5G COUNTRY PROFILE

REPUBLIC OF MOLDOVA

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1. ICT background and current status of broadband

The Republic of Moldova has a dynamic and competitive telecommunication market which is characterized by high Internet access speeds, good mobile services accessibility and robust nation-wide infrastructure. There is a clear interest and drive on the part of both the government of Moldova and the regulator to provide a strong role for ICT-centric innovation as a support for the economy.[1] Fixed-line and mobile broadband sectors have seen years of solid growth, but between 2016 and 2019 the sector experienced a revenue decline.[2] The mobile market is currently responsible for generating a larger portion of the telecom revenue in the country. Additionally, Moldova legislation in the ICT sector is largely aligned to the European Union legal framework.[3] In the 2017 ITU's ICT Development Index, Moldova ranks 59th out of 176 countries.[4]

The Moldovan government has implemented a variety of ICT-related strategies on a national level, such as the 2005 National Strategy for Building an Information Society ("Electronic Moldova" or E-Moldova), the 2011 Strategic Program for Technological Modernization of Governance (e-Transformation), the 2013 e-Agriculture Strategic Program,[5] among other strategies and action plans.[6] The creation of the IT Park in 2018 also promoted fiscal and economic incentives,[7] thus enhancing the competitiveness of the IT industry by confronting challenges such as the low regional/international competitiveness, risk of business relocation to other countries, and the migration of a skilled labour force.[8]

The National Strategy for Information Society Development "Digital Moldova 2020" launched in 2013 currently guides the policies directed toward sustainable growth of the ICT sector and is based on three pillars[9] followed by an action plan:[10] I) Infrastructure and access – improving connectivity and access to the various networks; II) Digital content and electronic services – promoting the generation of digital content and services; and III) Capacities and usage – enhancing literacy and digital skills to enable the innovation and stimulate the usage.

In terms of broadband development in the country, the strategy listed the following goals for 2020:[11]
- All localities of the country shall have at least one point of access to broadband with a minimum speed of 30MB/s while at least 60% of households shall be connected to broadband Internet;
- At least 75% of citizens shall be Internet users;
- 100% of public services which may be provided electronically shall be available online;
- 100% of archives, civil status records, cultural and scientific heritage shall be digitized and available;

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[1] See: https://www.itu.int/dms_pub/itu-d/opb/inno/D-INNO-MD-2018-01-PDF-E.pdf
[2] See: https://en.anrceti.md/files/filefield/Raport_trim_III_2019.pdf
[3] See: https://www.itu.int/en/ITU-D/Statistics/Documents/publications/misr2017/MISR2017_Volume2.pdf
[4] See: https://www.itu.int/net4/ITU-D/idi/2017/index.html
[5] See: http://www.fao.org/3/I8303EN/i8303en.pdf
[6] See: https://www.itu.int/dms_pub/itu-d/opb/inno/D-INNO-MD-2018-01-PDF-E.pdf
[7] See: https://emerging-europe.com/intelligence/moldovas-ict-sector-is-primed-for-further-growth/
[8] See: https://emerging-europe.com/intelligence/moldovas-ict-sector-is-primed-for-further-growth/
[9] See: https://eufordigital.eu/wp-content/uploads/2020/01/strategia_moldova_digitala_2020_857.pdf
[10] See: http://mei.gov.md/sites/default/files/anexa_i_hg_857_md.pdf
[11] See: http://old.mtic.gov.md/sites/default/files/transparency/public_consults/strateg_857_en.pdf

- At least 80% of citizens shall be satisfied with the quality of provided services;
- Public services shall be provided under the ID card, including electronic or through electronic or mobile identification;
- At least 70% of the population shall use electronic services;
- At least 60% of the population shall use digital signature;
- At least 20% of the population shall shop online;
- 100% of the population shall have access to digital terrestrial television.

In 2018, the government of Moldova launched the "Strategy for the development of the information technology industry and the ecosystem for digital innovation for the years 2018-2023." Through this strategy, more focused on IT and entrepreneurship, the government aims to facilitate the emergence of dynamic ecosystems through close collaboration with entrepreneurs, investors, corporations and other stakeholders, as well as multiplying IT solutions horizontally.[12] As of 2020, there are 2,145 companies with over 27,000 employees working in the IT sector, which generates about 7% of the country's GDP.[13]

In response to the COVID-19 pandemic, the Ministry of Economy and Infrastructure, the Ministry of Education, Culture and Research, the National Association of Information Technology and Communications Companies and the Tekwill ICT Training and Innovation Centre signed a Memorandum of Understanding on the 'Development of digital skills, IT and STEM throughout life' in July 2020. This document provides information on the use of digital technologies at all school levels. It also specifies the teachers' role in preparing students for digital transformation, thus ensuring the quality and relevance of ICT skills for professional activity in a digital economy.[14] Within the COVID-19 context, a roadmap with 37 actions for boosting the process of the digitization of the Moldovan economy and the expansion of e-commerce was also prepared by the government.[15]

2. Broadband and telecommunication sectors data

ITU data shows that 72.12% of individuals in the Republic of Moldova had access to the Internet in 2017.[16] In 2010, the ITU data for the country was 32.30% and, in 2000, 1.28%. A report by the National Regulatory Agency for Electronic Communications and Information Technology in Moldova (ANRCETI) shows that the country also had one of the lowest fixed broadband costs globally in 2015.[17] In 2019, the number of fixed-broadband subscriptions per 100 inhabitants was 16.58[18] with 94 active Internet service providers.[19] However, more recent data from ANRCETI shows that fixed broadband household subscriptions in Moldova amount to 25 every 100 inhabitants and, if an average of 3 persons per household is considered, then ANRCETI estimates 75,0% of the population enjoys fixed access at home 2019.[20]

[12] See: https://eufordigital.eu/wp-content/uploads/2020/01/2018-2023_strategie_aprobata_hg_904_24.09.2018.pdf
[13] See: https://eufordigital.eu/moldova-moves-to-develop-digital-skills-in-schools/
[14] See: https://eufordigital.eu/moldova-moves-to-develop-digital-skills-in-schools/
[15] See: https://mei.gov.md/sites/default/files/foia_de_parcurs.pdf
[16] See: https://www.itu.int/en/ITU-D/Statistics/Documents/statistics/2019/Individuals_Internet_2000-2018_Dec2019.xls
[17] See: https://mei.gov.md/sites/default/files/2._avasant_it_strategic_roadmap.pdf
[18] See: ITU World Telecommunication/ICT Indicators Database online (2020): http://handle.itu.int/11.1002/pub/81550f97-en (indicator "i992b")
[19] See: https://www.brodynt.com/business-internet-connectivity-in-moldova/
[20] See: https://anrceti.md/files/filefield/Anuar%20statistic%202019_22aprilie_2020.pdf

In 2019, half the subscribers to fixed Internet access services benefited from data access and transfer speeds between 30 and 100 Mbps, while 13.8% enjoy speeds over 100 Mbps.[21] FTTx connections increased by 14.7%, reaching 452,300, while coaxial cable connections increased by 20.6% to reach 53,500. FTTx technology now represents 66.6% of the total number of subscribers,[22] with a significant high rate in Chișinău and other major cities, while xDSL technology is most common in smaller towns and rural areas.[23] Moreover, the number of subscribers using xDSL connections was down by 10.5% to about 163,000.[24]

According to ANRCETI data, in 2019, the number of active mobile-broadband subscriptions per 100 inhabitants was of 88.8, an increase from the same figure in 2018 standing at 79.4.[25] At the moment of writing, there are 3 MNOs operating in Moldova—Orange Moldova, Moldcell, and Moldtelecom—that currently have licenses for the use of radiofrequency for commercial use. The mobile market sector now accounts for the majority of total telecoms revenue in the country.[26] In terms of network coverage, 3G covers 99% of Moldova's territory[27] and 4G networks provide the coverage of 95% of the territory,[28] serving 98% of the population according to ITU data.[29] The traffic generated by mobile broadband users via smartphones increased by 47.2% up to about 52.4 million GB out of the total of 104,7 million GB consumed during the reference period in the country, which increased by 24%.

Despite the overall decline in telecom revenues between the 2016-2019 period, ANRCETI data show that there has been a significant increase in sales from 2018 onwards, with Orange Moldova registering the largest growth in revenue (63.4%) at the end of 2019.[30] In 2019, the total number of users accessing mobile broadband based on 4G technology registered a significant increase when compared to 2018.[31] In the same year, the market for fixed broadband Internet access services in Moldova registered a significant increase, with the volume of sales rising by 6.1% year-on-year to reach 1.16 billion lei (59.1 million EUR).[32] In 2019 alone, the total amount of mobile-broadband Internet traffic within the country corresponded 0.1 exabytes.[33]

3. Current progress on 5G: consultations and national strategies

Moldova's Ministry of Economy and Infrastructure is finalising the draft programme on 5G, which was submitted for public consultation and is to be approved by the government by the end of 2020. Some of

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[21] See: https://eufordigital.eu/broadband-access-up-in-moldova-as-users-opt-for-higher-speeds/
[22] See: https://eufordigital.eu/market-value-of-fixed-broadband-internet-access-services-in-moldova-exceeded-1-billion-lei-in-first-nine-months-of-2019/
[23] See: https://digital.report/moldova-state-of-affairs-report/#_ftn10
[24] See: https://www.anrceti.md/news_250320
[25] See: https://anrceti.md/files/filefield/Anuar%20statistic%202019_22aprilie_2020.pdf
[26] See: https://www.brodynt.com/business-internet-connectivity-in-moldova/
[27] See: https://anrceti.md/files/filefield/Anuar%20statistic%202019_22aprilie_2020.pdf
[28] See: https://anrceti.md/files/filefield/Anuar%20statistic%202019_22aprilie_2020.pdf
[29] See: ITU World Telecommunication/ICT Indicators Database online (2020): http://handle.itu.int/11.1002/pub/81550f97-en (indicator "i271GA")
[30] See: https://en.anrceti.md/news_060420en
[31] See: https://en.anrceti.md/news_060420en
[32] See: https://anrceti.md/news10122019
[33] See: ITU World Telecommunication/ICT Indicators Database online (2020): http://handle.itu.int/11.1002/pub/81550f97-en (indicator "i136mwi")

the preconditions for the establishment of 5G allocation and consequent implementation in Moldova set out by the Ministry of Economy are:[34]

- Creating the legal framework for sustainable development of terrestrial mobile electronic broadband communications and other types of communications for the years 2021-2025 by continuing the Radio Spectrum Management Program for the years 2013-2020;
- The need to harness the available radio spectrum resources;
- The need to continue the application of best practice with reference to the implementation of the EU's Multiannual Policy Program in the field of radio spectrum (Radio Spectrum Policy Program-RSPP, Decision 243/2012 / EU of 14.03.2012);
- Ensuring the possibility of implementing 5G mobile broadband communications services, which offer citizens and industries the competitive advantages necessary for development in a favourable environment.

In the National Development Strategy "Moldova 2030," approved on June 10, 2020 [35] by the Government, it is established that a considerable increase in access speeds is expected due to the development of the implementation of new access technologies and revamp of networks. The document also establishes the need to promote 5G accessibility at over 100 Mbps for any household in the country by 2030.[36]

In June 2020, the government held a public consultation session with operators as well as the National Agency for Public Health, the National Radio Frequency Management Service and the national regulator to discuss the new Radio Spectrum Management Programme, the plans of mobile communications operators regarding next-generation 5G technologies, and the state of play regarding the protection of public health.[37] MNOs informed that their investment plans did not foresee the implementation of 5G technology before 2023.[38] During the consultation, it was also agreed to create a working group with all stakeholders to develop the regulatory framework for the implementation of 5G technology in Moldova.

4. Spectrum assignment for 5G and market development

Moldova's Ministry of Economy and Infrastructure, in partnership with experts from ITU and Korean Information Society Development Institute, is developing a spectrum management program for 2021-2025. This new document will continue the Ministry's spectrum management program for the 2013-2020 period, which had previously freed radio frequency bands 800 MHz, 900 MHz, 1800 MHz; 2100 MHz; 2600 MHz and 3400-3800MHz. [39]

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[34] See: https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2020/Spectrum_EUR_CIS/Andrei%20Gavrisi%20(1).pdf
[35] See: https://www.legis.md/cautare/getResults?doc_id=121920&lang=ru
[36] See: https://cancelaria.gov.md/sites/default/files/cu_privire_la_aprobarea_proiectului_de_lege_pentru_aprobarea_strategiei_nationale_de_dezvoltare_moldova_2030.pdf
[37] See: https://eufordigital.eu/when-could-5g-technology-be-rolled-out-in-moldova-ministry-of-economy-holds-public-consultation-with-operators/
[38] See: https://mei.gov.md/ro/content/mei-consultat-furnizorii-de-comunicatii-electronice-mobile-si-institutiile-de-sanatate
[39] See: https://www.itu.int/net4/ITU-D/CDS/GSR/2018/documents/contributions/Moldova_English.pdf

The 3400-3800 MHz frequency band is free while the 700 MHz band is assigned for terrestrial television services in an analogue format as its allocation will be possible once the transition to digital television is completed.[40] Therefore, the new rules are set to continue the harmonization processes established in the previous program and aligned with the EU. The main tasks and objectives of the new policy program include:

- Concluding the activities for releasing of the spectrum in the 700 MHz band;
- Creating the legal framework for organization of an objective, transparent, non-discriminatory and proportionate auction process for the targeted spectrum resources;
- Developing long-term spectrum policy and ensuring medium and long-term predictability of radio spectrum resources usage;
- Maximizing the efficiency of the use of limited radio spectrum resources and stimulating the competition on the mobile electronic communications market.

Based on the technical requirements and channel arrangements are based on CEPT Decisions and Recommendation, there are two main stages for the development of the new program: I) consolidation of the current networks (2021-2022 years, some spectrum re-farming and consolidation activities on the current bands and technologies); and II) 2022-2025 years, creation of conditions and enabling the environment for implementation of 5G networks.[41]

The targeted bands for the new 2021-2025 spectrum management program include 700 MHz, 3600 MHz, 26 GHz, and also 1500 MHz (L band) and 2300MHz. The program also targets available spectrum resources from the 450MHz, E900MHz, 2100MHz and 2600MHz bands. With the ongoing strategies on the spectrum use that will pave the way for 5G implementation in Moldova, the government plans to:[42]

- Ensure stakeholders with sufficient spectrum resources that will make possible the implementation of 5G networks, and consequently the new applications and business cases that 5G can deliver;
- Implement new broadband technologies and services and increasing the capacities of existing networks;
- Attract new investments in the information and communications technology sector of the national economy;
- Increase the turnover of companies in this sector;
- Increase of the incomes to the state budget generated by the capitalization of the radio spectrum resources and by the economic activities in the market of the mobile electronic communications services;
- Promote the development of other sectors of the national economy as a result of modernization and continuous development of the radio communications infrastructure and the diversification of the offer of mobile electronic broadband communications services;

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[40] See: https://www.anrceti.md/news11102019
[41] See: https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2020/Spectrum_EUR_CIS/Andrei%20Gavrisi%20(1).pdf
[42] See: https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2020/Spectrum_EUR_CIS/Andrei%20Gavrisi%20(1).pdf

- Increase the accessibility of broadband mobile electronic communications services to the population as a result of establishing a fair and efficient competitive environment on the mobile electronic communications services market;
- Improve the quality of services provided; reducing the digital divide between rural and urban areas;
- Create new jobs and increasing the average wage in the ICT sector.

5. Electromagnetic fields levels and the implementation dynamics

There is no public information on EMF limits in Moldova. The country is in talks to participate in the World Health Organization EMF project.[43]

6. Commercial launches: announcements, trail cities, and digital cross-border corridors

Since 2018, the Orange Group implemented Nokia Voice over LTE technology in Moldova to significantly enhance the quality of its mobile voice services. Orange uses Nokia's Cloud-based IP Multimedia 2 Subsystem (IMS), which includes Telecom Application Server (TAS), a native cloud application, to deliver full-featured 4G network calls. Through this implementation, Orange is also delivering virtualization of its core network, a key milestone for the launch of 5G.[44]

In a January 2019 meeting with high-level government representatives, the Chinese company ZTE expressed business plans to allow the implementation of 5G technology in Moldova.[45]

In March 2019, Orange Moldova became the first operator to test 5G technology in the country. On that occasion, Orange Moldova shared with the Moldavian public that their 5G strategy is based on improving high-speed mobile bandwidth; establishing high-speed access to the fixed network; and promoting applications to support the local business digital transformation.[46] Several months before the first test, Orange Moldova expressed their interests in 5G implementation as well as mobile financial services to the Moldovan government.[47]

In April 2019, Moldtelecom displayed their preliminary work on 5G research and development to the public on a mobile truck lab at the Museum of Outdoor Technology of the Technical University of Moldova. Operator's technical experts discussed topics in wireless networks, backhaul, IT, and basic network services to hundreds of visitors.[48] There were also interactive presentations on large-scale infrastructures, ecosystems, as well as 5G-related equipment such as robots, vehicles, and smart TVs.[49]

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[43] See: https://www.who.int/docs/default-source/radiation-international-emf-project-reports/emf-iac-2015-progress-report.pdf?sfvrsn=e74f20af_2&download=true
[44] See: https://www.itu.int/net4/ITU-D/CDS/GSR/2018/documents/contributions/Moldova_English.pdf
[45] See: https://gov.md/ro/content/o-companie-chineza-interesata-sa-investeasca-tehnologia-5g-republica-moldova-pavel-filip
[46] See: https://www.moldova.org/r-moldova-fost-testata-premiera-tehnologia-5g/
[47] See: https://gov.md/ro/content/reteaua-5g-va-fi-testata-republica-moldova
[48] See: https://www.moldova.org/5g-este-aici-moldtelecom-prezinta-un-laborator-al-tehnologiilor-viitorului/
[49] See: https://www.moldova.org/foto-ziua-tehnologiilor-5g-moldova-moldtelecom-prezentat-camionul-tehnologiilor-viitorului-care-fost-disponibil-pentru-toti/

In October 2019, ANRCETI hosted the 9th EaPeReg Network (Eastern Partnership Electronic Communications Regulators Network) meeting of the Radio Frequency Spectrum Expert Working Group (SEWG), which is fostering 5G frequency harmonization across EaP countries.[50]

As of September 2020, there have been no commercial 5G launches as the national MNOs did not requested the national regulator authorizations in order to commercially operate 5G networks and equipment.

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[50] See: https://www.anrceti.md/news11102019