



Republic of North Macedonia

Broadband Competence Office

Report

Implementation of the National Operational Broadband Plan

Broadband development in the country

(period April 2022 - September 2022)

Skopje, September 2022

Content

Introduction	2
Implementation of the National Operational Broadband Plan for the period April 2022 - September 2022 e....	3
Activities conducted by the Government of the RNM and MISA in NOBP implementation	3
Activities conducted by NBCO in NOBP implementation	4
Activities conducted by the Agency for Electronic Communication in NOBP implementation	7
Report on Broadband Development in the Country	10
Connectivity – indicators	11
Comparison with indicators of EU Member States	13
• Total incomes of telecom operators (in MKD, excuding VAT)	13
• Broadband coverage	12
• Overall fixed broadband take-up (% of households)	16
• Fixed brodadbnd take-up with at least 100 Mbps downlodad speed (% of households)	17
• Fixed brodadbnd take-up with at least 1 Gbps downlodad speed (% of households) 1 Gbps.....	18
• Fixed broadband take-up, market share per technology	19
• Number of active subscribers to fixed broadband –by access speed	21
• Number of active subscribers to connected service packages	21
• Fixed broadband market competition	22
• Mobile broadband take-up (subscribers per 100 inhabitants)	22
• Internet (IP) traffic per resident	23
• Broadband price index.....	24

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 establishment of target areas that would use state aid in construction and development of broadband networks,
- Shall issue opinions and proposals during construction of broadband networks with utilization of state aid for: potential technical solutions, investment and business models, criteria for selection of operator, price policy and related issues,
- Shall participate, issue opinions and proposals in preparation of plans for promotion of broadband in the country,
- 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 April 2022 –September 2022

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>¹.

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

At its 54th session held on June 21, 2022, the Government of the RNM reviewed and adopted the text of the Information on Starting the Preparation of a Feasibility Study for National Transport Optical Network Construction.

The information was proposed by the Minister for Information Society and Administration

With the proposed conclusions from the Government session, among other things, it is required:

- The Ministry of Information Society and Administration in cooperation with the National Office for Broadband Competence to apply to the EU IF (EU Integration Facility) for obtaining technical assistance for the preparation of a Feasibility Study for National Transport Optical Network construction (NTON);
- NBCO to prepare Terms of Reference (ToR) for public procurement of consulting services for the preparation of the Feasibility Study;
- The Feasibility study should include: Analysis of the existing state of the broadband in the country, Conceptual project of NTON, Analysis of economic and technical impacts and parameters and impact of the construction of NTON on the environment and society;
- PE Macedonian Radio Broadcasting to provide the necessary administrative, technical and spatial capacities for the needs of the consulting firm that will prepare the Feasibility Study;
- AEK, PE MRT, SSO and state-owned enterprises that work with optical infrastructure to provide data necessary for the preparation of the Feasibility Study.

The Minister of Information Society and Administration in cooperation with the National Office for Broadband Competence held meetings with the Community of Local Self-Government Units, the Agency for Electronic Communications and PE Macedonian Radio Broadcasting with regards to the implementation of activities for the preparation process of the Feasibility Study for construction of the National Transport Optical Network

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.

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

In the period from April 2022 to September 30th 2022, NBCO held a total of 11 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), all 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, a representative from the EU Office in Skopje, a representative from the Office of the Prime Minister was invited to the NBCO's meetings, and representatives of other institutions, Agency for Electronic Communications, etc were also invited at some meetings.

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.

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 April 2022, the NBCO held one meeting (45th meeting), as well as a meeting with representatives from PE Macedonian Radio Broadcasting. Members of the NBCO participated in international meetings / workshops, and there was continuous communication between members and external experts on certain issues within the competence of the NBCO.

Namely, in October 2021:

NBCO held a working meeting with the Director and other representatives from PE Macedonian Radio Broadcasting. At the meeting, the attendees were introduced to the activities and results achieved in relation to the implementation of the National Operational Broadband Plan (NOBP), as well as the role of PE MRD in the direction of executing the legal responsibilities in accordance with the NOBP and the Law on the establishment of PE Macedonian Radio Broadcasting.

- The meeting was attended by a representative from the EU Office in Skopje, and support was expressed for the work of JP Macedonian Radio Broadcasting, and it was agreed to hold working meetings in the coming period to consider the possibilities for cooperation and assistance from EU bodies therein.
- Within the framework of the 45th regular session, the proposal for the Cooperation Agreement with Israel in the field of electronic communications and postal services was discussed. At the session, the members of the NBCO presented their remarks regarding certain articles of the agreement, in the direction of their clarification and improvement in terms of the competence they have in the field of electronic communications.

In May 2022, the NCBO held one session (the 46th session), members of the NBCO participated in international meetings / workshops, and there was continuous communication between members and external experts on certain issues within the competence of the NBCO. Namely, in May 2022:

- NBCO held a working meeting with the Minister of Information Society and Administration and the Director of the Agency for Electronic Communications at the regular session.
- The Minister and the Director were acquainted with the work and activities undertaken so far by the NBCO in relation to the implementation of the NOBP. It was noted by the Minister that the National Office for Broadband Competence is the key factor in the country for implementing the activities resulting from the broadband strategy adopted by the Government. Hence, accelerated development activities for broadband Internet in the country are expected in the coming period.
- The amendments to the Methodology for determining the DESI Digital Economy and Society Index were presented by the members of the NBCO, and it was clarified that they are in line with the methodology of the European

Commission for DESI 2021. The amendments to the Methodology for determining the Digital Economy Index and the DESI Society, were unanimously adopted by the members of the National Broadband Competence Office.

During June 2022 the NBCO held one session (the 47th session), members of the NBCO participated in international meetings / workshops, and there was continuous communication between members and external experts on certain issues within the competence of the NBCO. Namely, in June 2022:

- The proposed amendments to the Rulebook of the Agency for Electronic Communications on the method of construction of public electronic communication networks and related assets were considered herein. It was emphasized that they are being done in order for the Agency for Electronic Communications to start collecting data on the built and planned infrastructure network, according to the latest DESI EU methodology, which as such was previously adopted by the NCBC.

During July 2022 the NBCO held three sessions (the 48th, the 49th and the 50th session) as well as a working meeting with the Minister, the president of ZELS and the Directors of AEC and MRT. Members of the NBCO participated in international meetings / workshops, and there was continuous communication between members and external experts on certain issues within the competence of the NBCO. Namely, in July 2022:

- The conclusions of the 54th Government session (held on June 21, 2022) resulting from the Information on the preparation of a feasibility study for the construction of the National Transport Optical Network and the actions of the institutions that should be taken for successful completion of the process, were analyzed herein.
- At the regular sessions, the members of the NBCO worked on the preparation of the two basic documents (Project summary and Terms of reference) for submitting the application to the EU (through the Instrument Integration Facility - IF) for the public procurement of consulting services for the preparation of a Feasibility Study for National Transport Optical Network construction (NTON). The preparation of these materials is in accordance with the Conclusion of the 54th Government session.
- The members of the National Office for Broadband Competence held a working meeting with the Minister of Information Society and Administration, which was attended by the president of ZELS and the mayor of the city of Skopje, the Director of AEK, as well as the director of PE Macedonian Radio Broadcasting. At the meeting, they discussed the dynamics of the implementation of activities related to the broadband development in the country, that is, the accelerated implementation of the National Operational Broadband Plan. It was emphasized that the Feasibility study for the construction of the National Transport Optical Network will be started soon.
- At the 50th session of the NBCO, the members of the NBCO, in accordance with the deadlines established in the Conclusion of the 54th session of the Government, adopted the text of the Project summary for applying for receiving technical assistance from the IF/EU for the preparation of a Feasibility Study for the construction of a National Transport Optical Network. The text was submitted to MISA representatives responsible for this area.

During August 2022, NBCO held two sessions NBCO (the 51st and 52nd session). Members of the NBCO participated in international meetings / workshops, and there was continuous communication between members and external experts on certain issues within the competence of the NBCO. Namely, in August 2022:

- Within the sessions, the body continued with the preparation of the Terms of Reference for the public procurement of consulting services for the preparation of a Feasibility Study for the construction of a National Transport Optical Network. The preparation of these materials is in accordance with the Conclusion of the 54th Government session.

During September 2022, the NBCO held three sessions (the 53rd, the 54th and the 55th session). Members of the NBCO participated in international meetings / workshops, and there was continuous communication between members and external experts on certain issues within the competence of the NBCO. Namely, in September 2022:

- At the 54th session of the NBCO, the members adopted the text of the Terms of Reference (ToR) for the public procurement of consulting services for the preparation of a Feasibility Study for the construction of a National Transport Optical Network. The text was submitted to MISA representatives responsible for this area.
- With the adoption of the ToR and previously the text of the Project summary for applying for technical assistance from the IF/EU for the preparation of a Feasibility Study for the construction of a National Transport Optical

Network, NBCO completed the obligation assigned to it by the Government according to the Conclusion of the 54th session of the Government.

- The members unanimously adopted this Report at the 55th session of the NBCO therein.

Participation of NBCO members on webinars organized by the European BCO network

Pursuant to Article 71-a of the Law on Electronic Communications, the NBCO participates in the operation of the network of broadband competence offices in the European Union and in the region.

European BCO network has been established in order to promote the exchange of knowledge and experience between the European Broadband Competence Office (BCO), as well as to overcome obstacles for broadband projects and capacity building in the areas of financing, planning and broadband policies. The European BCO Network has an annual program of activities for key areas of interest, which includes organizing link events, training materials and publications, and seminars on policy, funding, good practice, and broadband issues.

During the period April 2022 – September 2022, NBCO's members have actively participated on the following events, organized by the European BCO network:

- Series 7 comprised of the following webinars:
 - On May 24, 2022, the session entitled "Special assistance for Ukraine" was held, during which brainstorming was done within the network of BCOs for the purpose of ensuring quality connectivity for Ukrainians, citizens and refugees, to enable the affected population access to essential services and media, as well as to guarantee the best possible level of cyber security protection and resilience.
 - On May 31, 2022, the session entitled "5G communities: Shaping the next call" was held, where a representative of DG Connect at the European Commission informed that the first call for CEF (Connecting Europe Facility) was closed on April 20, 2022 and that in the procedure for evaluating the received proposals is underway, following which contracts will be concluded therein. He also announced that the next call for CEF is expected to be published in October 2022, to last until the middle of January 2023, and that 24 million euros will be allocated for the same from the budget of the European Commission for 2022.
 - On June 14, 2022, a session entitled "Telecom eco-systems and OTTs" was held, which presented the Internet eco-system of Europe, as well as the socio-economic benefits of a fairer balance between technology giants and telecom operators.
 - On June 21, 2022, the session entitled "Voucher Scheme - Lessons Learned" took place where representatives of the Greek and Italian BCOs presented the Super-Fast Broadband Access Voucher Scheme with its reasons and objectives, scope, budget, beneficiaries, application and award procedures, which were implemented in Greece and Italy, respectively, as well as the results of the same in those countries herein.
 - On June 28, the session entitled "Mapping and Monitoring for Broadband" was held, where a representative from the research center of the European Commission presented the results of the analysis of the spatial availability of broadband and the quality of broadband connection according to the degree of urbanization of the European territory, with special reference to digital gap urban-rural and remote areas.
 - On June 28, 2022, a session entitled "Global gateways – shaping the next call" was held, at which a representative of the European Commission presented the specific fund of the European Union CEF (Connecting Europe Facility) for connectivity infrastructure (transport/energy/digitalization).

- On July 5, 2022, the session entitled "RRF7 milestones – lessons learned from the first semester" was held, where the RRF (Recovery and Resilience Facility), its objectives and ideas, plan and milestones for implementation were presented hereto.
- Series 8 comprised of the following webinars:
 - On September 6, 2022, a session titled "CEF digital matchmaking for Ukraine – digital global gateways" was held, where a representative of DG Connect at the European Commission presented the legislation and strategic goals of CEF2 (Connecting Europe Facility) as an instrument to support development and the utilization of the network infrastructure for Digital global gateways, on the one hand, and the existing policies and network infrastructure operators in Ukraine.
 - On September 13, 2022, the session entitled "Smart cables: seismic detection via submarine cables" was held.
 - On September 20, 2022, the session entitled "CEF digital matchmaking – 5G for smart communities" was held, at which a representative of DG Connect at the European Commission presented the first call for CEF (Connecting Europe Facility) as an instrument to support development and use of network infrastructure, and panellists from Vodafone and Nokia presented their experiences from participating in approved projects in CEF's First Call for 5G for Smart Communities.
 - On September 20, 2022, the session titled "CEF digital – digital global gateways: Preparation for Call 2" was held, where a representative of DG Connect at the European Commission presented the legal framework and objectives of the Second Call of CEF (Connecting Europe Facility) as an instrument to support the development and utilization of the network infrastructure for Digital global gateways.

Activities conducted by the Agency for Electronic Communications in NOBP implementation

Agency planned to award three approvals for use of radiofrequencies of 700MHz, seven approvals for use of radiofrequencies of 3.xGHz and four approvals for use of radiofrequencies of 26GHz as follows:

On April 6, 2022, the Agency for Electronic Communications announced a new intention to implement a public call procedure with public bidding for the issuance of a limited number of approvals for the utilization of radio frequencies. The intention states that the subject of the public call for 5G are:

- 2x30MHz in the frequency range 694-790MHz,
- 300MHz in the frequency range 3400-3800MHz and
- 800MHz in the frequency range 24.25-27.5GHz.

The agency planned to grant three approvals for the utilization of radio frequencies in the 700MHz band, seven approvals for the utilizations of radio frequencies in the 3.x GHz band and four approvals for the utilization of radio frequencies in the 26GHz band, namely:

700 MHz		
Approval	Frequency band	Radio-communication service
A1	703-713/758-768MHz	Land mobile
A2	713-723/768-778MHz	Land mobile
A3	723-733/778-788MHz	Land mobile

3.x GHz		
Approval	Frequency band	Radio-communication service
B1	3.5-3.6GHz	Land mobile
B2	3.6-3.7GHz	Land mobile
B3	3.7-3.8GHz	Land mobile
26 GHz		
Approval	Frequency band	Radio-communication service
C1	24.3-24.5GHz	Land mobile
C2	24.5-24.7GHz	Land mobile
C3	24.7-24.9GHz	Land mobile
C4	24.9-25.1GHz	Land mobile

During the public debate, which lasted until May 13, 2022, letters of interest for 5G were lodged from interested parties, namely:

- A1 Macedonia- for Approvals: A3 and B2 and
- Makedonski Telecom - for Approvals: A2 and C3.

AEC published the received comments in the letters of interest from the interested parties and the response to the comments on the website on May 20, 2022.

Since the received number of letters expressing interest is less than or equal to the published number of approvals for the utilization of radio frequencies to be issued, pursuant to Article 134 paragraph (6) indent 2, AEC implemented a procedure for issuing an approval for the utilization of radio frequencies by virtue of the lodged request for the use of radio frequencies in accordance with Article 133 of the LEC, after previously obtained consent from the Government of the Republic of North Macedonia for the amount of the one-time fee.

At the 54th session of the Government of the Republic of North Macedonia held on June 21, 2022, the Government made a decision to approve the Decision on determining the lowest amount of the one-time fee and the method of its payment for obtaining approval for the use of radio frequencies from the radio frequency bands 700MHz and 3.xGHz, adopted by the director of the Electronic Communications Agency no. 0805-1145/6 from June 16, 2022.

According to the Decision by the Director of the Agency for Electronic Communications no. 0805-1145/6 of 16.06.2022, the amount of the one-time fee for the utilization of radio frequencies for the A2 and A3 approvals in the entire territory of RNM is determined to be 5 250 000.00 (five million two hundred and fifty thousand) euros and for the B2 approvals and B3 in the entire territory of RS Macedonia, it is determined to be 2,900,000.00 (two million and nine hundred thousand) euros.

The one-time compensation is paid to the RNM Budget account at the middle exchange rate of the National Bank of the RNM on the day of the payment. After the payment of the one-time fee, the approvals were issued

700MHz			
Approval	Frequency band	Approval number	Operator
A2	713-723/768-778MHz	112867	Makedonski Telekom

A3	723-733/778-788MHz	112865	A1 Macedonia
3.x GHz			
Approval	Frequency band	Approval number	Operator
B2	3.6-3.7GHz	112866	A1 Macedonia
B3	3.7-3.8GHz	112868	Makedonski Telecom

The situation in North Macedonia with the so-called 5G pioneer bands are as follows:

- - 700MHz band: 60MHz (703-733 & 758-788MHz.) Out of the total available 60MHz for 5G, 40MHz is allocated to operators. 20MHz is reserved for a new network operator
- - 3.6GHz band: 400MHz (3 400-3 800MHz). Of this range, 300 MHz is planned to be used for 5G. Out of a total of 300MHz available for 5G, operators have been allocated 200MHz. 100MHz is reserved for a new network operator.
- - 26GHz band: 1000MHz within 24 250-27 500MHz. In Macedonia, there are 1000MHz available for allocation to 5G operators, which were offered to interested parties, but there were no interested parties for their allocation.

In June 2022, the Agency for Electronic Communications prepared a draft Rulebook for amendments and supplements to the Rulebook on the method of construction of public electronic communication networks and related assets in the direction of providing data from operators for built public electronic communication networks and planned for construction public electronic communication networks in accordance with the new DESI coverage indicators and submitted it to a public discussion that lasted until July 21, 2022. The amendments and supplements to this regulation were adopted by the director of AEC in September 2022 and were published in the "Official Gazette of RNM", no. 209/2022).

Report on Broadband Development in the Country

According to the Law on Electronic Communications, NBCO "prepares a report at least twice a year, for 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, in accordance with 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 implementation of the national broadband targets established therein."

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

At the session held on May 27, 2022, the NBCO adopted a new "Methodology for determining the Digital Economy and Society Index in the Republic of North Macedonia" which is aligned with the EC Methodology for DESI 2021. After adopting the new methodology for the Republic of North Macedonia, the NBCO approaches to aligning 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 according to the EC Methodology for DESI 2021.

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

When preparing this Broadband Market Development Report in the "Connectivity" dimension, NCBC used data from:

- Agency for Electronic Communication, in most parts,
- State Statistics Office²,
- National Bank.

This Report compares the RNM's indicators with the "DESI 2022 Report"³ published by the European Commission (EC) on 28/07/2022.

Connectivity – indicators

The indicators in the "Connectivity" dimension for RNM are shown in Chart 1.

Chart 1. Indicators in the "Connectivity" dimension (September/2022)

Indicators	Description	Unit	Value/ Reference date	Value/ Reference date	Value/ Reference date	Value/ Reference date	Value/ Reference date
2a1 Overall fixed broadband coverage	% of broadband covered households	70.91% (Q3/2019)	72.95% (Q1/2020)	73.58% (Q3/2020)	75.79% (Q1/2021)	77.92% (Q3/2021)	74.49% ⁴ (Q1/2022)
2a2 Fixed broadband take- up with at least 100 Mbps download speed	% of households subscribed to broadband 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)
2a3 Fixed broadband coverage with at least 1 Gbps download speed	% of households subscribed to broadband with at least % 1 Gbps download speed						0.024% (Q1/2022)
2b1 Fast broadband coverage(NGA)	% of households covered with broadband with at least 30 Mbps download speed. Affected technologies	78% (Q1/2019)	78% (Q1/2019)	82.84% (Q4/2020)	82.84% (Q4/2020)	82.84% (Q4/2020)	78.11% ⁵ (Q4/2020)

²The official data of the State Statistics Office according to the Census of 2021 are used for the demographic data (population 1,836,713, households 598,632)

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

⁴Indicator 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 by 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, the number of households increased to 598,632

⁵Indicator 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, the number of households increased to 598,632

	include FTTH, FTTB, cable Docsis 3.0 and VDSL						
2b2 very high capacity network (VHCN) fixed broadband coverage							NA ⁶
2c1 4G coverage	% of settlements with 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)
2c2 Preparedness for 5G	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	0%	22.2% (14.07.2020)	22.2%	22.2%	22.2%	44.44%
2c3 5G coverage	% of settlements with 5G coverage						26.5% (Q3/2022)
2c4 Mobile broadband coverage	Number of mobile internet subscribers (or smart phone) for access to the internet	70.06% (Q3/2019)	64.83% (Q1/2020)	64.95% (Q3/2020)	66.78% (Q1/2021)	75.83% (Q3/2021)	76.43% (Q1/2022)
2d1 Broadband price index	The Broadband Price Index measures the prices of representative baskets of fixed, mobile and converged broadband offers						

⁶In September 2022, the Agency for Electronic Communications adopted amendments and supplements to the by-law to start collecting data from operators for the indicator 2b2 Very High Capacity Fixed Network (VHCN) Coverage

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 Chart 2.

Table 2. Revenues from telecommunication services

Service	Revenues in 2018 (mkd)	Revenues in 2019 (mkd)	Revenues in 2020 (mkd)	Revenues in 2021 (mkd)
Fixed telephony	2,131,578,000.00	2,026,590,000.00	2,004,000,000.00	1,998,928,000.00
Fixed internet access	3,990,676,000.00	4,126,204,000.00	4,145,699,000.00	4,469,349,000.00
Mobile telephony	6,823,893,000.00	7,076,195,000.00	7,007,180,000.00	7,335,682,000.00
Mobile internet access	1,468,488,000.00	1,628,726,000.00	1,622,939,000.00	1,773,654,000.00
Business Internet users	555,277,292.00	489,512,212.00	507,696,976.00	553,213,532.00

Source: Agency for Electronic Communications

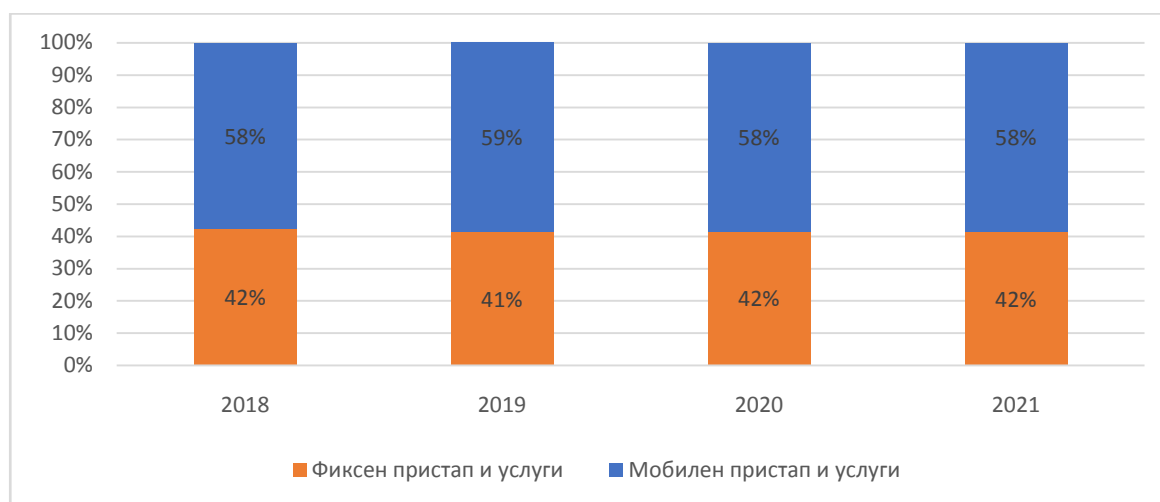


Figure 1: Share of revenues from telecommunication services (Source AEC)

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.⁷

A. Fixed broadband coverage

Indicators2b1 fast broadband coverage (NGA)

467,599 households have fixed broadband coverage (download with at least 30Mbps and not more than 100 Mbps) or 78.11% of the total number of households in RNM. 131,627 households or 21.98% of the total number of households are located in rural areas.

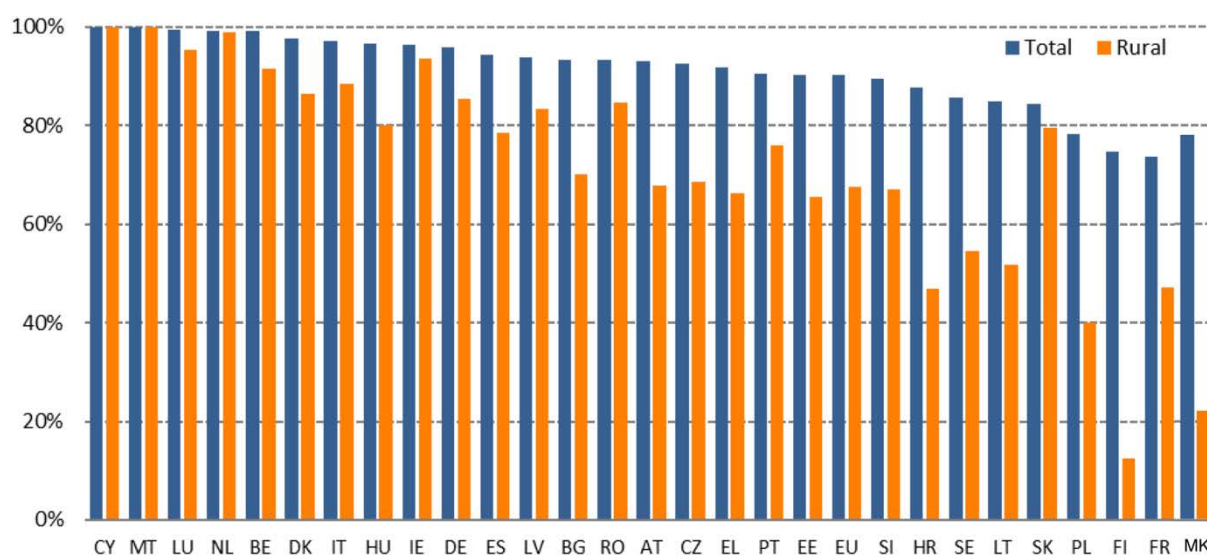


Figure 2: Fixed broadband coverage (% of households) (Source: EC (2022), AEC (Q4/2020))

Indicator2b2 Very High Capacity Networks coverage (VHCN)

The Electronic Communications Agency, which is the source of the data for the indicator 2b2 Very High Capacity Fixed Network (VHCN) Coverage, amended the by-law in September 2022 to start collecting data from operators for this indicator. The changes and additions are published in the "Official Gazette of RSM", no. 209/2022.

B. Mobile broadband coverage

Indicator2c1 4G Coverage

99.67% of the population in RNM is covered by a 4G (LTE) network (by at least one mobile operator).

⁷<https://www.stat.gov.mk/OblastOpsto.aspx?id=1>

The average availability of 4G (as the middle value of the two mobile operators' coverage) is 99.44% of the population in RSM.

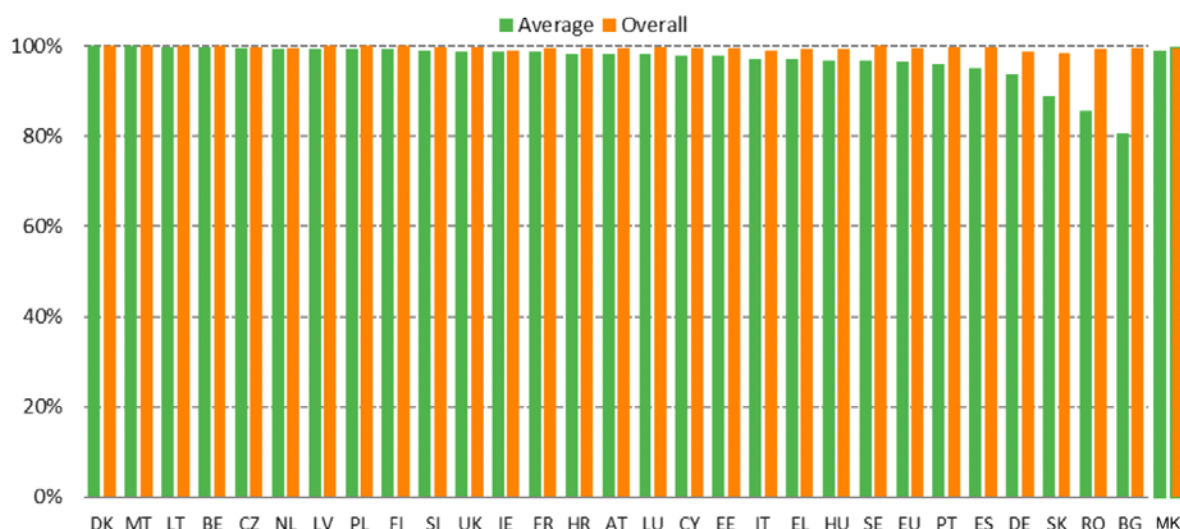


Figure3:4G coverage, % of households (Source: EC (mid-2019), AEC (Q2/2022))

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 of 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.

$$2c2 = (40/60) * 33.33\% + (200/300) * 33.33\% + (0/1000) * 33.33\% = 44.44\%$$

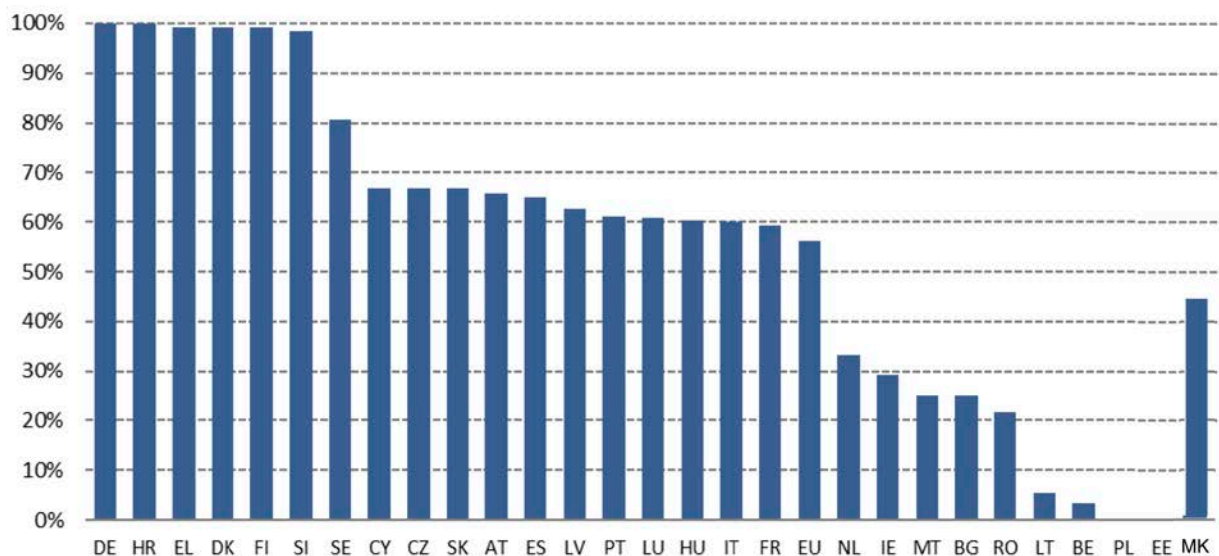


Figure 4: 5G spectrum, as % of awarded spectrum of the overall harmonized 5G spectrum (Source: EC (2022), AEC (Q2/2022))

Indicator 2c3 5G coverage

The prevalence of 5G network in RNM is 26.5%⁸ of the population, from at least one mobile operator.

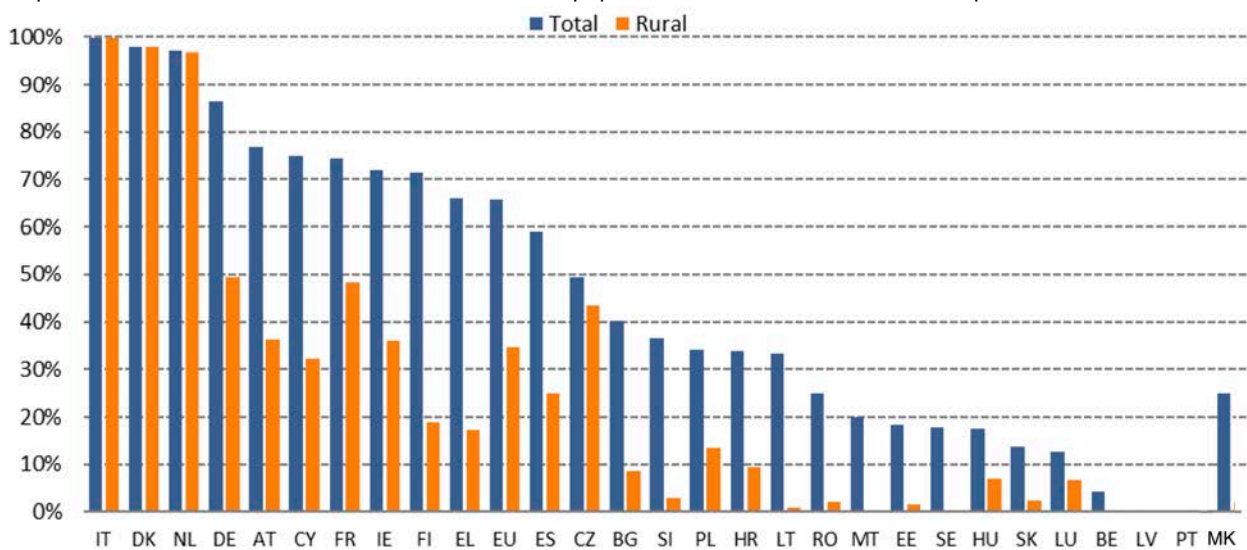


Figure 5: 5G coverage, in percentage of populated areas (Source: EC (2022), AEC (Q3/2022))

⁸The data is provided by one of the two mobile operators that has obtained approval for 5G utilization

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

Indicator2a1

The overall prevalence of fixed broadband in the Republic of NM is noted to have continuous growth, as shown in Table 3.

Table 3. Number of households subscribers of fixed broadband

Reference date	Q3/2019	Q1/2020	Q3/2020	Q1/2021	Q3/2021	Q1/2022
Number of residential subscribers	400,172	411,682	415,253	427,687	439,718	445,928

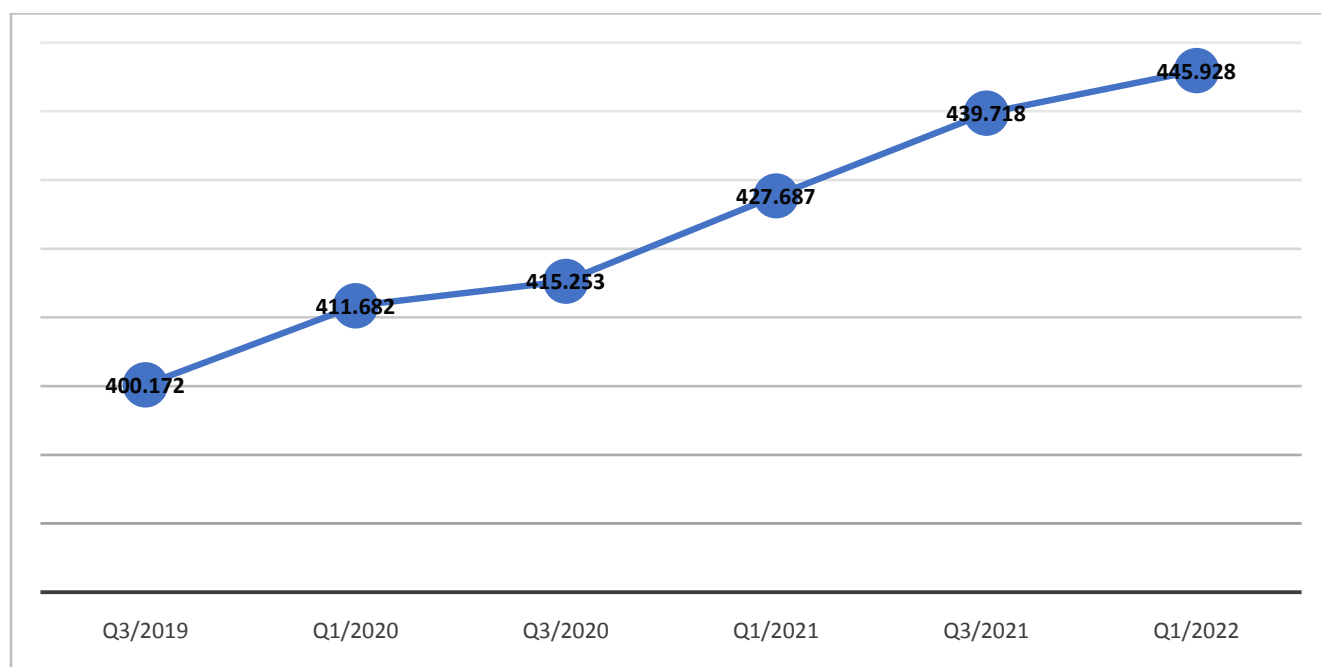


Figure 6: Change in the number of subscribers of fixed broadband in RNM (Source: AEC)

The prevalence of fixed broadband for Q1/2022 is 74.49%, i.e. 445,928 households in RNM have subscription agreement for fixed broadband (basic and/or NGA). (Source: AEC (Q1/2022))

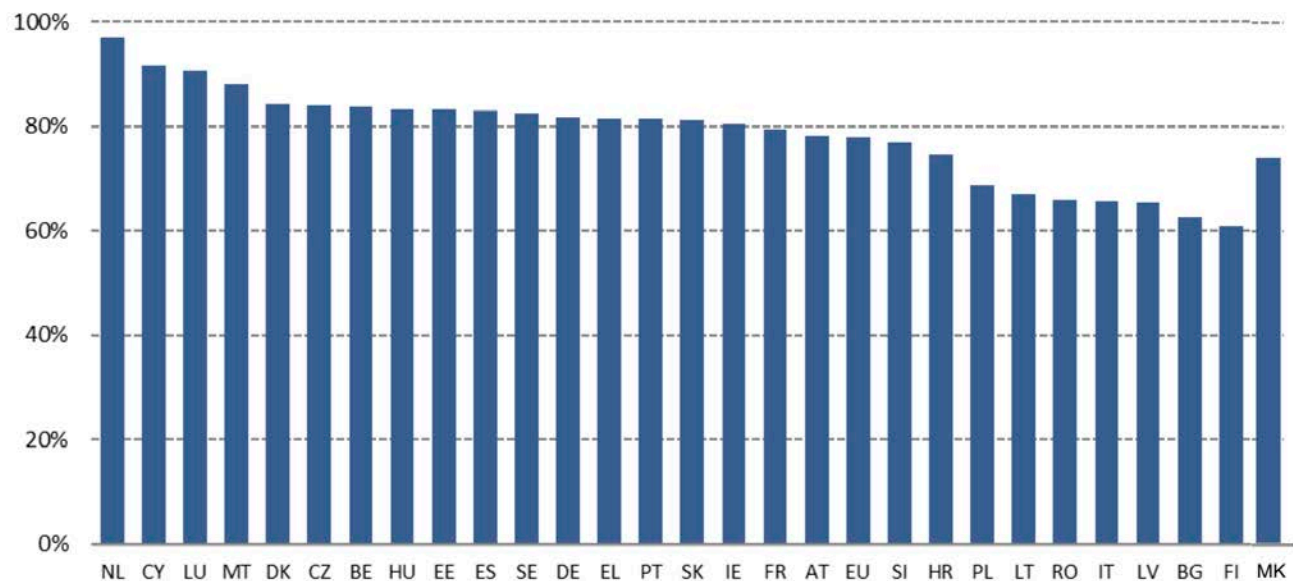


Figure7:Households subscribers to fixed broadband (Source: EC (2022), AEC(Q1/2022))

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

Indicator2a2

The prevalence of fixed broadband with at least 100 Mbps download speed for Q1/2022 is 2.36%, ie 14,184 households have subscription agreement for fixed broadband with download speed of at least 100 Mbps. (Source: Agency for Electronic Communications)

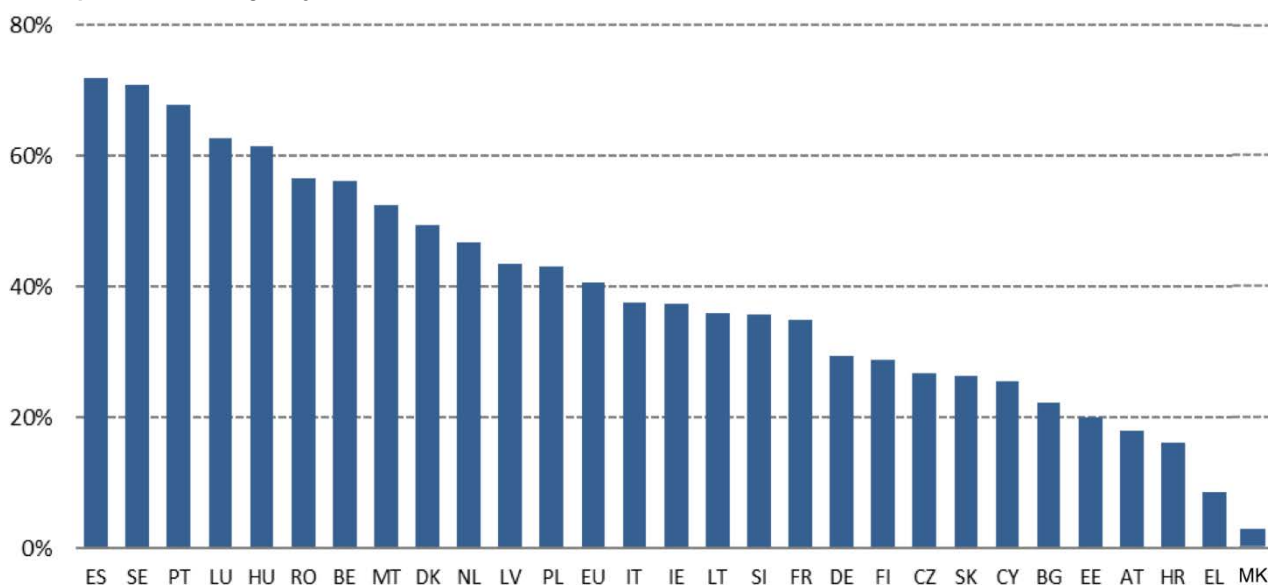


Figure8:Fixed broadband household subscribers with a speed higher than 100 Mbps (Source: EC (2022), AEC (Q1/2022))

The overall prevalence of fixed broadband with a speed higher than 100 Mbps in the RNM notes continuous growth, as shown in Table 4.

Table 4. 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
Number of residential subscribers	5,544	9,869	10,221	11,122	13,102	14,184

- 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 Q1/2022 is **2.36%**, i.e. **148 households have subscription agreement for fixed broadband with download speed of at least 1 Gbps**. (Source: Agency for Electronic Communications)

Fixed broadband take-up, market share per technology

Chart 5. shows the percentage of fixed broadband technology used:

Chart 5. market share of fixed broadband based on technology

Technology	Market share (%) (March/2020)	Market share (%) (September/2020)	Market share (%) (March/2021)	Market share (%) (September/2021)	Market share (%) (March/2022)	Market share (%) (September/2022)
DSL (VDSL included)	30.75	29.14	28.22	26.75	25.33	24.22
Cable (with Docsis 3.0 included)	34.29	33.29	31.99	30.37	30.37	30.09
FTTH + B	13.87	15.45	17.04	19.66	21.05	22.38
Other (LL-Leased Lines, LAN, Fixed LTE)	21.09	22.12	22.75	23.22	23.22	23.31

Source: Agency for Electronic Communications

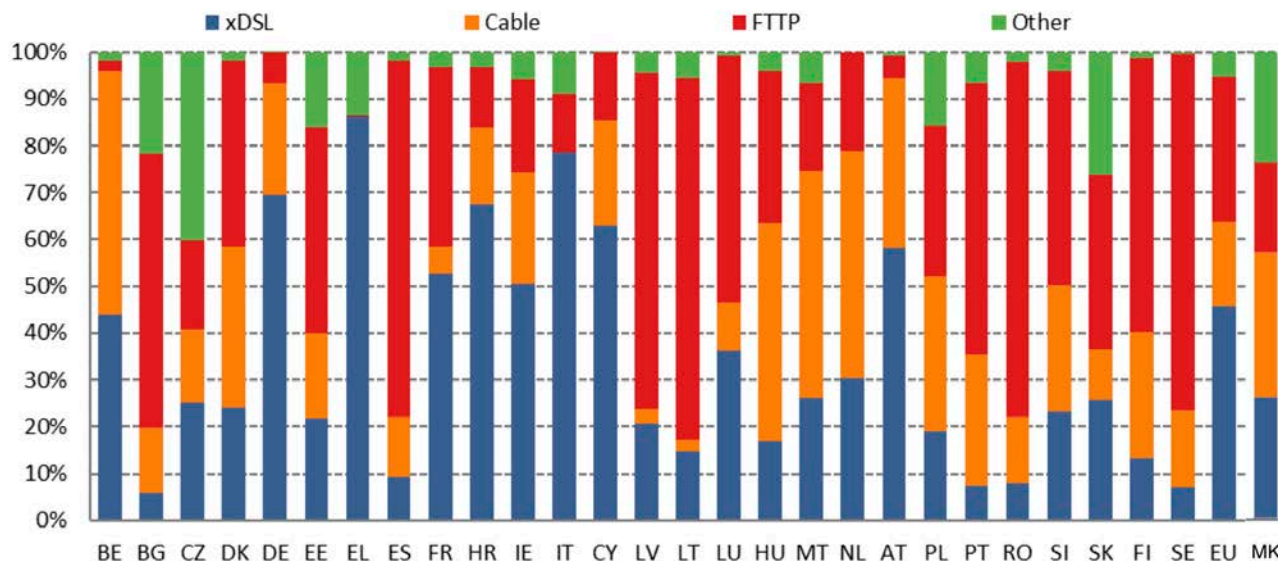


Figure9: Technologies used to provide fixed broadband

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 22.38% (the average value of the share of access through optics in the 27EU 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 **48.09%** and the same in the period from the first report of NBCO, March/2020 to this report of NBCO, September/2022 records a continuous **increase**.

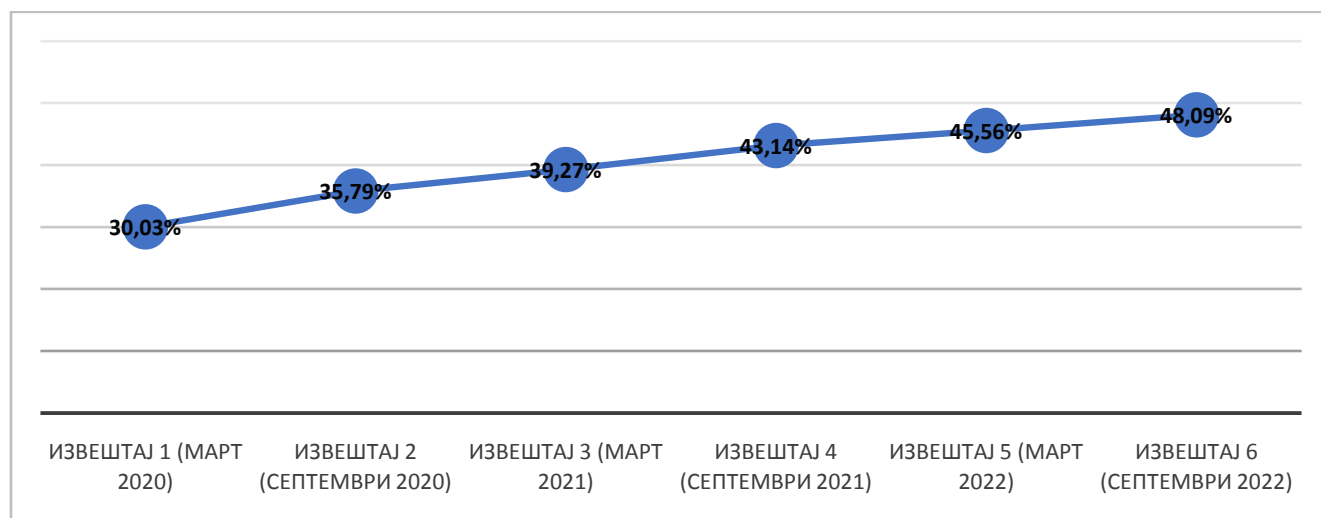


Figure 10: Change of the share of NGA subscription agreements in RNM (Source: AEC)

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

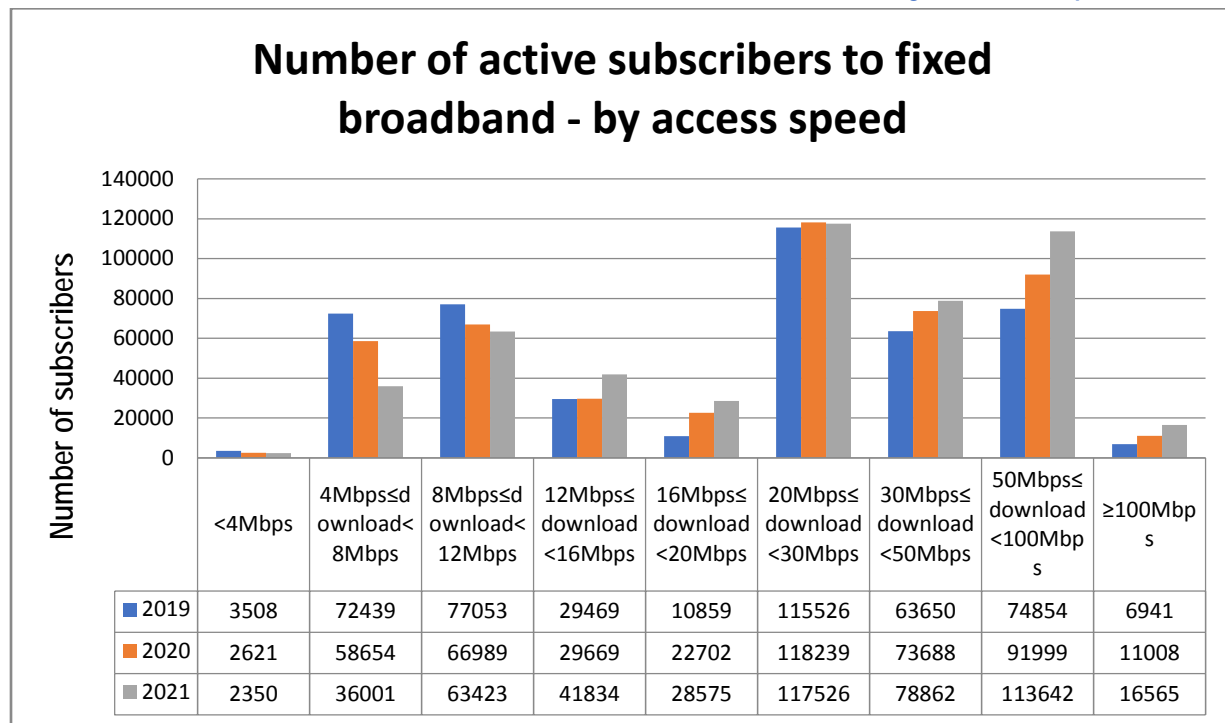


Figure 11: Number of active fixed broadband subscribers by access speed (Source: AEC)

- 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
MARCH 2020	119.319	14.532	143.352	16.259	88.588	638
MARCH 2021	122.314	15.765	164.754	17.637	78.657	0
SEPT. 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
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(Source: AEC)

- Fixed broadband market competition

In RNM, the share of the traditional (incumbent) operator "Makedonski Telekom" on the fixed broadband market in Q3 / 2021 according to the total number of subscribers (residential and business) according to all technologies for fixed broadband access is **39.88%**, while the share of new emerging operators on the fixed broadband market is **60.12%**.
(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 27EU member states (according to the EC Report "DESI 2022" from 2022), where traditional telecom operators still control 40% of subscribers

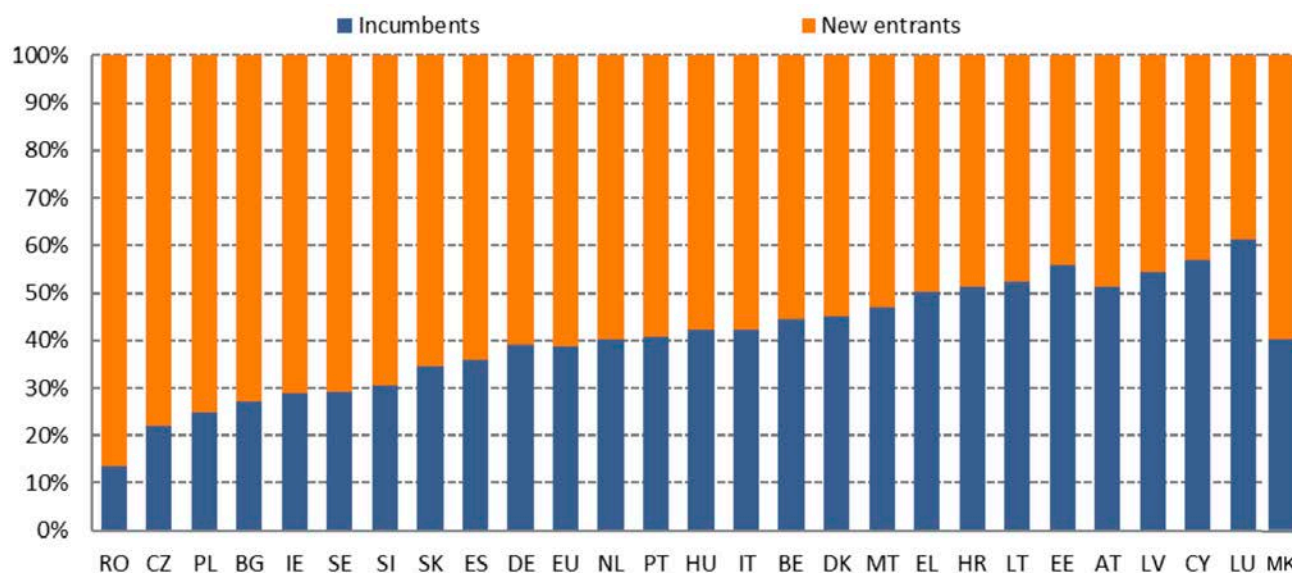


Figure 12: Fixed broadband market share by number of subscribers (Source: EC (2022), AEC (Q1/2022))

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

Indicator 2c4

The prevalence of mobile broadband for Q1/2022 is **76.43%**, i.e. the total number of subscribers who use mobile broadband is 1,403,888. (Source: Agency for Electronic Communications).

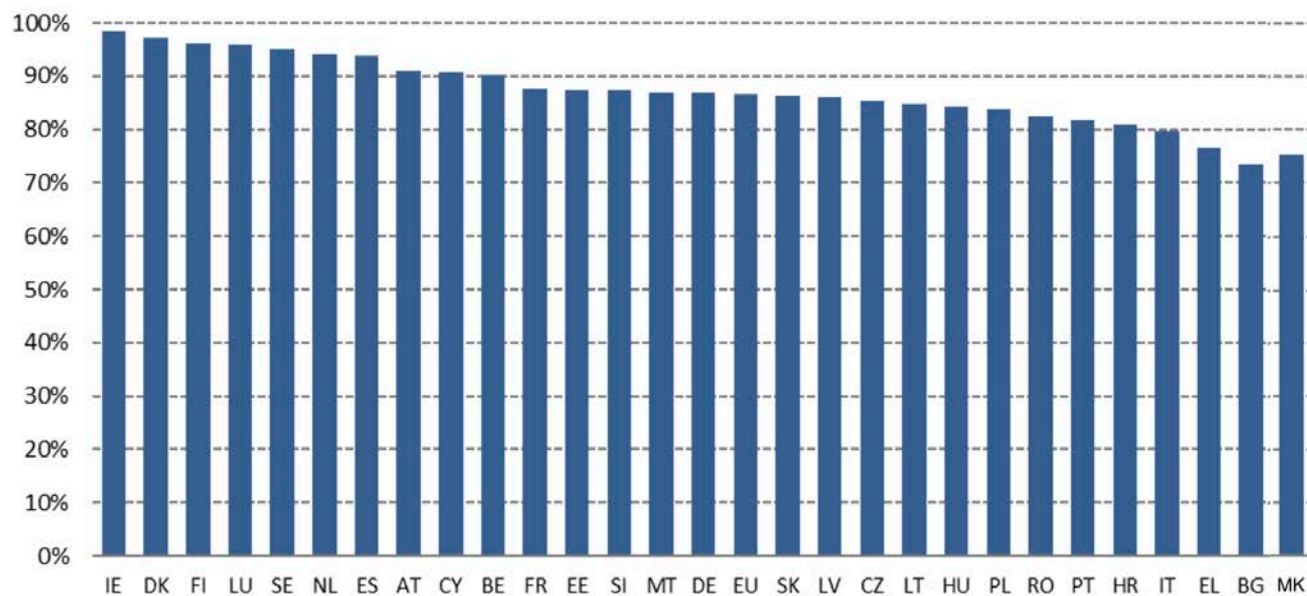


Figure13: Mobile broadband take-up (Source: EC (2022), AEC(Q1/2022))

- Internet (IP) traffic per resident

A. Fixed broadband internet traffic per household during one month is **210.26 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 / 2022 records the following **increase**, as shown in Figure 15

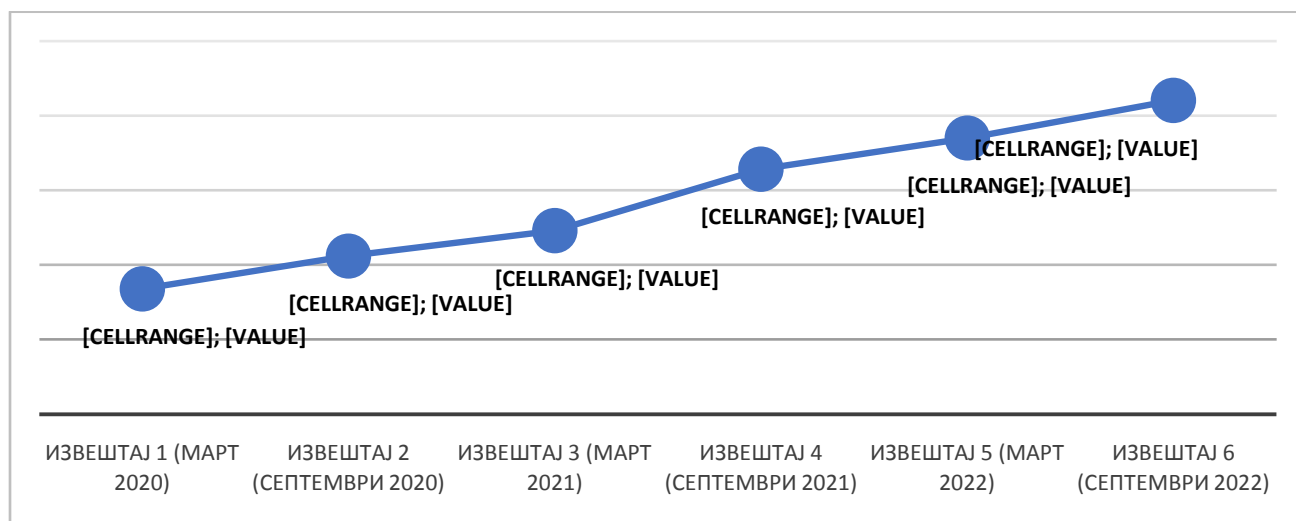


Figure 14: Change of fixed broadband internet traffic per household in RNM (Source: AEC)

B. Mobile broadband internet traffic per subscriber who uses mobile internet during a month is **5.85 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 / 2022 records the following **increase**, as shown in Figure 16.

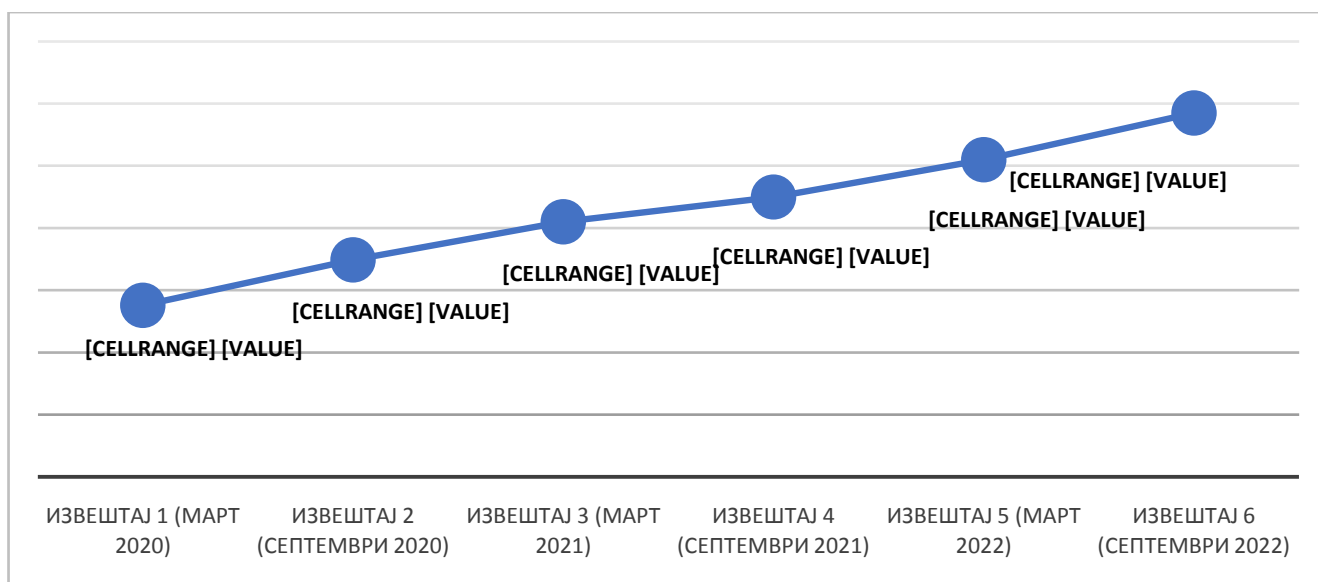


Figure 15: Change of mobile broadband internet traffic per subscriber in RNM (Source: AEC)

- **Broadband price index**

Indicator 2d1

In the analysis of the retail prices offered on the market of fixed broadband services in RNM, the OECD methodology "Revised OECD telecommunication price baskets" from December 2017 was used, according to which the retail offers of the three first ranked operators are analyzed according to the market share by number of users, whose common total market share is at least 70%.

The analysis of the retail prices on the market of fixed broadband services in this report included the retail offers of the operators "Makedonski Telekom", "A1 Macedonia" and "TRD ROBI - Telekabel", which together in Q3 / 2022 have an 86.64% share of fixed broadband market according to the number of residential subscribers.

The lowest offers for three categories of speeds (12-30 Mbps, 30-100 Mbps and at least 1000 Mbps) and three types of products in the carts (standalone internet, internet + fixed telephony and internet + TV + fixed telephony), adjusted according to the parity of Purchasing Power Parity (PPP) is shown in Chart 6.

Chart 6. Broadband price index

Category	Internet		Internet and fixed telephony		Internet + TV + f.telephony	
	Offer	The lowest price	Offer		Offer	The lowest price
12-30 Mbps	Cable internet Lightspeed 30/1 of TRD-KTVROBI Ltd. Shtip (TELEKABEL)	500 MKD 8.1 Euro 23.37 PPP	A1 Net Neon 15/1 by A1	599 MKD 9.7 Euro 28.00 PPP	A1 Combo Neon 15/1 by A1	799 MKD 13.0 Euro 37.34 PPP
30-100 Mbps	Mobile Internet with stick A1 Internet Extra 60/20 Mbps, 60 GB	1999 MKD 32.5 Euro 93.43 PPP	A1 Net M 50/3 by A1	799 MKD 13.0 Euro 37.34 PPP	A1 Net M + TV M 50/3 A1	1199 MKD 19.5 Euro 56.04 PPP
>100 Mbps	Optical Package Optic 40 150/150 Mbps ofof TRD- KTVROBI Ltd. Shtip (TELEKABEL)	1000MKD 16.3 Euro 46.74 PPP	Optic 40 150/150 Mbps + fix.tel. ofTELEKABEL	1150 MKD 18.7 Euro 53.75 PPP	Package Optic 40 150/150 Mbps + telephony +television	1600 MKD 26.0 Euro 74.78 PPP