (NOBP).

During **September 2023** one session was held (70th session).

### Participation of NBCO members in webinars organized by the network of European BCO

Pursuant to Article 71-a of the Law on Electronic Communications, NBCO participates in the work of the network of Broadband Competence Offices in the European Union and in the region.

The network of European BCOs was established with the aim of promoting the exchange of knowledge and experiences between the European bodies competent for broadband (BCO-Broadband Competence Office), as well as overcoming obstacles for broadband projects and upgrading capacities in the areas of financing, planning and broadband policies. The European BCO Network has an annual program of activities on key areas of interest, which includes organizing networking events, training materials and publications, and seminars on policy, funding, good practice and issues about broadband.

In the period May 2023 – September 2023, members of the NBCO took an active part in the following events organized by the network of European BCO:

- On Series 10 webinars:

- On May 23, 2023, a session entitled "Gigabit Infrastructure Act – Cabling in Buildings" was held, where a representative of DG Connect at the European Commission presented the proposal for the Gigabit Infrastructure Act - the installation of physical infrastructure within buildings. He provided an overview of the overall reasons for the revision of the Broadband Cost Reduction Directive (BCRD), which led to the proposal for a new gigabit infrastructure act, the pillars of the new act with particular emphasis on physical infrastructure in buildings and deployment on optical cables.

- On May 30, 2023, the session titled "Satellite Connectivity" was held, where a representative of DG Connect at the European Commission presented the importance of connectivity through satellite digital networks, and a representative of the Spanish BCO presented a new measure to encourage access to wholesale services in order to increase the coverage of ultra-fast broadband networks and bridge the digital divide in rural areas.

- On June 6, 2023, a session titled "Public Consultation on State Aid Schemes" was held, during which a representative from the Polish BCO presented the state aid schemes for the periods 2014-2020 and 2021-2027.

- On June 21, 2023, a session titled "Simplified Cost Options for Broadband Deployment" was held, where a representative from the Polish Digitalization Project Center presented the methodology for simplified broadband costs, consisting of 3 steps: description of the individual component costs in the broadband access infrastructure building process, data processing using IT tools to describe capex and investment gap, as well as analysis and grouping of the results to determine representative category groups.

- On July 4, 2023, a session titled "New Broadband Investment Guide" was held, where representatives of DG Connect at the European Commission presented the new guide of the European Commission for broadband investments, its objectives, structure, content, and potential business plans.

- On Series 11 Webinars:

- On September 19, 2023, a session titled "State Aid Scheme for 5G in Spain" was held, where a representative of the Spanish BCO presented the latest state aid measure for the upgrade of existing 3G and 4G networks to 5G Stand Alone (SA), with the aim of improving broadband network coverage with quality parameters such as download speed characteristic as a 5G network.

## Conducted activities of the Agency for Electronic Communications in the implementation of NOBP

In September 2023, the director of the Agency for Electronic Communications adopted amendments to the Rulebook on Quality Parameters for Public Electronic Communication Services Delivered via Radionetworks. The Rulebook defines the quality parameters for 5G technology, as well as the obligation of operators to submit 5G coverage data on a quarterly basis.

In September 2023 the director of the Agency for Electronic Communications adopted a by-law that will implement the Directive on measures to reduce the costs of deploying broadband networks (Directive 2014/61/EU on measures to reduce the cost of deploying high-speed electronic communications networks – Official Journal of the European Union L155 of 23.5.2014) and the proposal for a new regulation on measures to reduce the cost of deploying gigabit electronic communications networks and repealing Directive 2014/61/EU (Gigabit Infrastructure Act), COM (2023) 94 final of 23.2.2023). This act envisages measures that will spread the construction and use of broadband infrastructure, such as coordination of construction activities, cabling in built objects, etc.

## Report on Broadband Development in the Country

Pursuant to the Law on Electronic Communications, the NBCO "at least twice a year prepares a report to the Minister of Information Society and Administration on the development of broadband in the country in relation to the development of the broadband market in the European Union, pursuant to DESI (The Digital Economy and Society Index) and a report on the implementation of the adopted strategic documents and plans for the development of broadband in the country, the fulfillment of the national broadband targets established therein."

In order to meet this obligation, in February 2020 NBCO adopted the "Methodology determining the Digital Economy and Society Index in the Republic of North Macedonia" and Template on the Form and Content of the Broadband Market Development Report pursuant to DESI. The methodology was based on the DESI methodology of the European Commission (EC) from 2014, and pursuant to the same NBCO is responsible for monitoring only the "Connectivity" dimension.

At the session held on 27.05.2022, NBCO adopted a new "Methodology determining the Digital Economy and Society Index in the Republic of North Macedonia" pursuant to the EC Methodology for DESI 2021. After adopting the new methodology for the Republic of North Macedonia, NBCO approaches to align the institutions that are the source of the data for the indicators in the Connectivity dimension to start providing the data for the new indicators pursuant to the EC Methodology for DESI 2021.

The preparation of this Report is in accordance with the adopted Template for the form and content that should be contained in the Broadband Market Development Report pursuant to DESI (consolidated text).

When preparing this Broadband Market Development Report in the "Connectivity" dimension, NBCO as data source for certain sub-dimensions and indicators used data from:

- Agency for Electronic Communication, in most parts,
- State Statistics Office<sup>2</sup>,
- National Bank.

This Report compares the RNM's indicators with the "DESI 2022 Report" <sup>3</sup> published by the European Commission (EC) on 28.07.2022.

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<sup>2</sup> For demographics data, official data of the State Statistical office are used, according to the 2021 census (population 1.836.713, households 598.632)

<sup>3</sup> <https://digital-strategy.ec.europa.eu/en/policies/desi>



## Connectivity – DESI indicators

The Digital Economy and Society Index (DESI) is a composite index composed of indicators structured into four dimensions: human capital, connectivity, integration of digital technology, and digital public services, through which the digital performance of the country is evaluated. The National Broadband Competence Office (NBCO) tracks the indicators in the Connectivity dimension.

Table 1. shows the description for each of the DESI indicators in the “Connectivity” dimension:

**Table 1.** Description of the indicators in the “Connectivity” dimension

Indicator	Description
<b>2a1</b> Overall fixed broadband take-up	% of households subscribed to broadband
<b>2a2</b> Fixed broadband take-up with at least 100 Mbps download speed	% of households subscribed to broadband with at least % 100 Mbps download speed
<b>2a3</b> Fixed broadband take-up with at least 1 Gbps download speed	% of households subscribed to broadband with at least % 1 Gbps download speed
<b>2b1</b> Fast fixed broadband coverage (NGA)	% of households covered with broadband with at least 30 Mbps download speed. Affected technologies include FTTH, FTTB, cable Docsis 3.0 and VDSL
<b>2b2</b> Very high capacity networks (VHCN) coverage	% of households covered with at least one fixed VHCN. Affected technologies include FTTH, FTTB and cable Docsis 3.1
<b>2c1</b> 4G coverage	% of settlements with 4G coverage
<b>2c2</b> 5G readiness	Portion of the spectrum intended and awarded for 5G in the so called 5G pioneer ranges. These ranges are 700 MHz (703-733 MHz and 758-788 MHz), 3.6 GHz (3400-3800 MHz) and 26 GHz (1000 MHz in 24250- 27500 MHz). All three frequency bands have equal weight
<b>2c3</b> 5G coverage	% of settlements with 5G coverage
<b>2c4</b> Mobile broadband take-up	Number of mobile internet subscribers (or smart phone) for access to the internet
<b>2d1</b> Broadband Price Index	The Broadband Price Index measures the prices of representative baskets of fixed, mobile and converged broadband offers

The indicators in the “Connectivity” dimension for RNM are shown in Table 2.

**Table 2.** Indicators in the “Connectivity” dimension (September/2023)

Indicator	Value/ Reference date	Value/ Reference date	Value/ Reference date	Value/ Reference date	Value/ Reference date	Value/ Reference date	Value/ Reference date	Value/ Reference date	EU DESI 2022
<b>2a1</b> - Overall fixed broadband take-up	70,91% (Q3/2019)	72,95% (Q1/2020)	73,58% (Q3/2020)	75,79% (Q1/2021)	77,92% (Q3/2021)	74,49% <sup>4</sup> (Q1/2022)	75,58% (Q3/2022)	<b>76,93%</b> <b>(Q4/2022)</b>	<b>78%</b>
<b>2a2</b> - Fixed broadband take-up with at least 100 Mbps download speed	0,98% (Q3/2019)	1,74% (Q1/2020)	1,81% (Q3/2020)	1,97% (Q1/2021)	2,32% (Q3/2021)	2,36 % (Q1/2022)	2,53% (Q3/2022)	<b>5,80%</b> <b>(Q4/2022)</b>	<b>41%</b>
<b>2a3</b> - Fixed broadband take-up with at least 1 Gbps download speed						0,024% (Q1/2022)	0,030% (Q3/2022)	<b>0,030%</b> <b>(Q4/2022)</b>	<b>7,6%</b>
<b>2b1</b> - Fast fixed broadband coverage (NGA)	78% (Q1/2019)	78% (Q1/2019)	82,84% (Q4/2020)	82,84% (Q4/2020)	82,84% (Q4/2020)	78,11% <sup>5</sup> (Q4/2020)	88,8% (April/2023)	<b>88,8%</b> <b>(April/2023)</b>	<b>90%</b>
<b>2b2</b> - Very high capacity networks (VHCN) coverage						NA <sup>6</sup>	68,67% (April/2023)	<b>68,67%</b> <b>(April/2023)</b>	<b>70%</b>
<b>2c1</b> - 4G coverage	99,365% (Q4/2019)	99,38% (Q2/2020)	99,395% (Q4/2020)	99,395% (Q2/2021)	99,395% (Q4/2021)	99,44% (Q2/2022)	99,395% (Q1/2023)	<b>99,395%</b> <b>(Q1/2023)</b>	
<b>2c2</b> - 5G readiness	0%	22,2% (14.07.2020)	22,2%	22,2%	22,2%	44,44%	44,44%	<b>44,44%</b>	<b>56%</b>
<b>2c3</b> - 5G coverage						26,5% (Q3/2022)	31,5% territory 62,15% population (Q2/2023)	<b>31,5%</b> <b>territory</b> <b>62,15%</b> <b>population</b> <b>(Q2/2023)</b>	<b>66%</b>
<b>2c4</b> - Mobile broadband take-up	70,06% (Q3/2019)	64,83% (Q1/2020)	64,95% (Q3/2020)	66,78% (Q1/2021)	75,83% (Q3/2021)	76,43% (Q1/2022)	86,12% (Q3/2022)	<b>79,40%</b> <b>(Q4/2022)</b>	<b>87%</b>

<sup>4</sup> Indicator 2a1 in this report records a decrease due to the data from the State Statistics Office for the total number of households in the country. Namely, the number of households in the five previous reports of the NBCO according to the official data of the SSO was 564.296, while according to the official data from the 2021 Census in RNM there was an increase in the number of households to 598.632

<sup>5</sup> Indicator 2b1 in this report records a decrease due to data from the State Statistics Office for the total number of households in the country. Namely, the number of households in the five previous reports of the NBCO according to the official data of the SSO was 564.296, while according to the official data from the 2021 Census in RNM there was an increase in the number of households to 598.632

<sup>6</sup> The Electronic Communications Agency in September 2022 adopted amendments to the by-law to start collecting data from operators for the indicator 2b2 Very High Capacity Fixed Network (VHCN) Coverage

2d1 - Broadband Price Index							47,0 <sup>7</sup>	47,0 <sup>8</sup>	73
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<sup>7</sup> <https://www.rcc.int/pubs/159/western-balkans-digital-economy-society-index-wb-desi-2022-report>

<sup>8</sup> <https://www.rcc.int/pubs/159/western-balkans-digital-economy-society-index-wb-desi-2022-report>

## Comparison with indicators of EU member states

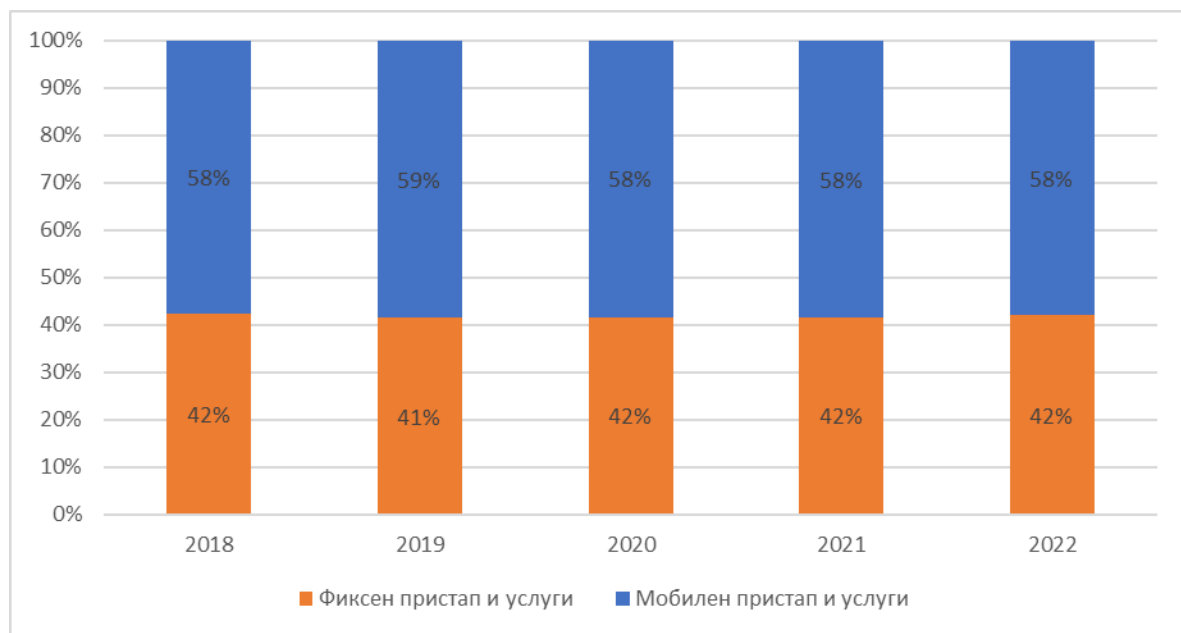
- Total revenues of telecom operators (in MKD, excluding VAT)

The data on the total revenues of the operators are shown in Table 3.

**Table 3.** Revenues from telecommunication services

Service	Revenues in 2018 (mkd)	Revenues in 2019 (mkd)	Revenues in 2020 (mkd)	Revenues in 2021 (mkd)	Revenues in 2022 (mkd)
Fixed telephony	2.131.578.000,00	2.026.590.000,00	2.004.000.000,00	1.998.928.000,00	2.002.503.163,00
Fixed internet access	3.990.676.000,00	4.126.204.000,00	4.145.699.000,00	4.469.349.000,00	5.030.145.018,00
Mobile telephony	6.823.893.000,00	7.076.195.000,00	7.007.180.000,00	7.335.682.000,00	7.234.653.707,00
Mobile internet access	1.468.488.000,00	1.628.726.000,00	1.622.939.000,00	1.773.654.000,00	2.494.604.807,00
Business Internet users	555.277.292,00	489.512.212,00	507.696.976,00	553.213.532,00	613.241.538,00

Source: Agency for Electronic Communication



**Figure 1:** Share of revenues from telecommunication services (Source AEC)

- Broadband coverage

Broadband infrastructure coverage data were obtained from the NOBP Implementation Support System launched by the Agency for Electronic Communications in December 2020. In the System for Support of the Implementation of the NOBP starting from September 2021, the categorization of all settlements in RNM (total 1.783) was performed according to the nomenclature of the State Statistical Office.<sup>9</sup>

#### A. Fixed broadband coverage

##### Indicator 2b1 Fast fixed broadband coverage (NGA)

**531.571 households** or **88,80%** of the total number of households in RNM have fixed high-speed broadband coverage (download speed of at least 30 Mbps and no more than 100 Mbps). Of these, **149.893 households** or **25,04%** of the total number of households in RNM are in **rural** settlements.

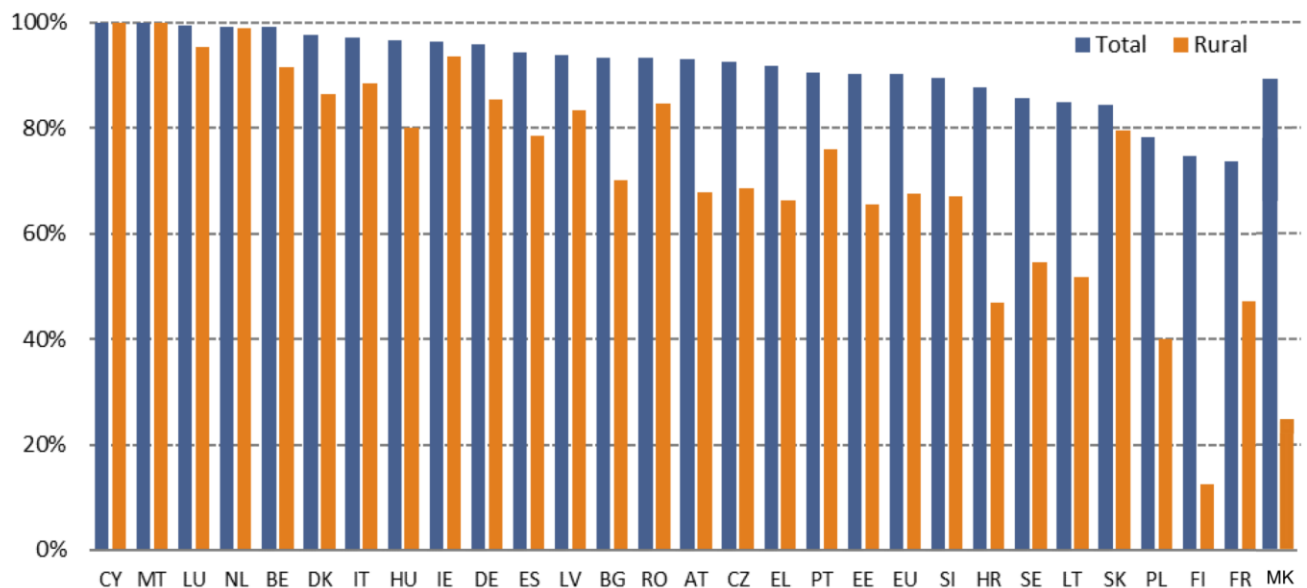
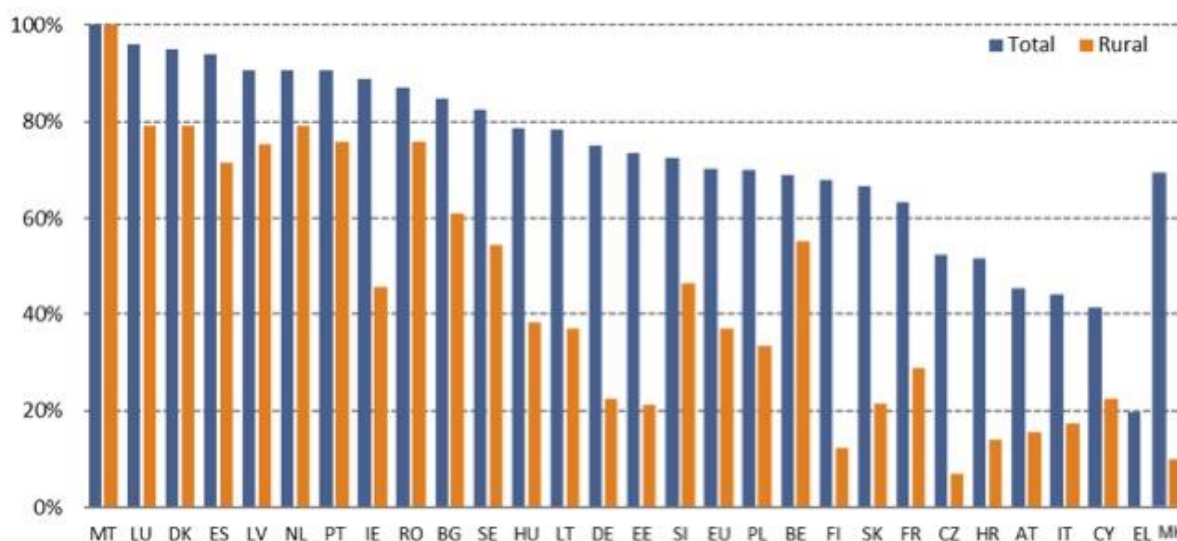


Figure 2: Fixed broadband coverage (% of households) (Source: EC (2022), AEC (April/2023))

<sup>9</sup> <https://www.stat.gov.mk/OblastOpsto.aspx?id=1>

## Indicator 2b2 Very High Capacity Networks (VHCN) coverage

**411,072 households** or **68,67%** of the total number of households in RNM have fixed networks with very high capacity (VHCN – Very High Capacity Network) coverage. Of these, **65,614 households** or **10,96%** of the total number of households in RNM are in rural settlements.



**Figure 3:** Very High Capacity Networks coverage (VHCN) (% of households) (Source: EC (2022), AEC (April/2023))

## B. Mobile broadband coverage

### Indicator 2c1 4G Coverage

99,58% of the population in RNM is covered by a 4G (LTE) network (by at least one mobile operator). The average availability of 4G (as the middle value of the two mobile operators' coverage) is 99,395% of the population in RNM.

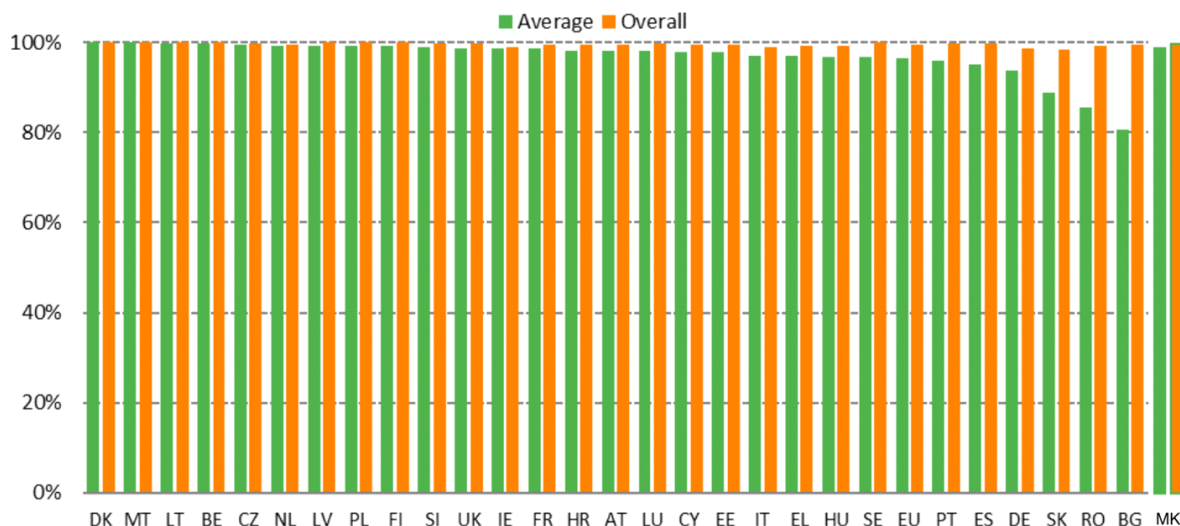


Figure 4: 4G coverage, % of households (Source: EC (mid-2019), AEC (Q1/2023))

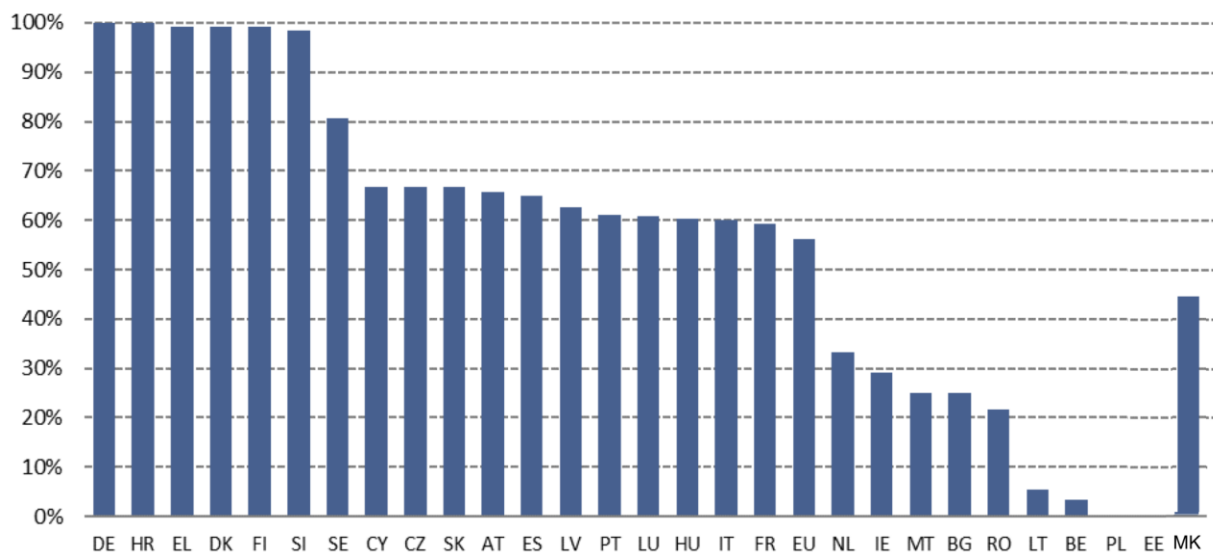
## Indicator 2c2 Allocated frequency spectrum for 5G

The following frequency bands were awarded in the so-called 5G "pioneer bands" in the Republic of NM:

- 700MHz: A total of 60MHz is available (703-733 & 758-788 MHz). 40 MHz these are awarded to operators, and 20MHz are reserved for a new network operator;
- 3.6 GHz: A total of 400 MHz is available (3 400-3 800 MHz), 300 MHz of which is planned to be used for 5G. Operators are awarded 200 MHz and 100 MHz are reserved for a new network operator;
- 26 GHz: A total of 1000 MHz (24 250-27 500 MHz) is available for allocation for 5G. All 1000 MHz were offered to interested parties during the public tender, but there was no interest in their allocation.

In the calculation of the 2s2 indicator, all three frequency bands have equal weight. The indicator is calculated as a portion of the spectrum awarded in each of the three 5G "pioneer bands", compared to the maximum possible value.

$$2c2 = (40/60) * 33,33\% + (200/300) * 33,33\% + (0/1000) * 33,33\% = 44,44\%$$



**Figure 5:** 5G spectrum, as % of awarded spectrum of the overall harmonized 5G spectrum (Source: EC (2022), AEC (Q2/2022))

### Indicator 2c3 5G coverage

31,5% <sup>10</sup> of the territory and 62,15% of the population in RNM is covered by a 5G network (by at least one mobile operator).

- Overall fixed broadband take-up (% of households)

### Indicator 2a1

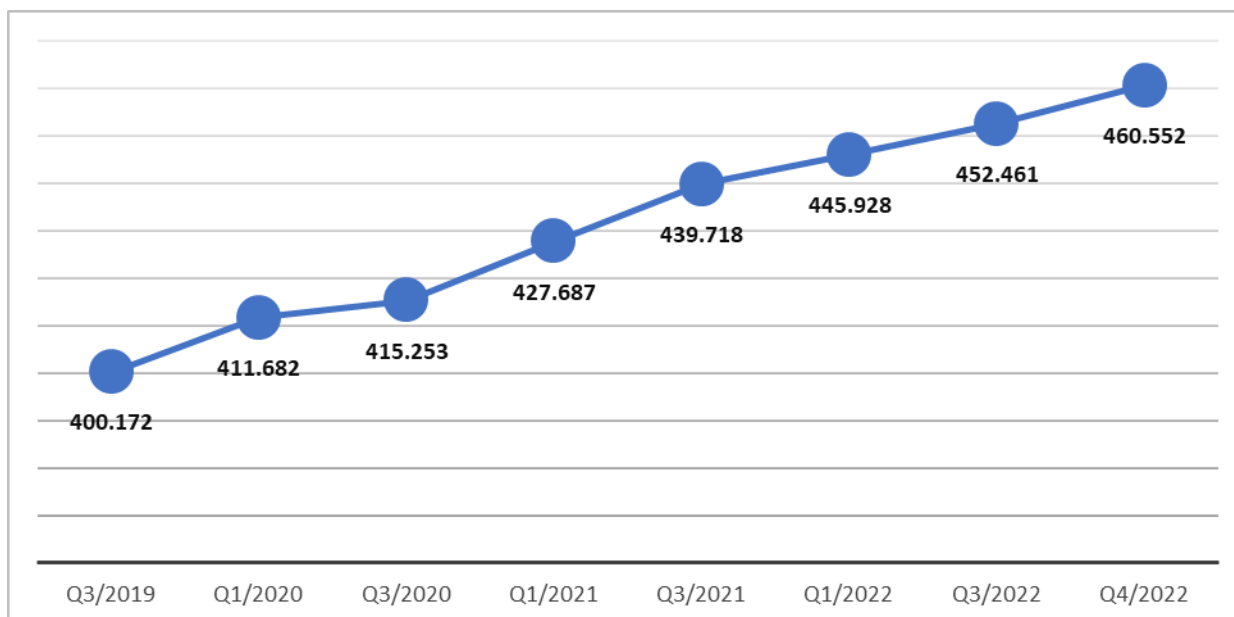
The overall take-up of fixed broadband in the Republic of NM is noted to have continuous growth, as shown in Table 4.

**Table 4.** Number of households subscribers of fixed broadband

Reference date	Q3/2019	Q1/2020	Q3/2020	Q1/2021	Q3/2021	Q1/2022	Q3/2022	Q4/2022
Number of residential subscribers	400.172	411.682	415.253	427.687	439.718	445.928	452.461	460.552

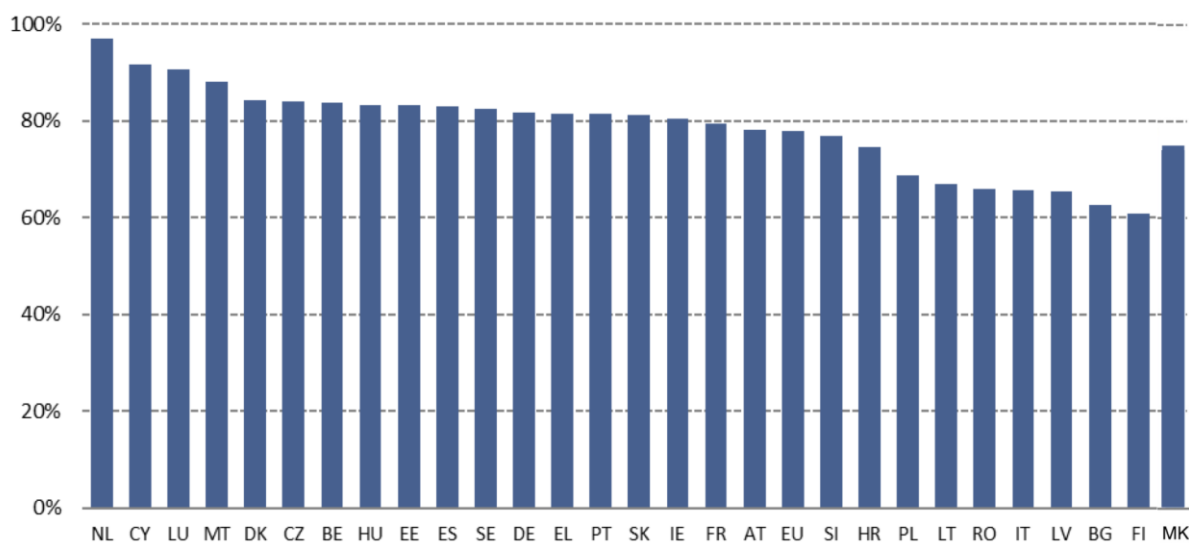
<sup>10</sup> The data is provided by one of the two mobile operators that have received approval for 5G





**Figure 6:** Change in the number of subscribers of fixed broadband in RNM (Source: AEC)

The take-up of fixed broadband for Q3/2022 is **76,93%**, i.e. **460.552 households in RNM have subscription agreement for fixed broadband (basic and/or NGA)**. (Source: AEC (Q4/2022))

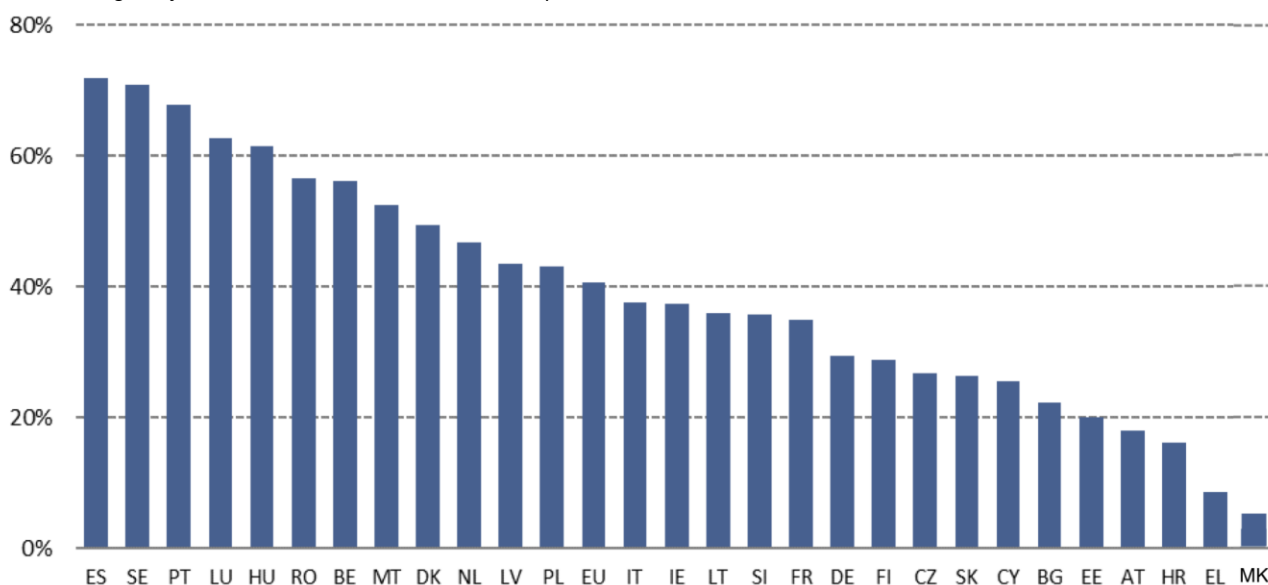


**Figure 7:** Households subscribers to fixed broadband (Source: EC (2022), AEC(Q4/2022))

- Fixed broadband take-up with at least 100 Mbps download speed (% of households)

## Indicator 2a2

The prevalence of fixed broadband with at least 100 Mbps download speed for Q4/2022 is **5,80%**, i.e. **34.730 households have subscription agreement for fixed broadband with download speed of at least 100 Mbps**. (Source: Agency for Electronic Communications)



**Figure 8:** Fixed broadband household subscribers with a speed higher than 100 Mbps (Source: EC (2022), AEC (Q4/2022))

The overall take-up of fixed broadband with a speed higher than 100 Mbps in the RNM notes continuous slight growth, as shown in Table 5.

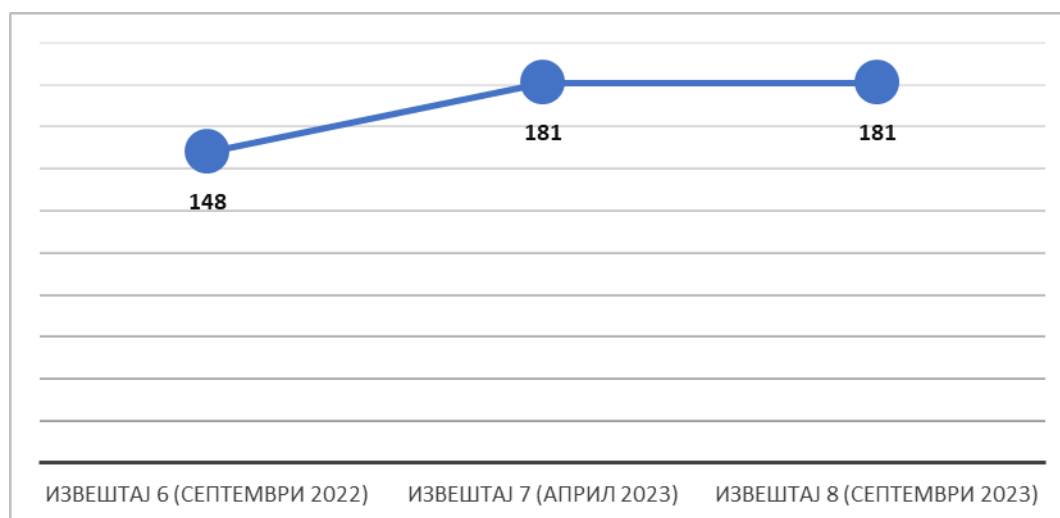
**Table 5.** Number of households with fixed broadband with a speed higher than 100 Mbps

Reference date	Q3/2019	Q1/2020	Q3/2020	Q1/2021	Q3/2021	Q1/2022	Q3/2022	Q4/2022
Number of residential subscribers	5.544	9.869	10.221	11.122	13.102	14.184	15.152	34.730

- Fixed broadband take-up with at least 1 Gbps download speed (% of households)

#### Indicator 2a3

The prevalence of fixed broadband with at least 1 Gbps download speed for Q4/2022 is **0,030%**, i.e. **181 households have subscription agreement for fixed broadband with download speed of at least 1 Gbps**. (Source: Agency for Electronic Communications)



**Figure 9: Fixed broadband household subscribers with a speed higher than 1Gbps (AEC (Q4/2022))**

- Fixed broadband take-up, market share per technology

Table 6. shows the percentage of fixed broadband technology used:

**Table 6.** Market share of fixed broadband based on technology

Technology	Market share (%) (3/2020)	Market share (%) (9/2020)	Market share (%) (3/2021)	Market share (%) (9/2021)	Market share (%) (3/2022)	Market share (%) (9/2022)	Market share (%) (4/2023)	Market share (%) (9/2023)
DSL (VDSL included)	30,75	29,14	28,22	26,75	25,33	24,22	23,44	22,49
Cable (with Docsis 3.0 included)	34,29	33,29	31,99	30,37	30,37	30,09	29,42	28,10
FTTH+B	13,87	15,45	17,04	19,66	21,05	22,38	24,10	25,70
Other (LL- Leased Lines, LAN, Fix LTE)	21,09	22,12	22,75	23,22	23,22	23,31	23,03	23,71

Source: Agency for Electronic Communications

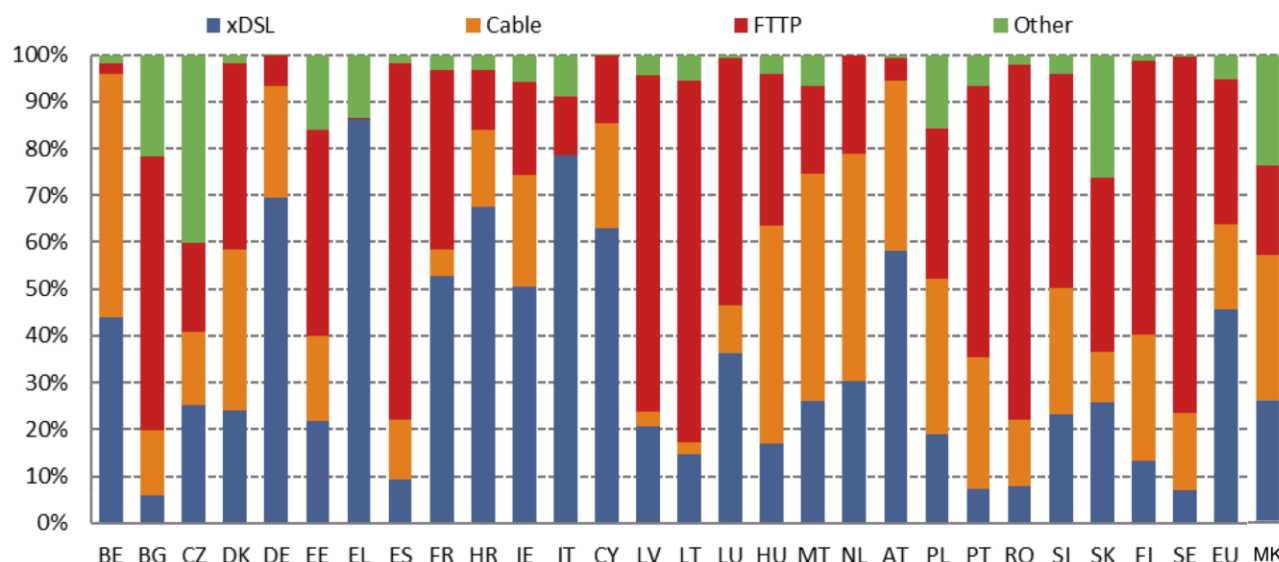


Figure 10: Technologies used to provide fixed broadband Source: EC (2022), AEC (Q1/2022)

The share of Fiber to the Premises - FTTP includes FTTH and FTTB technologies and its share in the total number of fixed broadband subscribers in RNM is 25,7% (the average value of the share of access through optics in the 28 EU member states is 31%, according to the EC Report "DESI 2022" from 2022).

Although xDSL is still the dominant technology at the level of the EU average, to which the main competing technology is Docsis 3.0 (according to the EC Report "DESI 2022" from 2022), Docsis 3.0 has surpassed xDSL technology in RNM according to the share and is the most utilized technology for providing fixed broadband.

The percentage of NGA subscriber contracts in RNM (download speed of at least 30 Mbps) in relation to the total number of subscriber contracts for fixed broadband in the country is **52,82%** and the same in the period from the first report of NBCO, March/2020 to this report of NBCO, September/2023 records a continuous **increase**.

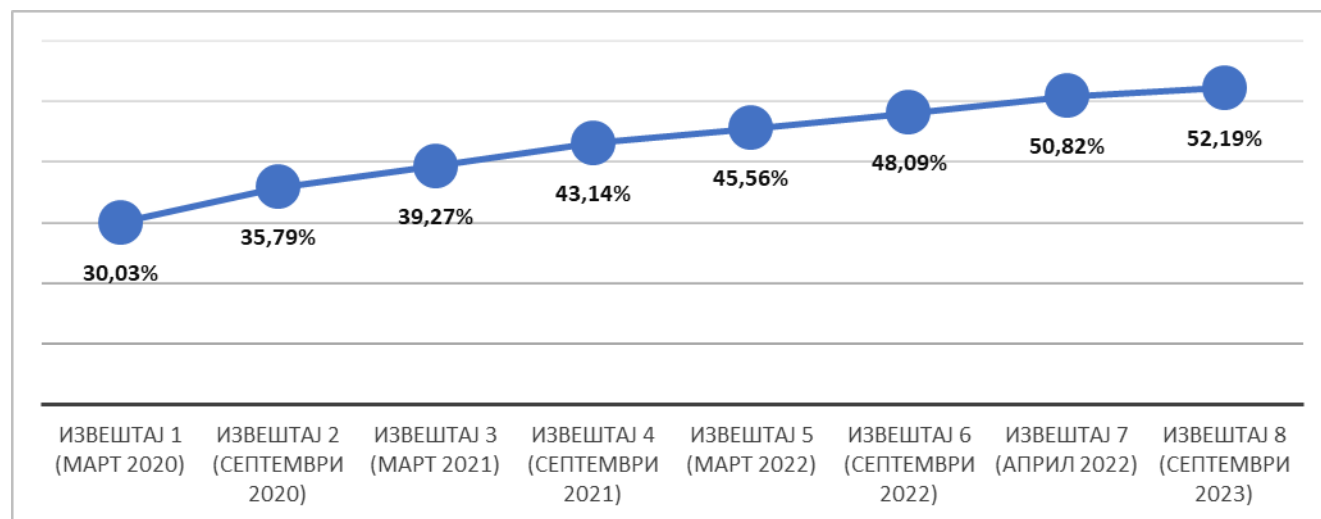
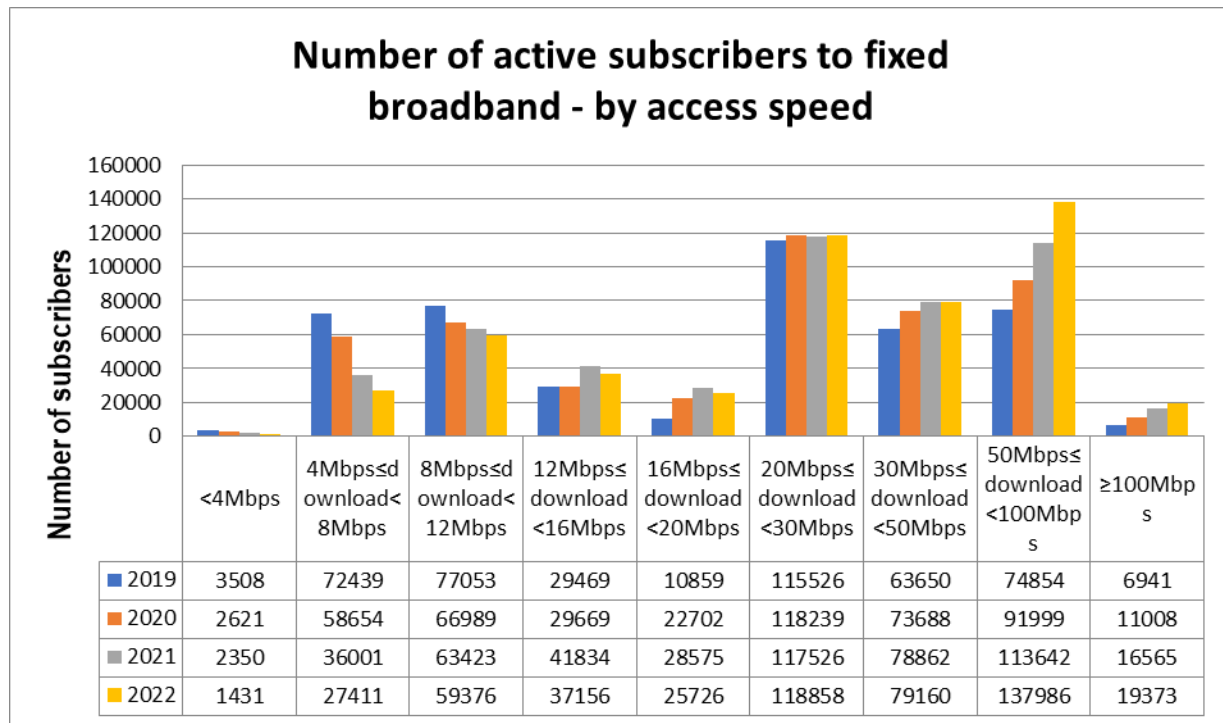


Figure 11: Change of the share of NGA subscription agreements in RNM (Source: AEC)

- Number of active subscribers to fixed broadband - by access speed



**Figure 12:** Number of active fixed broadband subscribers by access speed (Source: AEC)

From the graph of Figure.12 it can be concluded that the number of active subscribers to fixed broadband access with speeds higher than 30 Mbps has recorded continuous growth, at the expense of a decrease in the number of active subscribers to fixed broadband access with speeds lower than 12 Mbps.

- Number of active subscribers to Connected Service Packages

Table 7 shows the number of active users of bundled services for both residential users (households) and business users. The number of active users of packages with two services (double play), three services (triple play) and four services (quadruple play) is shown.

**Table 7.** Number of active subscribers to Connected Service Packages

	Two Service Package (Double play)		Three Service Package (Triple play)		Four Service Package (Quadruple play)	
	Households	Business Entities	Households	Business Entities	Households	Business Entities
<b>MARCH 2020</b>	119.319	14.532	143.352	16.259	88.588	638
<b>MARCH 2021</b>	122.314	15.765	164.754	17.637	78.657	0

SEPTEMBER 2021	125.419	17.165	167.181	17.951	82.874	0
MARCH 2022	129.350	19.454	164.505	18.201	85.741	0
SEPTEMBER 2022	144.882	32.909	148.627	6.064	89.149	1
APRIL 2023	126.314	20.492	168.922	19.063	91.857	1
SEPTEMBER 2023	130.247	20.651	167.960	19.216	91.619	2

(Source: AEC)

- Fixed broadband market competition

In RNM, the share of the traditional (incumbent) operator "Makedonski Telekom" on the fixed broadband market in Q4/2022 according to the total number of subscribers (residential and business) according to all technologies for fixed broadband access is **39,61%**, while the share of new emerging operators on the fixed broadband market is **60,39%**. (Source: Agency for Electronic Communications)

This ratio in terms of market share between traditional and emerging operators in RNM is according to the average of the 28 EU member states (according to the EC Report "DESI 2022" from 2022), where traditional telecom operators still control 40% of subscribers.

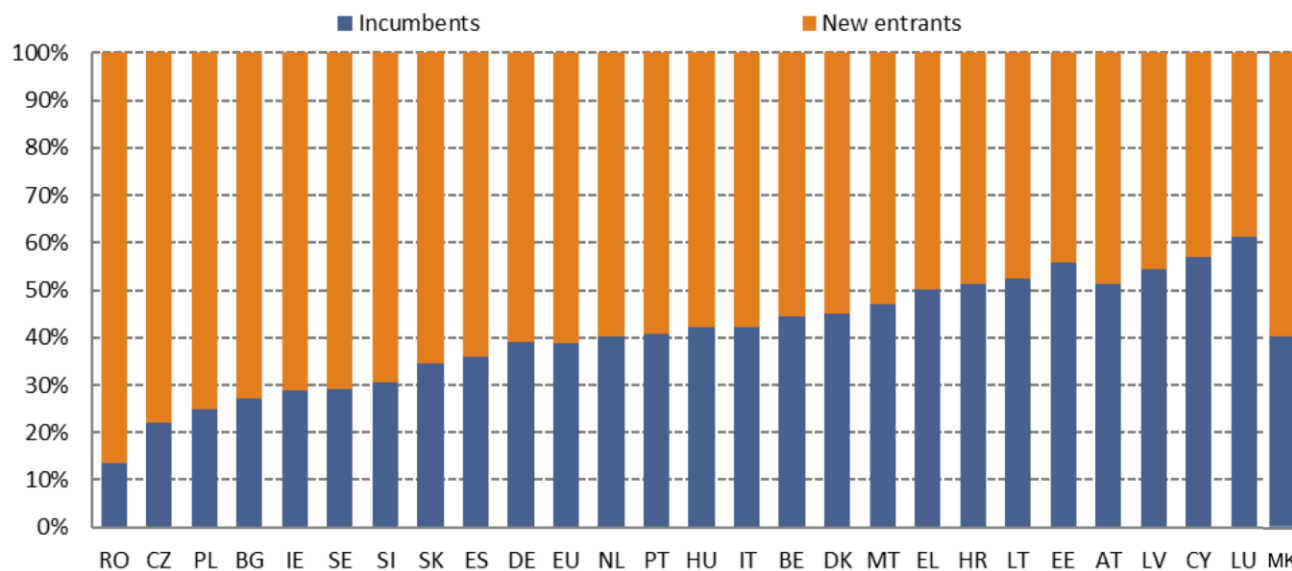


Figure 13: Fixed broadband market share by number of subscribers (Source: EC (2022), AEC (Q4/2022))

- Mobile broadband take-up (subscribers per 100 inhabitants)

#### Indicator 2c4

The take-up of mobile broadband for Q3/2022 is **79,40%**, i.e. the total number of subscribers who use mobile broadband is **1.458.377**<sup>11</sup>. (Source: Agency for Electronic Communications).

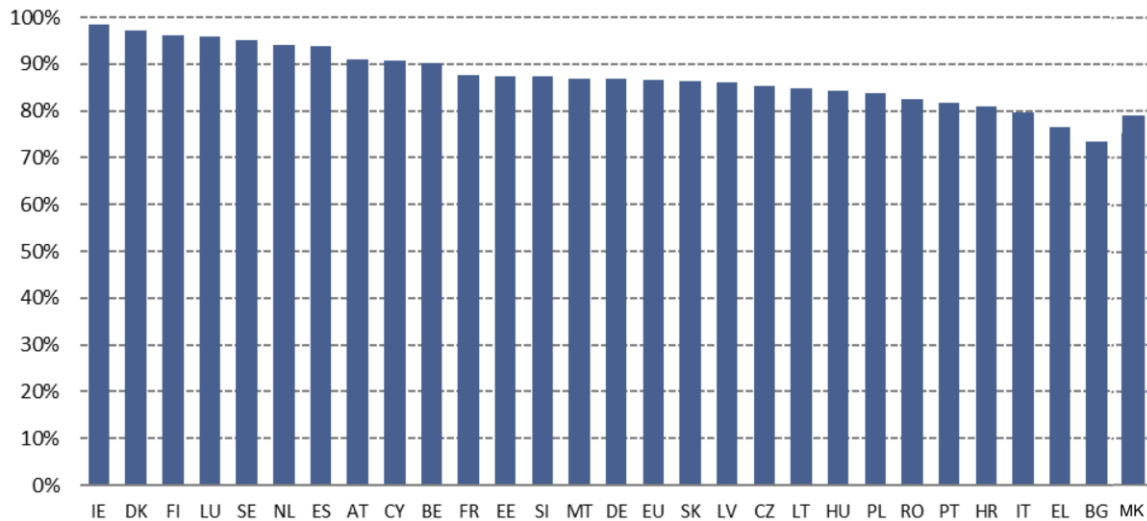


Figure 14: Mobile broadband take-up (Source: EC (2022), AEC(Q4/2022))

- Internet (IP) traffic per resident

A. Fixed broadband internet traffic per household during one month is **245,15 GB** (Source: Agency for Electronic Communications)

The average fixed broadband internet traffic per household during one month in the period from the first NBCO report from March/2020 to this NBCO report, September/2023 records the following **increase**, as shown in Figure 15.

<sup>11</sup> In RNM, in terms of the take-up of mobile broadband (subscribers per 100 inhabitants), in the third quarter (Q3) of the year (July, August, September) there is a noticeable trend of sharp increase in the number of mobile subscribers, due to the arrival of expatriates and due to the number of tourists, while in the other quarters the increase is milder

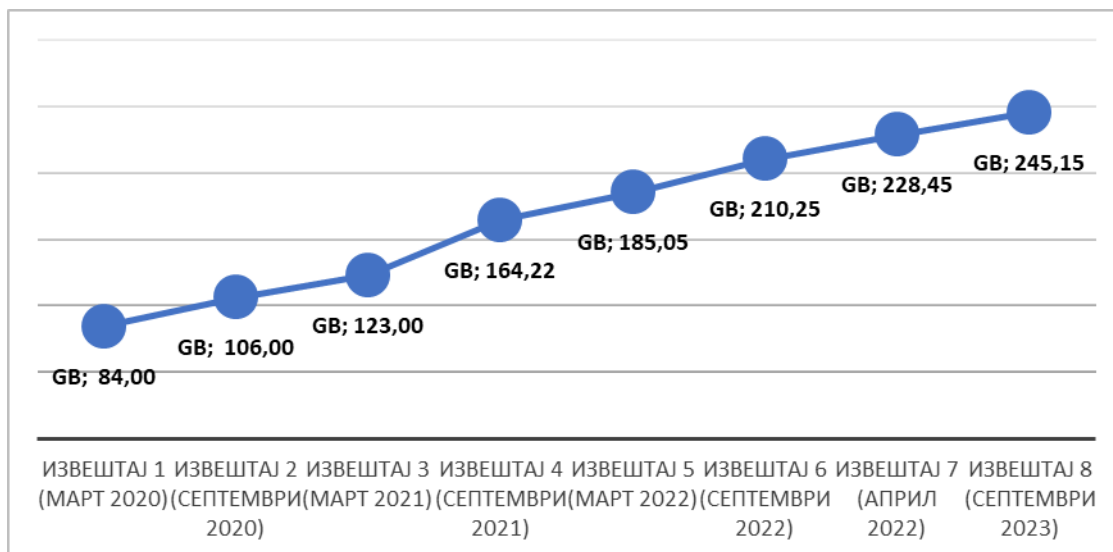


Figure 15: Change of fixed broadband internet traffic per household in RNM (Source: AEC)

B. Mobile broadband internet traffic per subscriber who uses mobile internet during a month is **8,42 GB** (Source: Agency for Electronic Communications)

The average mobile broadband internet traffic per subscriber during one month in the period from the first report of the NBCO from March/2020 to this report of the NBCO, September/2023 records the following **increase**, as shown in Figure 16..

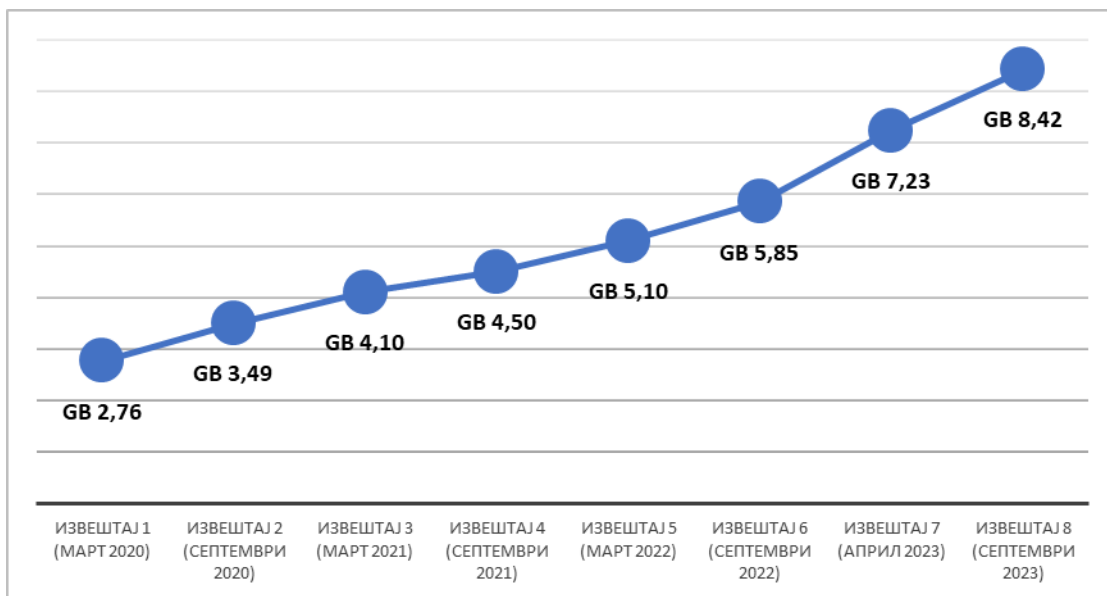


Figure 16: Change of mobile broadband internet traffic per subscriber in RNM (Source: AEC)

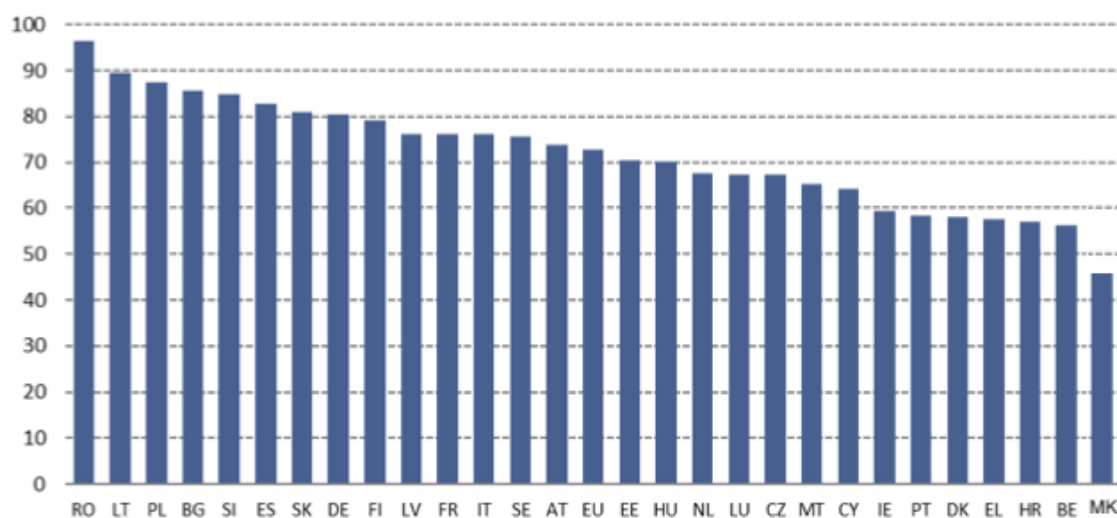


- Broadband price index

#### Indicator 2d1

The Broadband Price Index (BPI) measures the price level of representative baskets of fixed, mobile and converged broadband offers. The prices of the 34 consumer broadband baskets include different services: stand-alone internet, two-service package (fixed telephony + internet or mobile telephony + internet or TV + internet), three-service package (fixed telephony + TV + internet or mobile telephony + TV + Internet) and a package with four services (fixed telephony + mobile telephony + TV + Internet) and different Internet access speeds. A higher BPI score means lower prices.

This report uses the results of the DESI2022 Report for the Western Balkans 9, published by the Regional Cooperation Council (RCC). According to the Report, the Broadband Price Index for RNM is 47,0.



**Figure 17:** Broadband price index – all baskets (score 0-100, where 100 means lowest prices) (Sources: EC (2022), RCC (2022))