International Telecommunication Union

Recommendations for a national plan for the development of networks for broadband internet access 2025-2029 for Montenegro

Identification of a vision, objectives, targets and measures for action

Table of Contents

Acknowledgements

The “National Plan for the Development of Networks for Broadband Internet Access 2025-2029 for Montenegro” was developed by the International Telecommunication Union (ITU) Office for Europe, in close collaboration with the Ministry of Economic Development of Montenegro (MER).

The ITU wishes to express its sincere gratitude to the Department for Broadband at the Ministry of Economic Development of Montenegro, for the expertise, valuable insights, and unwavering commitment made available to engaging all relevant stakeholders. Additionally, the ITU extends heartfelt thanks to all stakeholders for their time, expert contributions, and active participation in the consultation interviews and feedback on the drafts, which have collectively brought this document to fruition. The following instutions have been especially instrumental in this process:

Ministry of Economic Development
Statistical Office of Montenegro (MONSTAT)
Agency for Electronic Communications and Postal Services (EKIP)
Ministry of Public Administration of Montenegro
Ministry of Spatial Planning, Urbanism and State Property of Montenegro
Environmental Protection Agency
Environmental Protection Agency
Ministry of Ecology, Sustainable Development and Northern Region Development
Podgorica.me
CIRT (Computer Incident Response Team)
Crnogorski Telekom
One Crna Gora
One Crna Gora
Mtel
Telemach Crna Gora
Electric Power Distribution Operator (CEDIS)
Crnogorski Telekom
Electric Transmission System (CGES)

Introduction

Objective and Methodology

This document presents the National Plan for the development of networks for Very High Capacity Broadband Internet Access 2025-2029 for Montenegro ("NBP"), including a national vision, strategic and specific objectives and operational targets, as well as key recommendations and proposed actions to achieve the objectives and targets. Following the letter of agreement (LoA) signed between the International Telecommunication Union (ITU) and the Ministry of Economic Development of Montenegro (MoED) on 14 March 2024, ITU and MoED have agreed to work together towards elaboration of a comprehensive National plan for development of networks for broadband internet access in Montenegro, aimed at expanding broadband internet access throughout Montenegro through strategic and comprehensive planning. The outcomes of this activity will contribute to the implementation of the ITU Regional Initiative for Europe on Digital infrastructure, serving as a reference point for other countries, when carrying out similar actions.

The project involved extensive desk research and stakeholder consultation, encompassing stakeholder questionnaires and interviews. It leveraged previous work and previous outputs including the WBIF Feasibility Study and Cost-Benefit Analysis for Regional Broadband Infrastructure Development in Montenegro[1], the related Initiation Report[2], the Inception Report[3] and the Strategy for the Development of 5G Mobile Communication Networks in Montenegro 2023-2027. The methodology for developing this plan adheres to the Regulation on the manner and procedure of drafting, harmonizing, and monitoring the implementation of strategic documents (Official Gazette of Montenegro 54/18).

Context - The National Broadband Plan within the Strategic Framework of Montenegro

The Government of Montenegro is strategically committed to expanding and modernizing its digital infrastructure as a foundational pillar for its socio-economic development. Recognizing the role that ICTs and digital transformation can play in furthering economic and social development, the Government of Montenegro, in its Digital Transformation Strategy 2022-2026 (with Action Plan 2022-2023) [4] and its "Strategy for the Information Society Development" [5], identified infrastructure as a key priority and fundamental to

[1] Western Balkans Investment Framework Infrastructure Project Facility, Technical Assistance 8 (IPF 8), TA2018148 R0 IPA - WB21-MNE-DII-01, Oct 2021

[2] Western Balkans Investment Framework Infrastructure Project Facility Technical Assistance 11 (IPF 11) - 27 July 2023

[3] INFRASTRUCTURE PROJECT FACILITY 11 (IPF11) Montenegro, Broadband Infrastructure Development / WB27-MNE-DII-01 Inception Report – 11 October 2023

[4] See: https://wapi.gov.me/download/59dcab9b-b0e8-48b7-830b-6e4eab690521?version=1.0

[5] Available at: https://www.gov.me/en/documents/68736414-503b-41bb-81b0-753b581fb386

achieving digital transformation.[6,7] In alignment with the European Commission's Economic and Infrastructure Development Plan for Western Balkans[8], the Government of Montenegro initiated the "Development of Infrastructure for Broadband Internet Access in Montenegro" project in 2020.[9] Three key outputs ensued from this project: namely, the report on the Feasibility Study and Cost-Benefit Analysis for Regional Broadband Infrastructure Development in Montenegro[10], the related Initiation Report[11], and the Inception Report[12].

The drafting of the National Broadband Plan is a mandate defined within several key strategic documents. The Medium-term Work Program of the Government of Montenegro 2024-2027[13] includes the goal "Digital Montenegro, transparent and efficient public administration." Additionally, the Program of Economic Reforms of Montenegro for the period 2024-2026[14], within the framework of reform measure 11, focuses on improving infrastructure for broadband internet access and introducing next-generation networks. The Digital Transformation Strategy of Montenegro 2022-2026 further reinforces the

[6] Digital Transformation Strategy 2022-2026m p.9: The Digital Transformation Strategy 2022-2026 states that "digital infrastructure is becoming as important in society as water or electricity infrastructure, because it needs to be available to everyone, under equal conditions. The success of all other activities depends on its development." And

[7] See Strategy for the Information Society Development, p. 13: The "Strategy for the Information Society Development" identifies in its Mission infrastructure as the first of three components that need to be in place to enable ICT sector growth and, ultimately, digital transformation.

[8] Flagship 8 – Digital Infrastructure: Following projects to be supported:

- The development and roll-out of national broadband infrastructure in the WB6 partners will continue – with the completion of the most advanced investment projects in the region by 2024. The preparation of further investments elsewhere will be accelerated with particular focus on connecting rural areas.
- Setting up secure, energy-efficient and trustworthy data centres, edge and cloud infrastructures while ensuring alignment with EU's rules and fundamental values, including data protection, as well as linking to EU initiatives on high performance computers, digital incubators and innovation hubs.
- Building on ongoing initiatives such as the Balkan Digital Highway, synergies with other connectivity areas such as transport and energy should be fully explored in the context of infrastructure-sharing. In addition, using technology and data purposefully to make better decisions has a high potential to deliver a better quality of life for the citizens in the region. Support will also be provided for adapting to the rapid transformative technological development to remain prosperous and competitive. The EU will promote cooperation in digital education globally through the renewed Digital Education Action Plan (DEAP) and promote equality in access, for disadvantaged groups, including Roma.

[9] https://www.wbif.eu/news-details/kick-montenegro-broadband-infrastructure-development-technical-assistance-project ; The deliverables of this phase are the following: backbone BB market and infrastructure screening with definition of white and grey zones; BB offer & demand assessment; conceptual design of the technology solution and cost estimate; legal, regulatory and organisational framework; cost-benefit analysis; market models and procurement plan.

[10] Western Balkans Investment Framework Infrastructure Project Facility, Technical Assistance 8 (IPF 8), TA2018148 R0 IPA - WB21-MNE-DII-01, Oct 2021

[11] Western Balkans Investment Framework Infrastructure Project Facility Technical Assistance 11 (IPF 11) - 27 July 2023

[12] INFRASTRUCTURE PROJECT FACILITY 11 (IPF11) Montenegro, Broadband Infrastructure Development / WB27-MNE-DII-01 Inception Report – 11 October 2023

[13] https://en.vijesti.me/news/politics/694270/the-government-determined-the-draft-of-the-medium-term-work-program ; https://www.gov.me/en/article/press-release-from-the-16th-cabinet-session

[14] https://www.gov.me/en/documents/97a5b5fd-9e83-4b63-82fa-c8692a242f82, https://www.gov.me/en/article/highlights-from-the-11th-cabinet-session

importance of developing broadband access in accordance with the EU document "European Gigabit Society 2025". To this effect, it includes Operational Objective 1.3 “Increased coverage and modernization of electronic communication infrastructure.” Within this objective, Activity 1.3.1 specifically addresses the establishment of a National Plan for Development of High-Speed Broadband Networks and activity 1.3.5 specifically targets the preparation of a 5G strategy.[15] These activities focus on expanding broadband infrastructure to ensure comprehensive coverage and modernize existing networks to support next-generation technologies. Key aspects of these operational objectives include enhancing network infrastructure, expanding coverage to rural and underserved areas, improving reliability and security, and facilitating investment by creating an investment-friendly environment.[16]

The National Broadband Plan presented in this document will serve as a cornerstone for Montenegro's vision of becoming the fastest digitally developing country in the region. By bridging the digital divide, enhancing investment environments, and ensuring secure and reliable broadband networks, the plan aims to foster an inclusive digital economy and society. This is aligned with the broader EU digital agenda, aiming for all European households to be covered by a gigabit network and all populated areas by a 5G network by 2030.

The document is structured as follows:

The **introduction** outlines its purpose and scope, followed by a section detailing the **objectives and methodology** used in its development. The **context of the National Broadband Plan within Montenegro’s strategic framework** is discussed, providing a comprehensive understanding of how the plan integrates with national development goals.

In section 3, an **analysis of the current situation** offers a contextual overview, examining the state of the broadband market in Montenegro, including both fixed and mobile broadband sectors. This section identifies the key stakeholders within the broadband infrastructure ecosystem and highlights the institutions responsible for broadband development. It also reviews the relevant regulations and laws aimed at fostering broadband infrastructure growth. The document then outlines Montenegro's **current vision, objectives, and targets** for broadband development, drawing on the Digital Transformation Strategy 2022-2026, the Strategy for the Information Society, and the Strategy for the Development of 5G Mobile Communication Networks 2023-2027. It also aligns these national strategies with EU objectives and targets.

Key issues and challenges faced in broadband infrastructure development are subsequently identified, along with key findings and recommendations from previous work in this area. The focus areas for broadband development are then detailed,

[15] Objective 1.3.5 has been achieved. The 5G Strategy, which was published in May 2023 and which covers the period from 2023 to 2027, underscores the importance of 5G networks in the digital transformation of society. It aims to enhance mobile broadband services and increase the coverage and use of 5G networks, as detailed in the strategic goals and operational objectives outlined in the strategy.
[16] See Digital Transformation Strategy pp. 120-124

addressing topics such as the regulatory and administrative barriers, investment environment, infrastructure sharing, digital divide, security and reliability, and environmental considerations of broadband networks.

Finally, the proposed **national vision, strategic, and operational objectives** for national broadband development are presented, including **supporting measures** to meet these operational objectives.

Analysis of the current Situation

Contextual overview

Montenegro, located in Southeast Europe along the Adriatic Sea, is known for its mountainous terrain and picturesque coastline. The country covers an area of 13,888 km^2. According to preliminary results from the 2023 Census[17], Montenegro has a population of 633,158[18] residing in 217,441 households[19]. The population distribution is predominantly urban, with 68 per cent living in urban areas and 32 per cent in rural areas.[20] Podgorica, the capital city, is the largest urban center, followed by cities like Niksic and Bar.[21]

In recent years, Montenegro's economy has experienced substantial growth. In 2022, the GDP was EUR 5,924.0 million, with a real growth rate of 6.4 per cent. By Q4 2023, the GDP reached EUR 1,753.8 million, with a real growth rate of 4.3 per cent.[22] The ICT sector significantly contributes to this economic landscape, with its contribution to the GDP increasing from 3.7 per cent in 2020 to 10 per cent in 2022.[23] The electronic communications market, a crucial part of the ICT sector, has benefited from continuous investments and technological advancements. Montenegro's telecommunications sector is entirely privately owned and financed, with a 2023 total revenue of EUR 257 million, as shown in Figure 1 below.[24] In 2023, telecommunications operators invested EUR 76.3 million in electronic communications infrastructure.[25] In 2023, 88.4 per cent of

[17] https://www.monstat.org/uploads/files/popis%202021/tradicionalni/METODOLOGIJA%20POPISA%202023.pdf

[18] (of which 49% were male and 51% female).

[19] https://eurydice.eacea.ec.europa.eu/national-education-systems/montenegro/population-demographic-situation-languages-and-religions , and https://monstat.org/eng/page.php?id=1302&pageid=48

[20] Infrastructure Project facility – technical assistance 8 (ipf8) – ta2018148 R0 IPAFeasibility Study and Cost-Benefit Analysis for Regional Broadband Infrastructure Development in MONTENEGRO, wb21-MNE-dii-01, See page 11, and https://datareportal.com/reports/digital-2023-montenegro

[21] https://www.monstat.org/uploads/files/popis%202021/tradicionalni/METODOLOGIJA%20POPISA%202023.pdf

[22] MONSTAT Stakeholder Questionnaire Response 2024

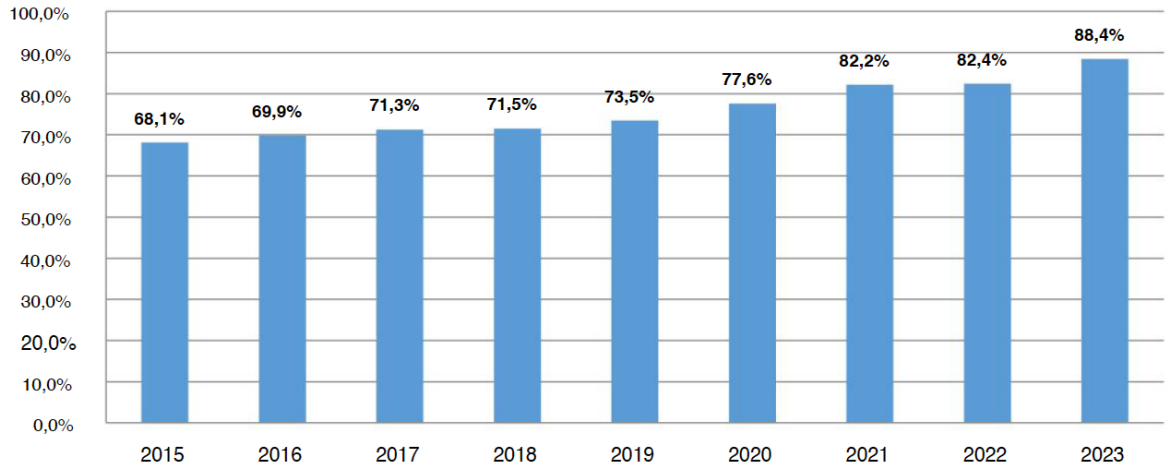
[23] MONSTAT 2020; The contribution of ICT sector to GDP growth in 2022 was 1.1 pp, while the contribution of the ICT sector to GDP growth in Q4 2023 was 0.5 pp, MONSTAT Stakeholder Questionnaire response 2024; based on figures provided by MER in the Stakeholder response, contribution to GDP in 2022 was 10%, or EUR 602 million gross and EUR 72.8 million net.

[24] EKIP Stakeholder Questionnaire response 2024

[25] EKIP Annual Report 2023, p.25

Montenegro's population used the Internet, which has grown by more than 20 per cent over the last 8 years, as illustrated in Figure 1 below. Montenegro has an overall ITU ICT Development Index (IDI) score of 87.9, which is above its regional peers and well above the average for Middle Income Countries, and just 2 points below the European average.[26]

Figure 1: Internet usage by population, 2020-2023



Source: EKIP Annual Report 2023

The ICT sector is pivotal for Montenegro's future economic development. About 1000 companies are currently operating within the sector[27], employing just under 4,500 employees, numbers that have been rapidly increasing, partly due to the relocation of IT firms from the war-affected regions of Ukraine. As of July 2021, Montenegro had 34 registered electronic communications operators, including the three main mobile telephony providers: Crnogorski Telekom (T-Com), One Montenegro (formerly Telenor), and M-tel. According to the Global Innovation Index 2023[28], Montenegro ranks 75th out of 132 global economies and 36th out of 39 European countries. It is 26th in ICT access and 51st in ICT use, reflecting significant advancements in digital infrastructure and services. The country has also made notable progress in e-government services, aimed at enhancing public sector efficiency and transparency.

Montenegro's ICT legislation is aligned with EU standards. In September 2024, the government adopted amendments to the Law on Electronic Communications (ZEK), originally enacted in 2018, to incorporate the provisions of the European Electronic Communications Code. Parliamentary approval is anticipated by early October 2024. The Law on Electronic Government, adopted in January 2020, aims to improve public administration services for citizens and businesses underpinned by the EU-conform Law

[26] https://datahub.itu.int/dashboards/idi/?e=MNE&y=2024&c=ALB
[27] See Digital Transformation Strategy p.93, Operational Objective 2.3 baseline value of 970 active ICT companies in 2022 and 4,441 employees employed by ICT companies in 2022.
[28] https://www.wipo.int/global_innovation_index/en/2023/

on Electronic Identification and Electronic Signature[29]. Key strategic documents include the Digital Transformation Strategy of Montenegro 2022-2026[30], the Cyber Security Strategy of Montenegro 2022-2026[31], and the Program to Attract Digital Nomads in Montenegro until 2025.[32] The government has introduced various initiatives to foster ICT development, such as increasing broadband penetration, enhancing digital literacy, and promoting innovation within the sector. Since 2012, efforts have been made to integrate ICT across different sectors, including education, healthcare, and public administration.

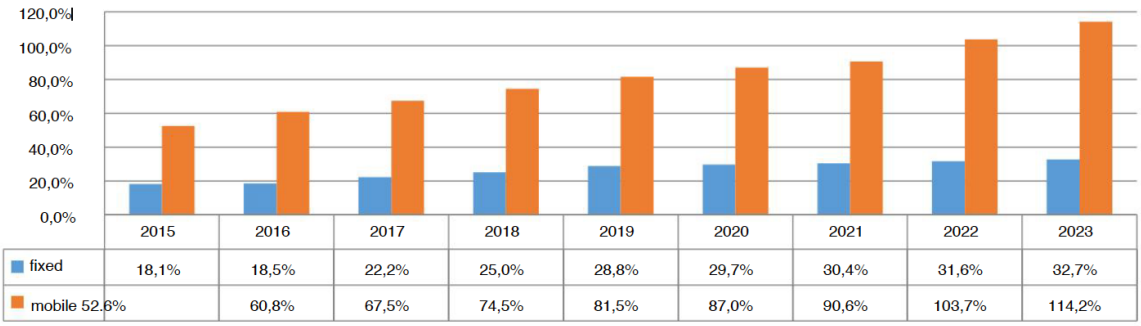
State of play Broadband Market in Montenegro

Montenegro's broadband market is vibrant and competitive, characterized by several key operators deploying a variety of broadband technologies, including mobile technologies such as 2G, 3G, 4G, 5G and satellite, as well as fixed technologies including xDSL, FTTx, KDS, WiFi and Leased lines, and MPLS. The landscape is continually evolving, marked by significant investments and technological upgrades that enhance service quality and coverage throughout the country.[33] In 2023, telecommunications operators invested EUR 76.3 million in electronic communications infrastructure.[34] Montenegro's operators have robust international connectivity, which is a critical factor for the country's integration into the regional and global digital economy. Similarly, it ensures that Montenegro's broadband users benefit from reliable and high-speed access to global internet resources, supporting the increasing demand for data and digital services.[35] Montenegro has an Internet Exchange Point (IXP) that connects all key players, facilitating efficient and high-speed data exchange.[36]

Figure 2 illustrates the progression of fixed and mobile broadband penetration in Montenegro from 2015 to 2023, measured by the number of inhabitants. Over this period, mobile broadband penetration has shown a significant and steady increase, starting at 52.6 per cent in 2015 and reaching 114.2 per cent in 2023. This indicates that, on average, each inhabitant has more than one mobile broadband subscription, reflecting the high adoption rate of mobile internet services.

Figure 2: Fixed and mobile broadband penetration 2015-2023, number of inhabitants

[29] https://joinup.ec.europa.eu/sites/default/files/inline-files/NIFO_2024%20Supporting%20Document_Montenegro_vFinal.pdf
[30] https://wapi.gov.me/download/59dcab9b-b0e8-48b7-830b-6e4eab690521?version=1.0
[31] https://joinup.ec.europa.eu/sites/default/files/inline-files/DPA_Factsheets_2022_Montenegro_vFinal.pdf
[32] https://www.trade.gov/country-commercial-guides/montenegro-information-and-communication-technology-ict-sector
[33] Information obtained from interviews conducted with relevant stakeholders in the first half of 2024, responses to Statekholder Questionniares, and in-depth desk research, including EKIP Annual Report 2023.
[34] EKIP Annual Report 2023, p.25
[35] Crnogorski Telekom leads with international capacity of 200 Gb/s, followed by Mtel with 140 Gb/s, Telemach with 10 Gb/s, and One Crna Gora with 20 Gb/s of capacity. See questionnaire response EKIP 2024.
[36] https://www.mixp.me/eng/



	2015	2016	2017	2018	2019	2020	2021	2022	2023
fixed	18,1%	18,5%	22,2%	25,0%	28,8%	29,7%	30,4%	31,6%	32,7%
mobile 52.6%		60,8%	67,5%	74,5%	81,5%	87,0%	90,6%	103,7%	114,2%

Source: EKIP Annual Report 2023

In contrast, fixed broadband penetration has grown more modestly, as shown in the figure 2 above. However, when considering fixed broadband household coverage, by 2023, 79.21 per cent of households were covered by fixed broadband with speeds of equal to or greater than 100 Mbps, 3 per cent with speeds between 30-100 Mbps and 2 per cent with speeds below 30 Mbps. 15 per cent of households had no fixed coverage.[37]

Crnogorski Telekom, Mtel, and One Montenegro are the leading operators driving this competitive market. They have significantly expanded their service offerings and network capabilities. As set out in the EKIP Annual report 2023, Crnogorski Telekom offers both, mobile and fixed broadband access services through xDSL (ADSL and VDSL), optical fiber connections and 2G, 3G, 4G and 5G technologies. By the end of 2023, the company reported having 47,632 xDSL users, with a notable increase in FTTH/B (Fiber to the Home/Building) connections (namely 35,815), which grew by 11.23 per cent from the previous year. In the area of mobile broadband services, Crnogorski Telekom achieved a subscriber-based market share of 35 per cent. Mtel focuses on both mobile and fixed broadband services, leveraging fiber and cable distribution systems. By the end of 2023, Mtel had 54,223 FTTH/B users, primarily in the residential sector, underscoring its strong presence in the market. Mtel had a mobile broadband services subscriber-based market share of 33 per cent in 2023. Telemach utilizes cable distribution systems and has expanded its HFC (Hybrid Fiber-Coaxial) networks, implementing the DOCSIS 3.0 standard. By the close of 2023, Telemach had 18,910 users, reflecting its steady growth. One Montenegro (One Crna Gora) is the third mobile operator providing comprehensive mobile broadband services, enhancing the competitive dynamics of the market, with a share of 32 per cent based on number of subscribers in 2023.

The market offers various service packages, including single, double, triple, and quadruple play options, catering to diverse consumer needs. These packages often bundle internet, television, fixed and mobile telephony services, providing consumers with integrated and cost-effective solutions. Popular OTT (Over-The-Top) packages for video and music streaming are also widely available, reflecting the growing consumer demand for digital entertainment services.[38]

[37] See section on Fixed Broadband Market below for more detail.

[38] INFRASTRUCTURE PROJECT FACILITY 11 (IPF11), Montenegro, Broadband Infrastructure Development / WB27-MNE-DII-01, Project Initiation Interim Report, pp. 14-15

Montenegro's broadband market shows extensive coverage across various technologies. Household coverage by speed and technology (see Figures 3 and 4 below) shows that fixed fibre optics-based networks in urban areas offer speeds up to 1 Gbps, whereas rural areas primarily use xDSL and mobile broadband, with speeds typically up to 50 Mbps. A significant shift from xDSL to optical fiber is underway in Montenegro, with FTTH/B networks now accessible in every municipality, covering a substantial portion of the population. Next Generation Access (NGA) networks, offering speeds above 30 Mbps, now cover 82.02 per cent of households, demonstrating the country's commitment to high-speed connectivity. The introduction of 5G, which began in 2023, is expected to improve speeds and reliability in remote areas. The 2G and 3G networks provide essential voice and data services, particularly in rural areas, while 4G networks deliver high-speed mobile internet across both urban and rural regions.

Investments in the broadband sector have been robust, with major operators focusing heavily on expanding their fiber optic networks and corresponding services. Crnogorski Telekom and Telemach are engaged in ongoing projects aimed at improving coverage and service quality, while Mtel continues to expand both its mobile and fixed infrastructure, ensuring a comprehensive approach to network enhancement. These investments are paying off as shown in Table 1 below, as broadband service revenues have seen an upward trend driven by increased penetration and growing demand for high-speed internet, indicating a healthy financial outlook for the sector.

Table 1: Total revenue in the telecommunications sector 2018-2023

	2018	2019	2020	2021	2022	2023
Revenues (€)	234.810.638	234.123.096	211.805.136	225.426.758	235.841.793	256.591.607

Source: EKIP 2024 Stakeholder Questionnaire Response

Broadband prices in Montenegro are competitive within the region, making high-speed internet more accessible. Current market prices for internet services at 100 Mbps vary between €20 and €35, depending on the operator.[39] Standalone broadband packages with speeds up to 100 Mbps range from EUR 12.86 to EUR 46.70, with an average price of EUR 25.83. These prices are relatively lower compared to European averages, enhancing affordability. It is expected for prices to remain stable in the retail market, although operators are likely to enhance service speeds and quality over time. In this regard it should be noted that service quality has markedly improved due to the transition to fiber optics and the deployment of 5G. The market now enjoys higher speeds and more reliable connections, particularly in urban areas. Regulatory measures and continuous operator investments ensure high standards of service, including better latency, reduced downtime, and enhanced customer support.

As regards the willingness to pay, Montenegrin customers exhibit a clear willingness to invest in both fixed and mobile internet services, although their price sensitivity is notable. Approximately 59 per cent of customers are willing to pay up to €10 per month for fixed internet services, while 53 per cent express a similar willingness to pay the same

[39] See EKIP Annual Report 2023

amount for mobile telephony services. For PAY-TV services, consumers are generally willing to spend between €20 and €30, depending on the content offered.[40]

When considering broadband internet speeds, the willingness to pay aligns closely with service quality. For instance, up to €10 per month is considered affordable for 30 Mbps speeds, and up to €20 for 100 Mbps speeds. Notably, a significant percentage of respondents are willing to pay up to €20 for internet services with speeds equal to or exceeding 100 Mbps.[41] This willingness to pay is contextualized by the 2021 average net income in Montenegro, which was around €500, with 4-5 per cent typically allocated to communication services.[42] Hence, €20 for 100 Mbps internet services is perceived as a fair price by most consumers. Interestingly, citizens in rural areas display a higher willingness to pay more for internet services compared to their urban counterparts, likely reflecting the greater challenges and costs associated with delivering high-speed internet to less densely populated regions.

The willingness to pay is often associated with higher internet speed services and cable TV offerings. This trend underscores the demand for better quality and higher-speed internet connections, which align with the increasing digital needs of Montenegrin consumers. As the market evolves, it is anticipated that service providers will continue to adapt their offerings to meet these preferences, ensuring competitive pricing while enhancing service quality.

Fixed Broadband market

The fixed broadband market in Montenegro has undergone significant transformation over recent years, marked by a shift towards higher-speed internet technologies. In 2023, the average monthly internet traffic per subscriber in Montenegro's fixed electronic communication networks reached 291.50 GB, marking a 32.38 per cent increase from the previous year. The total internet traffic for the year amounted to 709.56 petabytes (PB), which is 36.87 per cent higher than in 2022. This significant growth in both average and total internet traffic underscores the increasing reliance on high-speed fixed broadband services in Montenegro, driven by the proliferation of data-intensive applications and the expanding digital landscape.[43]

As of 2023, the market is characterized by a diverse range of technologies, with fiber optic (FTTx) connections leading the way, accounting for nearly half of all subscriptions. Traditional xDSL connections and cable distribution systems (KDS) continue to play substantial roles, reflecting the varied infrastructure across the country. Despite advancements, a considerable portion of the population still relies on lower-speed

[40] As part of the WB27-MNE-DII-01 project, a willingness to pay and affordability for broadband services survey was conducted by a specialised Montenegrin company, see: INFRASTRUCTURE PROJECT FACILITY 11 (IPF11), Montenegro, Broadband Infrastructure Development / WB27-MNE-DII-01, Project Initiation Interim Report, pp. 14-15

[41] INFRASTRUCTURE PROJECT FACILITY 11 (IPF11), Montenegro, Broadband Infrastructure Development / WB27-MNE-DII-01, Project Initiation Interim Report, pp. 14-15

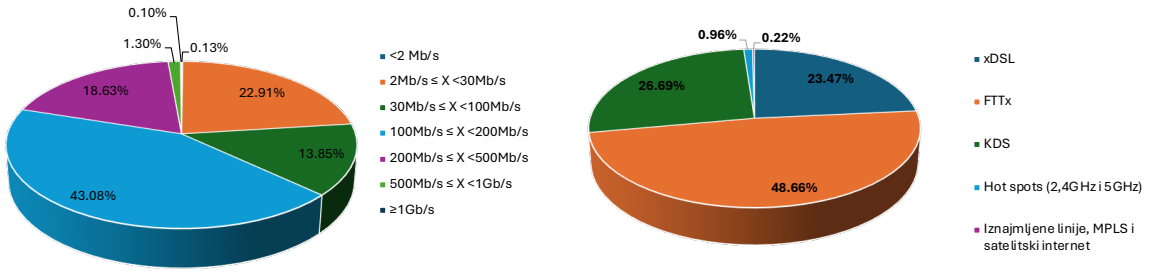
42 Please note that the net average wage at the end of 2023 was around EUR 790; https://www.monstat.org/eng/page.php?id=1270&pageid=24

[43] See pp. 65 and 66 of EKIP Annual Report 2023.

internet connections, highlighting ongoing challenges in achieving widespread high-speed internet access. The Montenegrin government's strategic investments and policies aim to enhance digital infrastructure, thereby fostering economic growth and integration within the broader European digital landscape.

Figure 3 shows the distribution of fixed broadband subscriptions in Montenegro by type of technology and speed. The pie chart on the left shows that the largest portion of subscribers (43.08 per cent) have connections with speeds between 100 Mbps and 200 Mbps, reflecting a significant demand for and investment in high-speed internet services. This is followed by 22.91 per cent of subscriptions in the 2 Mbps to less than 30 Mbps range, highlighting moderate-speed usage. Connections with speeds from 30 Mbps to less than 100 Mbps account for 13.85 per cent, and those with 200 Mbps to less than 500 Mbps represent 18.63 per cent. The highest speed categories, 500 Mbps to less than 1 Gbps, and equal to or greater than 1 Gbps, have minimal shares at 1.30 per cent and 0.10 per cent, respectively. Subscriptions with speeds less than 2 Mbps are around 0.13 per cent, indicating a very small portion of the market.

Figure 3: Fixed broadband subscriptions by speed (left) and type of technology (right)

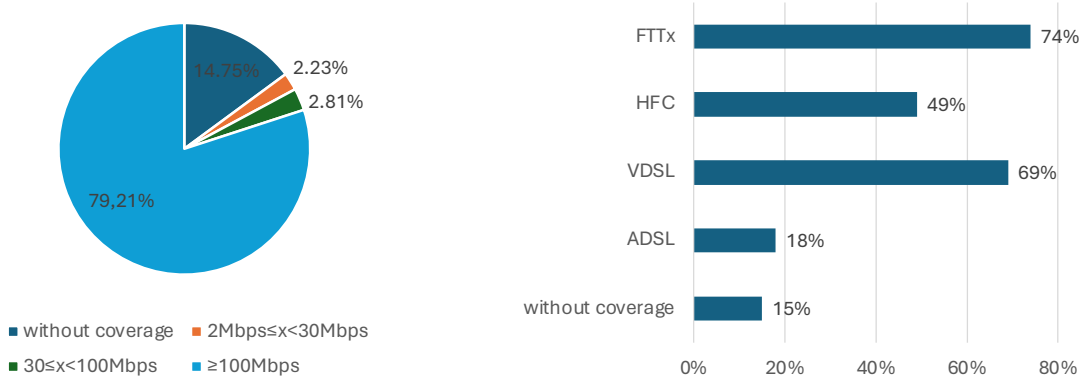


Source: EKIP Annual Report 2023

The pie chart on the right in Figure 3 categorizes fixed broadband subscriptions by technology. FTTx leads with 48.66 per cent, demonstrating the growing preference for fiber optic connections, which offer high-speed and reliable internet services. KDS (Cable Distribution Systems) holds a 26.69 per cent share, indicating a strong presence of cable broadband. xDSL technologies (ADSL and VDSL) together make up 23.47 per cent of the market, showing continued use of traditional copper wire infrastructure. Minor contributions come from hotspots (0.96 per cent) and leased lines, MPLS, and satellite internet (0.22 per cent), reflecting niche applications and specific use cases.

Looking at the uptake of fixed broadband services by households by speed and technology, which is illustrated in Figure 4, the pie chart on the left indicates that 79.21 per cent of households have coverage with speeds of equal to or greater than 100 Mbps, showing significant penetration of high-speed broadband. For households with lower speeds, 14.75 per cent have no coverage, highlighting gaps in broadband infrastructure. Additional 2.23 per cent of households have speeds between 2 Mbps and less than 30 Mbps, and 2.81 per cent enjoy speeds from 30 Mbps to less than 100 Mbps.

Figure 4: Household fixed coverage by speed and technology



Source: EKIP Annual Report 2023

The bar chart on the right in Figure 4 provides a breakdown of coverage by technology. FTTx networks cover 74 per cent of households, highlighting the extensive deployment of fiber optic infrastructure. VDSL technology covers 69 per cent of households, showing substantial adoption of high-speed DSL. HFC (Hybrid Fiber-Coaxial) networks cover 49 per cent of households, indicating a significant presence of cable broadband. ADSL technology covers 18 per cent of households, and 15 per cent of households remain without any coverage, underscoring areas with inadequate broadband access.

These graphics reveal that while Montenegro has made significant progress in deploying high-speed broadband technologies, there remain substantial areas, particularly rural regions, where broadband infrastructure is lacking. The government's planned focus on expanding FTTx and other high-speed technologies is crucial to bridging these gaps and ensuring widespread, reliable internet access across the country.[44]

Mobile broadband market

The mobile broadband market in Montenegro has experienced substantial growth and development, marked by increasing data usage and a broadening coverage of advanced mobile technologies. As of 2023, the total number of users accessing the internet via mobile services reached 708,376, encompassing prepaid and postpaid subscribers. This represents a penetration rate of 114.2 per cent, reflecting the high adoption rate of mobile internet services in the country.

The total internet traffic via mobile networks in 2023 amounted to 151.58 PB, which is 45.84 per cent higher than in 2022. This sharp increase underscores the rising demand

[44]See the output documents regarding NGA rollout in un-and underserved areas across Montenegro: Western Balkans Investment Framework Infrastructure Project Facility, Technical Assistance 8 (IPF 8), TA2018148 R0 IPA - WB21-MNE-DII-01, Oct 2021
Western Balkans Investment Framework Infrastructure Project Facility Technical Assistance 11 (IPF 11) - 27 July 2023[44] INFRASTRUCTURE PROJECT FACILITY 11 (IPF11) Montenegro, Broadband Infrastructure Development / WB27-MNE-DII-01 Inception Report – 11 October 2023

for mobile data services, driven by the proliferation of data-intensive applications and the increasing availability of high-speed mobile networks. The major mobile network operators in Montenegro—Crnogorski Telekom, Mtel, and One Montenegro—have all contributed to this growth. In 2023, both Crnogorski Telekom and MTel users generated approximately 55 petabytes (PB) of internet traffic, marking a more than 20 per cent increase from the previous year. One Montenegro users generated about 42 petabytes of traffic, a significant 33.32 per cent increase to the previous year. Despite the overall growth, the number of mobile broadband users who accessed the internet via data SIM cards decreased by 5.57 per cent compared to 2022. This decline was observed across operators, with Crnogorski Telekom and One Montenegro experiencing reductions of 0.83 per cent and 13.06 per cent, respectively.

In terms of technology deployment, all three operators have expanded their 4G LTE networks and introduced 5G services. By December 2023, 464,828 SIM cards accessed the internet via 3G, 608,898 via 4G, and 76,813 via 5G. The continued enhancement of LTE and the introduction of 5G have been pivotal in meeting the growing data needs of users and improving overall service quality.

Montenegro's mobile network coverage is extensive, with LTE networks covering approximately 98 per cent of the population. This extensive coverage ensures that most urban, suburban, and rural areas, as well as main roads and tourist centers, have reliable mobile broadband access. The 5G rollout, which began in earnest in 2023, is also progressing, with significant coverage in urban centers and strategic locations. As shown in Table 2, Broadband population coverage by mobile technology reveals that 3G and 4G networks cover 97 per cent of the population, while 5G covers 83 per cent. However, area coverage varies, with 3G covering 75 per cent, 4G covering 76 per cent, and 5G covering only 17 per cent.

Table 2: Population and geographic mobile coverage, 2023

	3G	4G	5G
Population coverage	97%	97%	83%
Area coverage	75%	76%	17%

Source: EKIP Response to Stakeholder Questionnaire 2024

The Montenegrin mobile broadband market's growth is supported by substantial investments in network infrastructure. In 2023, operators invested around 76.3 million euros in developing electronic communication networks and services, representing a 10.75 per cent increase compared to 2022. These investments are crucial for maintaining and enhancing network quality and expanding coverage, ensuring that Montenegro remains competitive within the broader European digital landscape.

Broadband Demand

Development of electronic services

The development of electronic services is a key driver of broadband demand in Montenegro, central to modernizing public administration and enhancing the efficiency

and accessibility of public services. The Ministry of Public Administration, Digital Society, and Media has been actively promoting various eServices to meet the growing digital demands of its citizens and businesses. This is supported by Montenegro's Digital Transformation Strategy 2022-2026, outlining a comprehensive plan to enhance the nation's digital infrastructure, aiming to improve electronic services for citizens, businesses, and public institutions.

Overview of Electronic Services and Usage

The Ministry of Public Administration's initiatives have significantly increased the number of electronic services available to citizens. As of the end of 2023, 389 services were published on the eGovernment Portal[45], with 87 being electronic and 302 informative. The eGovernment Portal has 109,510 active users, with 7,371 accounts opened and 11,965 users registered in 2023 alone.[46] Table 3 below provides an overview of the types of electronic services available in Montenegro:

Table 3: Different types of electronic services offered in Montenegro and their usage

Service Type	**Description**	**Examples**	**Users (Estimate)**
E-Government Services (ePortal)	Digital identity, electronic signatures, online service access	eRegistration, ePermits, eTaxation, eHealth	109,510 citizens
E-Health Services	Online health records, e-prescriptions, telemedicine	eHealth	20,000+ citizens
E-Education Services	Online learning platforms and digital resources	eStudent, eBirth, eEnrolment	15,000+ students/teachers
E-Business Services	Business registration, tax filings, digital transactions	eTaxation, eInvoicing	10,000+ businesses
Public Procurement	Electronic procurement system	Public Procurement	500+ institutions
Interoperability Services	Data exchange between government departments	Interoperability	30+ government entities
Fiscalization	Real-time software-based fiscalization system	Electronic cash registers, eInvoicing	N/A
Public Services	Various online services for public administration efficiency and citizen engagement	eNGO registration, eProfessional exam	N/A

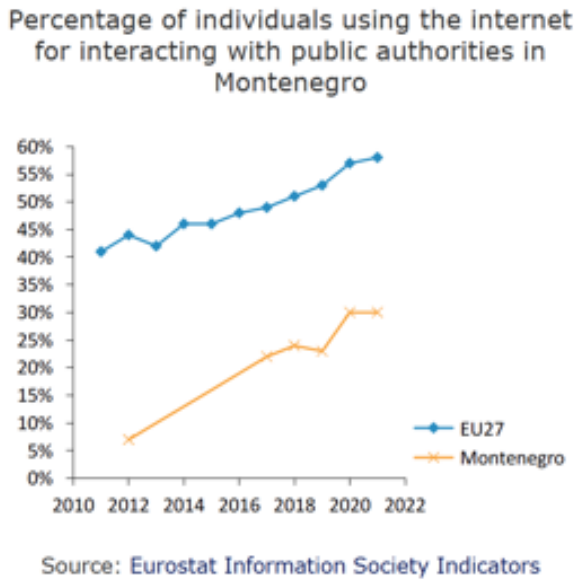
In 2022, more than 25 per cent of individuals used the internet for obtaining information from public authorities, about 15 per cent downloaded official forms, and about 15 per cent sent filled forms to public authorities,[47] trending upward.

[45] https://www.euprava.me/en

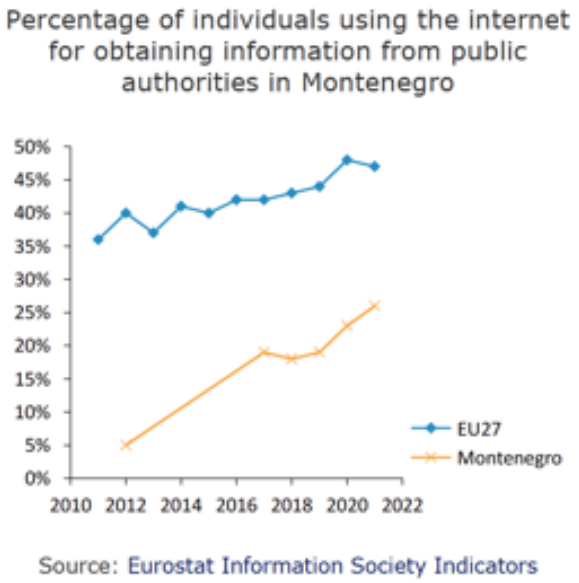
[46] Stakeholder Questionnaire response 2024, Ministry for Public Administration; The eGovernment Portal serves as a central point for accessing a variety of public services online. It offers a user-friendly interface, enabling citizens to interact with government services without needing to make physical visits. As of recent updates, the number of digitalized services available on the portal is expected to increase to twenty "life-event" services by 2026, including eBirth and eEnrolment.

[47] See p. 4, European Commission 2022: Digital Public Administration factsheets – Montenegro; https://joinup.ec.europa.eu/sites/default/files/inline-files/DPA_Factsheets_2022_Montenegro_vFinal_0.pdf

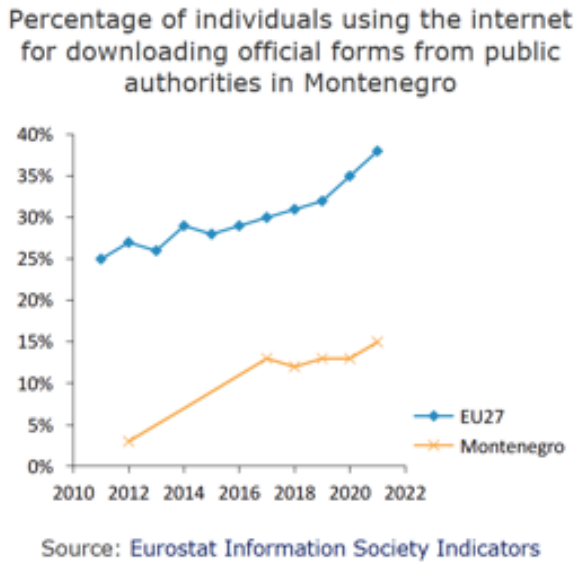
Figure 5: Montenegro Digital Administration Indicators 2010-2022



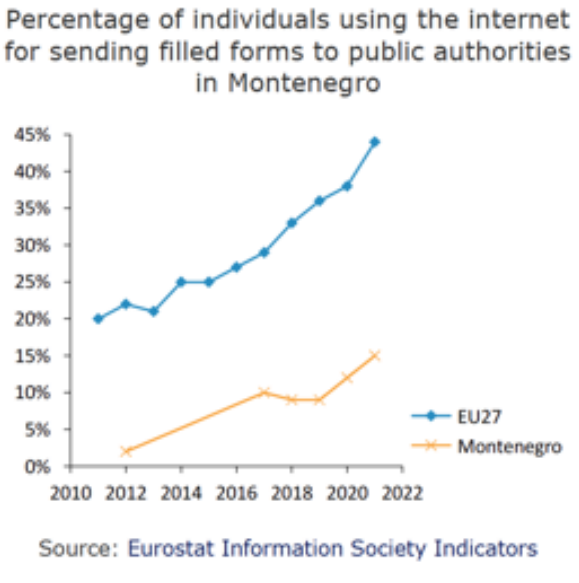
Source: Eurostat Information Society Indicators



Source: Eurostat Information Society Indicators



Source: Eurostat Information Society Indicators



Source: Eurostat Information Society Indicators

Key Government Programs and Initiatives

To support the creation and proliferation of digital services, Montenegro has implemented several policies and programmes:

- **eServices and Digital Infrastructure as a Response Measure to COVID-19**: Funded by the European Union and implemented in cooperation with the UNDP, this project aims to accelerate the digital transformation of public administration in Montenegro. The project focuses on developing new and upgrading existing platforms and complex software systems to meet the needs of citizens and businesses. Priority activities include establishing an integrated system of simplified electronic procedures and implementing services with significant

impact on citizens and the economy, such as online review and payment of fines, student loan applications, and eBusiness improvements.

- **Montenegro Digital Programme**[48]: Oversees the government's digital transformation, focusing on establishing digital standards, optimizing IT procurement, and creating an open digital market.
- **Public Administration Reform Strategy 2022-2026**[49]: Emphasizes the digitalization of public services, aiming to improve the efficiency and accessibility of public administration using technology.
- **Smart Specialisation Strategy 2019-2024**[50]: Supports digital transformation across various sectors by promoting innovation and the adoption of new technologies in economic activities.
- **Norway for you - Montenegro**[51]: Provides substantial support for the development of small businesses and the innovation ecosystem, further integrating ICT into various sectors of the economy.
- **Strategy for Scientific Research Activity of Montenegro 2024-2028**[52]

Digital Economy and Rural Inclusion

The digital economy has facilitated increased participation of rural communities in economic activities. Initiatives to improve broadband connectivity in rural areas are crucial for ensuring that all citizens benefit from digital services. However, disparities in internet penetration between urban and rural areas highlight the need for continued investment in digital infrastructure.

Prospects and Challenges

Looking ahead, Montenegro's integration into the EU's digital frameworks and its participation in regional initiatives like the Berlin Process[53] and the Common Regional Market[54] are expected to further enhance its digital infrastructure and service delivery. However, challenges remain, particularly in achieving uniform broadband penetration across all municipalities and ensuring that the benefits of digital transformation reach all regions and demographics of society.[55]

Use of ICTs by businesses

The use of ICTs by businesses in Montenegro has seen a notable increase in recent years, influenced by government initiatives, international support, and a growing digital infrastructure. As of recent reports, business broadband penetration in Montenegro shows significant variability across its municipalities. Plužine leads with an 87.8% penetration, followed by Petnjica (77.4%), Andrijevica (73.5%), Gusinje (65.5%), and

[48] https://www.gov.me/en/documents/97a5b5fd-9e83-4b63-82fa-c8692a242f82
[49] https://www.gov.me/dokumenta/ab9503b0-5f2e-42ef-b124-b8df949acfaa
[50] https://s3.me/en/smart-specialisation-in-montenegro/
[51] https://montenegro.un.org/en/146190-norway-supports-development-small-businesses-and-innovation-montenegro-one-million-euros
[52] Strategy for Scientific Research Activity of Montenegro 2024-2028 (www.gov.me)
[53] https://europeanwesternbalkans.com/2023/04/04/parliament-of-montenegro-ratifies-agreements-signed-within-berlin-process/; https://www.berlinprocess.de/
[54] https://neighbourhood-enlargement.ec.europa.eu/enlargement-policy/policy-highlights/common-regional-market_en
[55] https://montenegrobusiness.eu/

Žabljak (65.15%). These figures indicate robust adoption of broadband services in these areas, highlighting a strong foundation for digital business activities. Ten other municipalities have penetration rates between 50% and 62%, including Mojkovac (62.2%), Kotor (61.9%), and Tivat (56%). However, several municipalities lag, such as Rozaje with a penetration rate of just 26%.[56]

As regards ICT adoption and business use, the Montenegrin government has implemented several key initiatives to enhance ICT usage among businesses. Notably, the transition to a real-time software-based fiscalization system in June 2021 aims to reduce the grey economy and improve tax compliance. This system requires businesses to issue electronic invoices, ensuring that all transactions are recorded and reported in real-time, which is a significant step towards digitizing the economy.[57] Moreover, the "Norway for you - Montenegro" project[58], supported by Norway, has been crucial in fostering the innovation ecosystem and supporting small businesses. This project, running through 2023, focuses on enhancing the effectiveness of support for micro, small, and medium enterprises (MSMEs), improving the institutional framework for innovation, and strengthening capacities of entities like the Innovation Fund and the Science and Technology Park of Montenegro.

Digital Economy and Women Entrepreneurs

The digital economy has opened new avenues for women entrepreneurs in Montenegro. Women now own 24% of micro, small, and medium businesses, a significant increase from 9.6% a decade ago. The creation of the platform www.zenskibiznis.me aims to further support women in business by providing digital literacy training, business development resources, and a network of mentors. This initiative is part of broader efforts by the UNDP and the Montenegrin government to promote gender equality and empower women in the digital economy.[59]

Prospects and Challenges

The use of ICTs by businesses in Montenegro is on an upward trajectory, supported by significant government reforms, international partnerships, and a focus on innovation and gender equality. Continued investment in digital infrastructure and targeted support for small businesses and entrepreneurs will be key to sustaining this growth.[60]

Use of ICTs by citizens

Citizens in Montenegro are progressively embracing digital services, facilitated by government initiatives, increased internet penetration, and mobile device usage. However, challenges remain, particularly in rural areas. The availability of eGovernment services has significantly increased access to essential services online, reducing the need for physical visits to government offices.

[56] See: WB27-MNE-DII-01 Project Initiation Report Including the Cost and CBA update, pages 45-65
[57] https://www.trade.gov/ict-and-clean-technology-mission-serbia-and-montenegro
[58] https://montenegro.un.org/en/146190-norway-supports-development-small-businesses-and-innovation-montenegro-one-million-euros
[59] https://www.undp.org/montenegro/press-releases/undp-creates-website-women-business
[60] https://bti-project.org/en/reports/country-report/MNE

The percentage of individuals using the internet for interacting with public authorities has steadily increased. In 2020, about 30% of citizens were using the internet to obtain information from public authorities, and by 2022, this number had risen significantly, aligning closer to the EU27 average. This indicates a growing comfort and reliance on digital platforms for government services among Montenegrin citizens.[61] The adoption of eGovernment services has been a cornerstone of Montenegro's digital transformation strategy. The government has implemented various digital platforms to streamline administrative processes and make public services more accessible.[62] Key initiatives include:

- **Unified Information System for Electronic Data Exchange (JISERP)**: This system facilitates active data exchange between state bodies, enhancing the efficiency and responsiveness of public services.
- **eID and Trust Services**: Montenegro has harmonized its electronic identification and trust services with EU regulations, ensuring secure and reliable digital interactions for its citizens.

Digital Divide

Montenegro has made significant strides in developing its broadband infrastructure, yet there remains a pronounced digital divide, reflecting disparities in broadband and, more specifically, NGA (Next Generation Access) penetration across various municipalities, particularly between urban and rural areas. Montenegro's rugged terrain and dispersed rural settlements pose challenges for infrastructure deployment, leading to uneven internet access and quality across the country. Urban centers in Montenegro, such as Podgorica, Budva, and Tivat, have well-developed ICT infrastructures, predominantly supported by fiber optic networks (FTTH) and high-speed mobile broadband (4G and 5G). In these areas, broadband penetration is remarkably high, with some municipalities like Podgorica achieving penetration rates of over 90% for high-speed internet connections. In contrast, rural areas often lag, with significantly lower broadband penetration and reliance on older technologies such as xDSL or limited mobile broadband access.

The digital divide is highlighted by the existence of "white areas," where there is no internet coverage. These areas are predominantly rural and mountainous regions where the deployment of broadband infrastructure is economically challenging due to low population density and high investment costs. For instance, municipalities like Šavnik and Plužine exhibit some of the lowest broadband penetration rates in the country, with substantial portions of their populations still lacking access to high-speed internet.[63]

The impact of this digital divide is also evident in the quality of services. Urban areas enjoy superior service quality, with higher speeds and more reliable connections. In contrast, rural and suburban regions often experience lower speeds and less reliable

[61] European Commission 2022: Digital Public Administration factsheet 2022 Montenegro
[62] European Commission 2022: Digital Public Administration factsheet 2022 Montenegro
[63] See WB27-MNE-DII-01_MONT_01_Project Initiation Report Including the Cost and CBA update, pp. 45-51

service, hindering access to essential digital services such as e-health, e-education, and e-government. This discrepancy underscores the need for continued investment and strategic initiatives to ensure equitable access to digital services across Montenegro.

Despite these challenges, efforts are ongoing to bridge the gap. Various local and national initiatives aim to enhance broadband connectivity across all regions. For example, the Montenegrin government is committed to expanding fiber networks beyond urban centers, aiming to provide high-speed internet access to more remote areas. Investment in infrastructure is a key component, with significant potential funds to be allocated to developing next-generation access (NGA) networks.[64]

Table 4 ranks the municipalities by their broadband and NGA penetration rates for the year 2022. Broadband penetration measures the extent of internet connectivity among households, while NGA penetration indicates access to high-speed internet services, crucial for supporting modern digital applications.

Table 4: Ranking of Municipalities by Residential Broadband (all technologies) and NGA Penetration (VDSL, Cable / KDS and FTTx) (2022) (connections per 100 households)

Rank broadband penetration (all tech)	Municipality	Broadband Penetration (%)	Rank NGA broadband penetration	Municipality	NGA Penetration (%)
1	Budva	208.57	2	Budva	68.22
2	Tivat	113.27	4	Tivat	54.51
3	Podgorica	96.24	1	Podgorica	70.73
4	Ulcinj	82.09	5	Ulcinj	53.14
5	Petnjica	77.71	19	Petnjica	9.31
6	Nikšić	67.87	7	Nikšić	47.62
7	Bar	67.87	6	Bar	50.23
8	Kotor	62.28	3	Kotor	62.28
9	Plav	54.10	9	Plav	35.03
10	Herceg Novi	45.81	8	Herceg Novi	45.81
11	Cetinje	45.96	10	Cetinje	33.50
12	Rožaje	44.68	16	Rožaje	20.15
13	Bijelo Polje	41.36	15	Bijelo Polje	20.85
14	Danilovgrad	39.71	11	Danilovgrad	33.39
15	Berane	38.50	12	Berane	27.18
16	Pljevlja	27.74	22	Pljevlja	3.32

[64] See the output documents regarding NGA rollout in un-and underserved areas across Montenegro: Western Balkans Investment Framework Infrastructure Project Facility, Technical Assistance 8 (IPF 8), TA2018148 R0 IPA - WB21-MNE-DII-01, Oct 2021
Western Balkans Investment Framework Infrastructure Project Facility Technical Assistance 11 (IPF 11) - 27 July 2023[64] INFRASTRUCTURE PROJECT FACILITY 11 (IPF11) Montenegro, Broadband Infrastructure Development / WB27-MNE-DII-01 Inception Report – 11 October 2023

17	Gusinje	26.96	13	Gusinje	26.96
18	Mojkovac	22.30	14	Mojkovac	22.30
19	Žabljak	20.37	17	Žabljak	12.27
20	Andrijevica	16.36	23	Andrijevica	1.67
21	Plužine	12.24	18	Plužine	10.55
22	Kolašin	7.98	20	Kolašin	7.98
23	Šavnik	3.72	21	Šavnik	3.72

Source: WB27-MNE-DII-01_MONT_01_Project Initiation Report Including the Cost and CBA update, pp. 45-51 and EKIP 2023 Annual Report, Table 11 NGA residential penetration in Montenegro (connections per 100 households).

Budva, with its high tourism influx and secondary apartments, leads with an extraordinary broadband penetration of 208.57%. Similarly, Tivat and Podgorica, major economic and administrative hubs, show high penetration rates, underscoring the correlation between urbanization and digital access. In contrast, municipalities like Šavnik, Kolašin, Plužine and Andrijevica exhibit significantly lower penetration rates, highlighting the rural-urban digital divide. Addressing this divide is vital for fostering inclusive economic growth, enhancing education and healthcare services, and promoting social equity. High-speed broadband access can enable remote work, e-learning, telemedicine, and access to government services, thus bridging gaps in opportunity and quality of life.

Box 1 provides an overview of recommendations and measures to bridge the digital divide.

Box 1: How to address the rural-urban divide

Improving internet access in rural areas is crucial for bridging the digital divide and promoting equitable development. Recent public and private sector initiatives, programs, policies, and partnerships have shown significant impact in enhancing rural connectivity globally. Here are some key strategies and examples, with a nuanced focus on broadening the base of contributions and contributors to network costs.

1. Government / Donor Initiatives and Policies

- **Subsidies and Grants**: Governments can provide financial incentives to ISPs to extend broadband infrastructure to rural areas. For instance, the World Bank supported Mozambique with a $300 million grant to increase access to energy and broadband services, demonstrating how financial aid can accelerate infrastructure development.[65]
- **Universal Service Funding Mechanisms** - Universal Service Funding Mechanisms are frameworks designed to ensure widespread access to essential telecommunications services, typically funded through levies on operators, government subsidies, or international support, and can include direct financial assistance, public-private partnerships, and targeted subsidies for underserved areas (e.g. CAF[66]). The ITU's Global Symposium for Regulators (GSR) Best Practice Guidelines highlight the importance of flexible, technology-neutral approaches and innovative funding models that promote sustainability and digital inclusion while leveraging multi-stakeholder partnerships for maximum impact.

[65] For more information on the role of Government in rural connectivity, please see the following ITU report: https://www.itu.int/hub/publication/d-pref-ef-gov_ps-02-2022/ Economic and fiscal incentives to accelerate digital transformation ITU

[66] https://www.fcc.gov/general/connect-america-fund-caf

- **Western Balkans Investment Framework (WBIF)** – this EU-led donor platform has supported digital infrastructure projects, such as providing broadband to rural households in **Albania and connecting schools in Kosovo and Serbia**.[67]
- **Serbia – The European Bank for Reconstruction and Development (EBRD)** funded broadband infrastructure benefiting over 150,000 rural households and 500 schools.[68]
- **Regulatory Reforms**: Simplifying regulations and reducing bureaucratic hurdles can facilitate quicker deployment of internet infrastructure.[69]

2. Public-Private Partnerships (PPPs)

- **Collaborative Models**: **Broadband Master Plan of Navarra 2016 – 2021, Spain**, consisting of a public and private collaboration model, the project's main focus was to digitalise the public services in Navarra while bringing broadband services to the remote locations in order to foster the adoption of new technologies in rural areas. The project was awarded with the European Broadband Award 2022.[70]
- Partnerships between government agencies and private ISPs can share the costs and benefits of infrastructure projects. **The Internet para Todos initiative in Peru** is a prime example, where Facebook, IDB Invest, CAF, and Telefonica collaborated to build a 4G network in rural areas, providing connectivity to millions.[71]
- **Shared Networks**: **Ghana's government plans to build a shared 4G and 5G network** with operators and private investors, aiming to provide widespread internet access without the need for multiple competing infrastructures.

3. Infrastructure Investment

- **Fiber Optic Expansion**: Investing in fiber optic cables to rural areas ensures high-speed and reliable internet. The ITU's Global Connectivity Report highlights the critical role of middle-mile connectivity in bridging the digital divide.[72] One key example is the **Digital Nord-Pas-de-Calais Project, France** – This project deployed public optic fiber in rural areas, starting with public funds and later attracting private investment. [73]
- **Wireless Solutions**: Deploying wireless technologies like 4G LTE and 5G networks can be more cost-effective and quicker to deploy in rural settings. The development of 5G infrastructure is particularly emphasized for its potential to provide high-speed connectivity in underserved regions.[74]
- **Satellite Internet**: Satellite broadband services can reach remote and underserved areas where terrestrial infrastructure is not feasible. NGSO initiatives are examples of leveraging satellite technology to enhance rural connectivity globally.[75]
- **Infrastructure sharing with other utilities -** Infrastructure sharing with other utilities, such as energy and water companies, can significantly reduce broadband roll-out costs by leveraging existing ducts, poles, and rights-of-way. A successful example in Europe is Sweden's Stokab, where a city-owned company deployed a fiber-optic network using utility infrastructure, allowing multiple service providers to access the network, which reduced deployment costs and accelerated broadband coverage.[76]

4. Innovative Technologies

[67] https://www.wbif.eu/
[68] https://www.ebrd.com/news/2022/ebrd-eu-finance-expansion-of-broadband-in-rural-serbia.html
[69] Financing Universal access to digital technologies and services https://www.itu.int/hub/publication/D-PREF-EF-2021-ECO_FIN/
[70] https://digital-strategy.ec.europa.eu/en/library/broadband-master-plan-navarra-2016-2021-spain
[71] See: https://telefonica.com.pe/sostenibilidad-e-innovacion/internet-para-todos/ and "4G/5G Investment Opportunities in Africa" Report https://strandconsult.dk/financing-opportunities-for-4g-5g-investment-in-africa/
[72] https://www.itu.int/itu-d/reports/statistics/2022/05/29/gcr-chapter-1/
[73] https://digital-strategy.ec.europa.eu/en/library/digital-nord-pas-de-calais-france
[74] https://www.itu.int/itu-d/reports/statistics/2022/05/29/gcr-chapter-1/
[75] https://www.starlink.com/technology ; https://www.broadbandcommission.org/insight/the-role-of-geostationary-satellite-networks-in-meeting-the-rural-connectivity-challenge/
[76] https://stokab.se/en/stokab

- **TV White Spaces**: Utilizing unused television broadcast frequencies to deliver wireless internet over long distances can be a cost-effective solution for rural connectivity.[77]
- **Mesh Networks**: Community-driven mesh networks can provide resilient and scalable connectivity by linking multiple small nodes to form a wide area network.[78]

5. Economic and Educational Programs

- **Digital Literacy Training**: Offering programs to educate residents on the benefits and uses of the internet can enhance demand and utilization. Training initiatives in Morocco aim to empower rural women and girls by providing access to digital technologies and education.[79]
- **Affordable Access Programs**: Implementing affordable broadband plans for low-income households increases adoption rates. Efforts to reduce the cost of internet access, such as in Nepal, where internet affordability is being addressed through policy changes and subsidies, are crucial.

6. Local Solutions and Community Networks

- **Cooperative Models**: Forming broadband cooperatives where community members collectively own and manage the network can be effective. These cooperatives can leverage local knowledge and needs to provide tailored solutions. For example, **guifi.net[80], predominantly located in Spain, is the world's largest community network**. As of December 2016, guifi.net boasted more than 32,500 operating nodes, serving more than 50,000 people. Wi-Fi was the first technology to be used in the network, and remains the most popular.
- **Municipal Networks**: Local governments building and operating their own broadband networks ensure community-focused service provision.

Broadening the Base of Contributions and Contributors

One of the key strategies outlined in the "21st Century Financing Models for Bridging Broadband Connectivity Gaps" and the "Financing Opportunities for 4G/5G Investment in Africa" reports is broadening the base of contributions and contributors to network costs. This approach is essential for sustainable and scalable rural connectivity and is also promoted in the ITU's GSR 2023 Best Practice Guidelines[81].

1. **Inclusion of Digital Content Providers (DCPs)**:
    - **Equity Investments**: DCPs like Facebook have invested in initiatives such as Internet para Todos, demonstrating the benefits of equity investments in rural broadband projects. These investments help offset the infrastructure costs and create sustainable models where DCPs can gain from increased user bases.[82]
    - **Regulatory Obligations**: South Korea's legislation requires large content providers to negotiate network usage fees with broadband providers, ensuring that those who benefit from the infrastructure contribute to its maintenance and expansion.
2. **Universal Service Funds (USFs)**:
    - **Expanding Contributions**: The US has proposed the Lowering Broadband Costs for Consumers Act of 2023, which mandates that DCPs with significant traffic and revenue contribute to the USF, supporting broadband deployment and low-income access programs.[83]
    - **Utilizing ICT Taxes**: Earmarking a percentage of the proceeds from ICT sector taxes for broadband development projects can provide a steady revenue stream for

[77] https://cocreate.itu.int/post/3353900

[78] https://www.thefastmode.com/expert-opinion/34282-extending-broadband-to-the-last-mile-of-rural-areas-with-mesh-networking ; https://shape.host/resources/mesh-networks-building-a-decentralized-internet-infrastructure

[79] https://press.un.org/en/2023/wom2225.doc.htm

[80] https://guifi.net/ , https://guifi.net/en/technological-project

[81] https://www.itu.int/itu-d/meetings/gsr-23/

[82] https://telefonica.com.pe/sostenibilidad-e-innovacion/internet-para-todos/ and "4G/5G Investment Opportunities in Africa" Report https://strandconsult.dk/financing-opportunities-for-4g-5g-investment-in-africa/

[83] https://www.congress.gov/bill/118th-congress/senate-bill/3321

infrastructure expansion. This model ensures that the growth of the digital economy directly supports the enhancement of connectivity.[84]

3. **Public-Private Financial Models**:
    - **Blended Financing**: Combining public funds with private investments can reduce risks and attract more capital. The European Investment Bank's blended financing for upgrading networks to 4G in Africa is an example of leveraging multiple funding sources to achieve connectivity goals.[85]
    - **International Funds**: Establishing international funds to provide low-cost, long-term loans for broadband projects can facilitate large-scale infrastructure development. The proposed International Fund for Broadband Development aims to pool resources from various stakeholders to support global connectivity initiatives.[86]

Improving rural internet access requires a multifaceted approach, combining government support, private sector innovation, community involvement, and strategic investments in infrastructure and education. By broadening the base of contributions and ensuring that all beneficiaries of digital infrastructure contribute to its development, these efforts can achieve sustainable and equitable connectivity for all regions.

Institutional and legal framework responsible for broadband infrastructure development

In Montenegro, the development of broadband infrastructure is driven by a coordinated effort among several key institutions, each playing a vital role in promoting and regulating digital connectivity. These institutions and stakeholders are set out below.

The **Ministry of Economic Development (MoED)** serves as the primary governmental body overseeing broadband infrastructure development. Within the MoED, the Directorate for Electronic Communications, Postal Activity, and Radio Spectrum is specifically tasked with preparing laws and regulations, developing infrastructure plans, and coordinating activities with both national and international bodies. A dedicated division within this directorate, the Direction for Broadband Internet Access, focuses on new generation mobile communication networks and broadband internet access.

The **Agency for Electronic Communications and Postal Services (EKIP)** acts as the independent regulatory authority for electronic communications in Montenegro. EKIP is responsible for adopting regulations, providing expert opinions, promoting the realization of electronic communications infrastructure, protecting user interests, and resolving market disputes. The agency also conducts market analyses to identify operators with significant market power and imposes necessary remedies to ensure fair competition.

The **Ministry of Spatial Planning, Urbanism and State Property (MDUP)**[87] plays a crucial role in the spatial planning aspects of electronic communications networks and

[84] 21st Financing and funding models - https://www.broadbandcommission.org/working-groups/21st-century-financing-models-2020/

[85] https://www.eib.org/en/press/all/2024-097-usd40-million-european-backing-for-uganda-rural-telecom-expansion ; https://www.eib.org/attachments/publications/unlocking_digital_connectivity_in_africa_en.pdf

[86] 21st Financing and funding models - https://www.broadbandcommission.org/working-groups/21st-century-financing-models-2020/

[87] https://www.gov.me/en/mdup

services. This ministry is responsible for issuing opinions and permits, preparing relevant documents, maintaining records, and auditing the construction of facilities to ensure compliance with environmental and spatial planning regulations.

The **Ministry of Ecology, Sustainable Development and Northern Region Development** (MERS) equally carries key responsibilities in broadband development with an adopted Law on Amendments to the Law Prescribing Provisions on Inspection Supervision and the Law on Amendments to the Law on Inspection Supervision, which provide, that inspection tasks, according to areas which were carried out by the Administration for Inspection Affairs, are returned to the relevant ministries.[88] For e.g. with the implementation of newly adopted laws related to inspection affairs, from October 1st 2024, the Minister of Ecology, Sustainable Development and Northern Region Development will be the second instance in Administrative procedure for non-ionizing radiation and the Ministry will be responsible for overall supervision of the implementation of the Law on Non-Ionizing Radiation Protection, while the Environmental Protection Agency is responsible for issuing licenses, for monitoring programmes and for the registry.

Since the recently adopted institutional changes, the **Ministry of Ecology, Sustainable Development, and Northern Region Development (MERS)**[89] also plays a role in broadband development.[90] These changes stipulate that inspection tasks, previously managed by the Administration for Inspection Affairs, are now reverted to the relevant ministries. Specifically, MERS is involved in several key areas of oversight and administration including the drafting of law and regulations. The **Administration for Inspection Affairs** handles the inspection responsibilities until October 1st 2024, as prescribed by recently adopted laws related to inspection affairs.

Local governance is also significant in the broadband sector, with **municipalities** handling the procedural aspects of granting permits and rights of way for broadband infrastructure projects. Montenegro's 25 municipalities, each with their own administrative processes, ensure that local needs and conditions are addressed in the development of digital infrastructure.

Telecom operators are central to the broadband sector. They provide a range of services including fixed-line telephony, mobile telephony, internet services, and IPTV, contributing significantly to the expansion and modernization of Montenegro's broadband infrastructure. Additionally, the **Electric Transmission System (CGES)** and the **Electric Power Distribution Operator (CEDIS)** are registered as wholesale electronic communications operators. They offer services such as passive optical fiber rental and/ or other infrastructure such as poles or OPGW, which could support the broader deployment of broadband networks.

[88] The mentioned laws has been adoption by Parliament of Montenegro on 30, August 2024. According to both laws, the inspections will be part of the Ministry starting from 1 October 2024. See Stakeholder Response on Draft National Plan.

[89] https://www.gov.me/en/mers

[90] The mentioned laws have been adopted on 30, August 2024. According to both laws, the inspections will be part of the Ministry starting from 1 October 2024. - See Stakeholder Response on Draft National Plan.

As of 2023, Montenegro has established a comprehensive framework of policies, laws, and regulations to guide the development of broadband infrastructure, aiming to enhance digital connectivity and integration within the European digital landscape. The key components of this framework include the Law on Electronic Communications, the Law on the Protection of Competition, and the State Aid Control Act, among others.

Law on Electronic Communications (ZEK)
The Law on Electronic Communications (ZEK) was adopted in 2013 and has been amended several times, most recently in 2019 and in September 2024. [91] This law establishes the institutional framework for the regulation of the electronic communications sector in Montenegro. It aligns with the EU acquis Communautaire and the European Electronic Communications Code.[92] The ZEK provides the basis for policy implementation, including the promotion of broadband infrastructure development and the establishment of market regulations to ensure fair competition.

Law on the Protection of Competition
The Law on the Protection of Competition, enacted in 2012 and amended in 2018, aims to protect and regulate market competition in Montenegro. It controls state aid and aligns with EU standards, particularly Articles 101 and 102 of the Treaty on the Functioning of the European Union (TFEU).[93] This law ensures that anti-competitive practices do not hinder the development of broadband infrastructure.

State Aid Control Act
The State Aid Control Act of 2018 introduced significant changes to Montenegro's state aid framework, aligning it with EU requirements.[94] The act defines state aid and outlines the procedures for granting and controlling it to prevent market distortions. This regulatory framework supports fair competition and encourages investment in broadband infrastructure.

Key Issues and Challenges

Key findings from previous work and the stakeholder consultation

Since 2020, Montenegro has made significant strides in improving its broadband infrastructure, driven first and foremost by private sector investment, national strategies and international collaborations. Taking into consideration previous work conducted by Montenegrin stakeholders and the issues raised during the stakeholder consultation undertaken to develop the National Broadband plan, several critical challenges must be

[91] The Electronic Communications Law N°40/2013 and its amendments N°56/2013, N°02/2017, N°49/2019

[92] In September 2024, the government adopted amendments to the Law on Electronic Communications (ZEK), originally enacted in 2018, to incorporate the provisions of the European Electronic Communications Code. Parliamentary approval is anticipated by early October 2024.

[93] Out of 33 chapters under discussion for Montenegro's EU accession negotiations, the last one, Chapter 8 on competition, was opened in June 2020

[94] State aid Control Act, Law N° 12/2018

addressed to ensure continued progress and equitable broadband access. These issues and challenges are set out below.

Regulatory and Administrative Barriers

The current permit procedures for different types of permits, including, e.g., urban planning and technical conditions, public land leasing, construction approvals, are lengthy and unpredictable, varying significantly between municipalities, which hinders timely infrastructure deployment. Streamlining administrative processes for obtaining construction permits and rights of way is critical, as the existing framework often results in procedural delays and inconsistencies.

Box 2: Operators' perspective on complexity of rolling out communications infrastructure in Montenegro

Rolling out broadband infrastructure in Montenegro involves navigating a complex web of administrative, procedural, and regulatory processes. Operators face numerous obligations imposed by policies, laws, and regulations, making the process time-consuming and unpredictable.

1. **Permit Procedures**:
    - **Urban Planning and Technical Conditions**: The process begins with requesting Urban Planning and Technical Conditions from the municipality. Though legally required to be completed in 15 days, it often takes about a month. If there is no clear process or if the process is non-functional, operators cannot proceed with construction. For instance, in the Municipality of Kotor, building within 200 meters of any residence is forbidden.
2. **Land Leasing**:
    - **State-Owned Land**: Leasing state-owned land involves splitting the plot through the State Property Administration, a process that can take up to seven months.
    - **Municipal-Owned Land**: Municipalities typically lease land via public auctions, which occur infrequently, sometimes once every two to three years, delaying the process significantly.
3. **Construction Approvals**:
    - **Environmental Impact Assessment (EIA)**: The preparation and approval of an EIA study by the Municipality Secretariat for Spatial Planning and Sustainable Development take up to four months.
    - **Technical Documentation**: This includes obtaining consent from the Chief Architect of the Municipality, which should take 15 days by law but usually takes a month.
4. **Infrastructure Sharing**:
    - **Passive Infrastructure Sharing**: Legally mandated if capacity is available, but limited by the outdated and poor condition of existing infrastructure.
    - **Commercial Agreements**: Operators lease optical fibers from other network operators and utility companies like CEDIS (Montenegrin Electrical Distribution System) and CGES (Montenegrin Electrical Transmission System).
5. **Electricity Supply**:
    - **CEDIS Approvals**: Obtaining approvals for the base station Main Power Supply Project from CEDIS ideally takes one month but can extend to three to four months. Following this, a contract with EPCG (Electric Power Company of Montenegro) for electricity supply is required, which takes an additional 30 days.
6. **Coordination with Authorities**:
    - **EKIP (Agency for Electronic Communications and Postal Services)**: Centralized permit procedures managed by EKIP, which legally take 30 days and are generally conducted in a timely manner.
    - **Ministry of Spatial Planning, Urbanism and State Property**: Multiple steps involve coordination with these entities for Urban Development and Technical Conditions, impacting the overall timeline.

Areas to be Addressed and Suggested Measures

1. **Centralized and Streamlined Permit Processes**:
    - Implement a more centralized and streamlined permit procedure, ideally managed by a single agency, to reduce the time and unpredictability currently experienced.
2. **Consistent Application of Regulations**:
    - Ensure uniform application of regulations across all municipalities to prevent delays and inconsistencies in infrastructure development.
3. **Infrastructure Modernization**:
    - Invest in upgrading the existing infrastructure (such as electricity poles) to facilitate easier sharing and reduce the limitations caused by outdated and inadequate facilities.
4. **Incentives for Quick Approvals**:
    - Introduce incentives for municipalities and other regulatory bodies to process permits and approvals more swiftly.
5. **Public-Private Coordination**:
    - Enhance coordination between public entities like the Ministry of Spatial Planning, EKIP, and local municipalities with private operators to ensure efficient infrastructure rollout.
6. **Simplification of Land Leasing Procedures**:
    - Simplify the procedures for leasing state and municipal land to expedite the availability of necessary land for infrastructure projects.
7. **Supportive Legal Framework**:
    - Amend the legal framework to facilitate easier construction of telecommunications infrastructure, addressing specific barriers in the Law of Spatial Planning and related bylaws.

Implementing these measures will significantly ease the rollout of broadband infrastructure, promoting faster and more efficient development of high-speed internet access across Montenegro.

Source: Stakeholder Consultation Questionnaire responses

Investment Environment

The current financing model relies only on private sector investment, with no public funding mechanisms to support broadband projects in underserved areas. To bridge the digital divide between urban and rural areas, fostering public-private partnerships (PPPs) and establishing public funding mechanisms are essential.[95]

Infrastructure Sharing and Market Analysis

Promoting the shared use of infrastructure to reduce costs and streamline deployment is critical for broadband development. Conducting a market analysis on the existing passive infrastructure market is necessary to evaluate opportunities for further development, particularly in underserved areas. This approach can optimize resource utilization and facilitate broader network coverage.

Digital Divide

A significant digital divide exists in Montenegro, with many rural areas lacking adequate broadband access. More than 900 settlements have internet speeds below 30 Mbps, relying mostly on older technologies like copper or limited mobile broadband access. Targeted investments and incentives are required to ensure universal broadband coverage and equitable access to digital services, bridging the gap between urban and rural communities.[96]

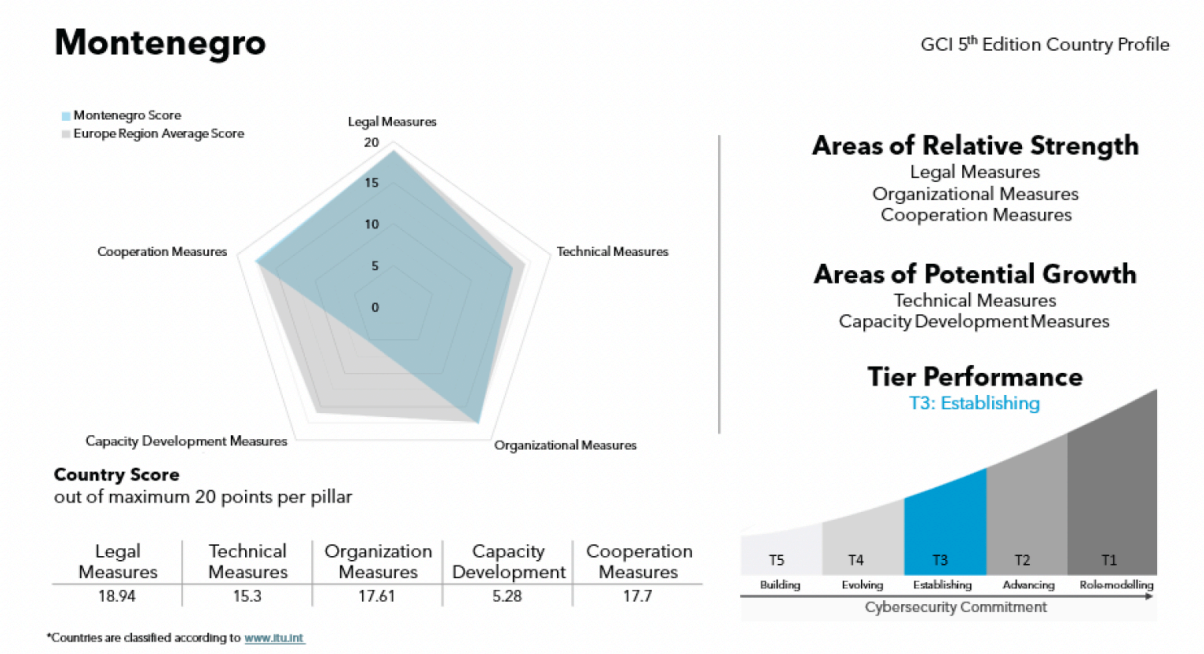
[95] Stakeholder Consultation Questionnaire responses

[96] See Section on the Digital Divide for a more detailed discussion

Security and Reliability

Enhancing the security and reliability of digital infrastructure is vital for sustaining broadband development. This involves securing ICT networks and ensuring the resilience of services dependent on electronic communications infrastructure. Robust security measures and a clear definition of the critical role of digital infrastructure are necessary to protect against cyber threats and ensure network resilience and service continuity. While Montenegro score strong in legal, organizational and cooperation measures, there is still room for improvement in the areas of technical measures and capacity development measures, as shown in the 5th edition of the Global Cybersecurity Index 2024.[97]

Figure 6: GCI Country Profile Montenegro 2024



Environmental Concerns

The implementation of the Law on Non-Ionizing Radiation Protection and ensuring effective implementation of the Law on Environmental Impact Assessments by

[97] https://www.itu.int/en/ITU-D/Cybersecurity/Pages/global-cybersecurity-index.aspx

municipalities for new base stations are crucial steps. This relates in particular to companies that need to be licensed for the implementation of the Law.

Table 5:Overview Table of Key Issues and Challenges

Theme	Issue or Barrier	Brief Description	Relation to Broadband Objective or Target	Responsible Stakeholder / Institution
Regulatory and Administrative Barriers	Permit Procedures	Lengthy and unpredictable, varying significantly between municipalities, hindering timely infrastructure deployment.	Objective: Streamlined infrastructure development processes	Ministry of Spatial Planning, Local Governments
	Construction Permits and Rights of Way	Streamlining administrative processes for obtaining construction permits and rights of way is critical.	Objective: Streamlined infrastructure development processes	Ministry of Spatial Planning, Urbanism and State Property; Local Governments
Investment Environment	Insufficient Public Funding Mechanisms	Reliance on private sector investment with insufficient public funding mechanisms to support projects in underserved areas.	Objective: Sustainable funding for broadband projects	Government, International Financial Institutions
	Fostering Public-Private Partnerships	Need to foster PPPs and establish public funding mechanisms to bridge the digital divide.	Objective: Increased investment in broadband infrastructure	Ministry of Economic Development, Private Sector
Infrastructure Sharing and Market Analysis	Shared Use of Infrastructure	Promoting shared use of infrastructure to reduce costs and streamline deployment is critical.	Objective: Cost-effective broadband infrastructure development	Ministry of Economic Development, Utility Companies, EKIP
	Market Analysis	Conducting a market analysis on existing passive infrastructure to evaluate opportunities for further development.	Objective: Development of underserved areas	EKIP
Digital Divide	Rural Broadband Access	Significant digital divide with many rural areas lacking adequate broadband access,	Objective: Universal broadband access	Ministry of Economic Development, Telecom Operators, EKIP

		requiring targeted investments and incentives.		
Security and Reliability	ICT Network Security and Reliability	Enhancing the security and reliability of digital infrastructure to protect against cyber threats and ensure service continuity.	Objective: Secure and reliable digital infrastructure	Ministry of Interior, Ministry of Economic Development, EKIP
Environmental Concerns	Enhancement of the Implementation of Laws	Ensuring smooth implementation of the Law on Non-Ionizing Radiation Protection and Law on Environmental Impact Assessment..	Objective: Improve and strengthen implementation	EPA, Local Municipalities
Institutional Capacity	Low headcount of qualified personnel	Lack of sufficient manpower at institutional level for timely implementation of legislation (e.g. in MERS and EPA).	Objective: Increase institutional capacity	MERS, EPA, local municipalities, Ministry of Economic Development / Directorate for Broadband Development
Administrative and Regulatory Improvements	Geoportal and Registries	Making the Geoportal of spatial data infrastructure, Central Registry of Construction, and Utility Lines Cadastre fully operational.	Objective: Improved coordination and planning	Ministry of Ecology, Spatial Planning, State Property
Incentives for Deployment	Municipal Incentives	Encouraging municipalities to reduce the costs of rights of way and provide access to public buildings during the deployment period.	Objective: Facilitate infrastructure deployment	Government, Parliament, Municipalities
	Voucher Schemes	Implementing voucher schemes to reduce the cost of superfast internet services for citizens and SMEs.	Objective: Increase broadband adoption	Government
Digital Skills and Adoption	Central Communication Plan	Developing a plan to promote the benefits of high-speed broadband.	Objective: Increased broadband adoption	Ministry of Economic Development, EKIP
	E-Government Services and Digital Skills	Implementing e-gov services and enhancing digital	Objective: Growth of basic	Ministry of Public Administration,

	literacy across various demographics.	and advanced digital skills	Ministry of Education

Source: author

Recommendations to address challenges and issues

The following recommendations set out by theme of challenges can help to address the issues and challenges identified.

Infrastructure Development and Sharing:

- **Infrastructure Sharing:** Promote shared use of infrastructure (including infrastructure of other utilities) to reduce costs and streamline deployment.
- **Single Point of Coordination:** Create a single point of coordination for all utility and infrastructure-related activities to streamline communications and reduce delays.
- **Market Analysis:** Conduct market analysis on passive infrastructure to identify opportunities for further development.
- **Mapping of other passive infrastructure** suitable for broadband network development

Box 3: Key measures from EU GIA[98] regarding facilitation of shared infrastructure

The GIA introduces several measures aimed at streamlining the deployment of networks:

- Shared use of infrastructure - Encouraging the shared use of ducts and poles for deploying very high-capacity networks (VHCN) to optimise resources and reduce costs.
- Co-deployment and Coordination of Civil Works – enabling telecom operators to collaborate with public works projects to install fiber optic cables simultaneously, reducing disruptions and expediting broadband expansion.
- Streamlining Administrative Procedures: Simplifying administrative procedures related to network rollout throughout the EU to reduce bureaucratic hurdles and improve efficiency.
- Equipping Buildings with High-speed Ready Infrastructure: Encouraging the provision of buildings with high-speed ready infrastructure and ensuring access to it to facilitate broadband deployment and adoption.

The GIA also seeks to reduce the environmental footprint of electronic communications networks by promoting the deployment of more environmentally efficient technologies, such as fibre and 5G. The re-use of existing physical infrastructure and the greater coordination of civil works will also contribute to reducing the overall environmental impact of deploying networks, through a more efficient use of resources.

Administrative and Regulatory Improvements:

- **Simplify Permit Procedures:** Establish a centralized system for processing all construction permits and approvals required for broadband infrastructure deployment, reducing the need to navigate multiple bureaucratic channels, noting that processes to obtain permits for EIA and Non-Ionizing Radiation Protection have already been simplified, with a set of minimum requirements to

[98] See https://digital-strategy.ec.europa.eu/en/library/recommendation-regulatory-promotion-gigabit-connectivity ; and https://digital-strategy.ec.europa.eu/en/policies/gigabit-infrastructure-act

be met. Ensure that implementation of existing legislation and processes in place are improved.

Box 4: Conditions for obtaining a permit for the use of sources of electromagnetic fields according to the Law on Non-Ionizing Radiation Protection:
The request for issuing a permit for the use of sources of electromagnetic fields must be accompanied by:

- report on the first measurements of the level of electromagnetic fields in the vicinity of the source and/or object with an already installed source;
- expert opinion on meeting the requirements for sources of electromagnetic fields with regard to prescribed exposure limits for electromagnetic fields;
- an act on the determination of the person responsible for the implementation of measures of protection against non-ionizing radiation from Article 39 of this law;
- proof of the qualification of the educational level and professional training of professionally exposed persons and persons responsible for the implementation of protection measures against non-ionizing radiation, in accordance with this law;
- certificate on the health capacity of professionally exposed persons and persons responsible for the implementation of protection measures against non-ionizing radiation;
- risk assessment from Article 32 of this law;
- action program, in accordance with Article 33 of this law;
- instructions for action in the event of an accident;
- list of means and equipment of personal protection at work and proof of its correctness;
- proof of paid administrative fee in accordance with the law.

NOTE: Both Laws are aligned with EU Acquis.

Source: response to First Draft Report

- **Geoportal and Registries:** Make operative the Geoportal of spatial data infrastructure, Central Registry of Construction, and Utility Lines Cadastre.
- **Fixed Time Frames:** Assess the possibility of implementing "shot clock" rules similar to those of the FCC, setting fixed time frames for the approval of infrastructure applications to ensure timely decisions.
- **Batch Processing of Applications:** Allow the submission and concurrent review of multiple infrastructure applications to accelerate the deployment process.
- **Unified Regulatory Framework:** Develop a consistent regulatory framework that applies uniformly across all municipalities, eliminating disparities and ensuring that all regions adhere to the same standards and processes.

Box 4: Examples of Streamlined Processes for Broadband Infrastructure Rollout

1. **The European Commission has** outlined best practices for reducing the costs of Very High Capacity Networks (VHCN) deployment and investment-friendly authorization of 5G radio spectrum in its "Connectivity Toolbox".[99]
2. **United States: One Touch Make-Ready (OTMR) Process[100], "Shot Clock Rules" and "Batch Processing"**
    - **Simplified Permitting:** The US has implemented a streamlined approach called "One Touch Make-Ready" where all necessary pole attachments and modifications are handled

[99] https://digital-strategy.ec.europa.eu/en/news/connectivity-toolbox-member-states-agree-best-practices-boost-timely-deployment-5g-and-fibre
[100] https://broadbandbreakfast.com/fcc-passes-one-touch-make-ready-designed-to-speed-broadband-deployment-on-a-split-vote/

simultaneously by a single contractor. This reduces the time and complexity involved in obtaining multiple permits and approvals.

- **Single Point of Contact:** A single point of contact for all utility coordination is established, improving efficiency and reducing delays.
- **Shot Clock Rules:** The FCC under its **Accelerated Deployment Initiatives**[101] introduced "shot clock" rules which impose time limits on local governments for approving or denying small cell infrastructure applications, generally 60 to 90 days, which significantly accelerates the deployment process.
- **Batch Processing:** Allows for the submission and review of multiple infrastructure deployment applications simultaneously, further speeding up the process.

3. Singapore: Infocomm Media Development Authority (IMDA)[102]

- **Coordinated Building Access:** IMDA facilitates coordinated access to buildings for the deployment of fiber networks, ensuring that multiple service providers can access necessary infrastructure efficiently.
- **Regulatory Support:** Streamlined regulatory processes support quick deployment, with clear guidelines and reduced bureaucratic hurdles.

Box 5: Summary Overview of the European Commission Report on Connectivity Toolbox

The report by the Special Group for developing a common Union Toolbox for connectivity outlines best practices **for reducing the costs of Very High Capacity Networks** (VHCN) deployment and investment-friendly authorization of 5G radio spectrum. The key recommendations and best practices are summarized as follows:

1. **Streamlining Permit Granting Procedures**:
    - **Legal Framework Diversity**: The deployment of digital infrastructure involves a range of laws, from telecommunications to environmental protection, varying by member state.
    - **Permit Exemptions**: Some member states offer permit exemptions for minor projects, while others have centralized management for permit granting.
    - **Tacit Approval**: Used by nine member states to ensure deadlines are met, with a general four-month deadline.
    - **Fast-Track Mechanisms**: Includes legislation to reduce procedures and deadlines, and use of deployment plans in private domains.
    - **Single Information Points (SIPs)**: Centralized platforms in some member states to coordinate and monitor permit granting processes, integrating geospatial data for efficiency.
2. **Improving Transparency**:
    - **SIP Functionality**: Varies across member states, often managed by telecom NRAs or ministries, providing access to geo-referenced data on infrastructure.
    - **Georeferenced Information**: Use of Web Mapping Service (WMS) and Web Feature Service (WFS) technologies for real-time data access.
3. **Expanding Access Rights to Existing Infrastructure**:
    - **Public Infrastructure Access**: Some member states allow free or simplified access to public properties for deploying small cells and other infrastructure.
    - **Coordination with Municipalities**: Broadband Competence Offices (BCOs) mediate between operators and municipalities to facilitate infrastructure deployment.
4. **Dispute Resolution Mechanism**:
    - **National Regulatory Authorities (NRAs)**: Serve as the primary dispute settlement body for access to physical infrastructure, with alternative dispute resolution mechanisms also in place.
5. **Environmental Aspects**:

[101] https://www.benton.org/headlines/analysis-fcc%E2%80%99s-third-report-and-order-and-declaratory-ruling-pole-attachments-and-wireless and https://docs.fcc.gov/public/attachments/DOC-364459A1.pdf

[102] See: https://www.imda.gov.sg/ ; Singapore's Infocomm Media Development Authority (IMDA) has established a one-stop-shop for telecommunications infrastructure permits, significantly reducing the time required to obtain necessary approvals.

- **Reducing Environmental Footprint**: Measures include infrastructure sharing, energy-efficient networks, and recycling of materials.
- **Environmental Assessments**: Regulations often apply during network rollouts, with assessments required for installations in sensitive areas.

6. **Spectrum Management**:
   - **Reserve Prices**: Set based on benchmarking and country-specific factors, often including instalment payment options.
   - **Spectrum Scarcity**: Full allocation of available spectrum bands is prioritized, with measures to migrate existing services and reserve spectrum for public safety.
   - **Cross-Border Use Cases**: Identified industrial use cases with cross-border dimensions, emphasizing harmonized technical regulations and coordination.

Source:
https://ec.europa.eu/information_society/newsroom/image/document/2020-51/compilation_report_special_group_-_summary_and_annex_002_A201FFA5-9ACE-4742-1ACCE7F8A8EC2438_72388.pdf

Incentives, Investment and Funding:

- **Public-Private Partnerships:** Foster PPPs to invest in underserved areas.
- **Public Funding:** Establish public funding mechanisms to support broadband projects in rural areas.
- **Municipal Incentives:** Encourage municipalities to reduce the costs of rights of way and provide access to public buildings during the deployment period. Ensure that existing legislation and processes are correctly and speedily implemented.
- **Voucher Schemes:** Implement voucher schemes to reduce the cost of superfast internet services for citizens and SMEs.

Security and Reliability:

Strengthen the security and reliability of digital infrastructure by:

- **Identify legal and regulatory requirements** for broadband network security
- **Establish a national cybersecurity framework**
- **Explore the option of regulatory obligations** on infrastructure providers to implement and maintain comprehensive cybersecurity policies (e.g. periodic vulnerability assessments, secure configuration of network equipment to enhance the protection and cyber-resilience of critical information infrastructure)
- **Explore the introduction of an obligation** of incident management and reporting
- Align with **EU Network and Information Security Directive** (NIS2), the **EU Toolbox on 5G Cybersecurity**
- Explore adopting **ITU Cybersecurity Assurance Practices**
- **Intensify collaboration** and leverage work undertaken by **Montenegro National CIRT**[103]

Box 6: European Commission Initiatives for network security

[103] https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2016/Cybersecurity%20Forum%20Bulgaria/Viktor%20Berishaj.pdf

- **EU Toolbox on 5G Security:** The EU has implemented the 5G cybersecurity toolbox to ensure a coordinated approach to secure 5G networks across member states. This includes reinforcing security requirements for 5G networks and managing the risks associated with high-risk suppliers. The EU emphasizes the importance of addressing these risks to protect critical infrastructure and maintain resilience and strategic autonomy.
- **Network and Information Security Directive (NIS2):** This directive aims to bolster the EU's cybersecurity framework by expanding its scope to include more sectors and increasing baseline security requirements. It mandates stricter incident reporting and establishes mechanisms for better cooperation among national authorities.

References:
- European Union Agency for Cybersecurity (ENISA). Available at: European Union Agency for Cybersecurity - https://www.enisa.europa.eu
- World Economic Forum. (2024). How the EU's new directive aims to strengthen cybersecurity. Available at: World Economic Forum https://www.weforum.org/agenda/2022/12/cybersecurity-european-union-nis/
- European Commission. (2023). Commission announces next steps on cybersecurity of 5G networks. Available at: European Commission https://ec.europa.eu

Box 7: Key Highlights of the ITU Report "Cybersecurity Assurance Practices"[104]

The ITU report "Cybersecurity Assurance Practices" provides an in-depth analysis of strategies and measures to enhance cybersecurity assurance across various sectors. The report outlines best practices, methodologies, and frameworks aimed at bolstering the security of digital infrastructures and services, ensuring resilience against cyber threats, and promoting a secure digital environment.

1. **Framework Development**:
   - Establishes comprehensive frameworks for cybersecurity assurance, focusing on creating robust policies and regulatory environments.
2. **Risk Management**:
   - Emphasizes the importance of risk management practices to identify, assess, and mitigate cybersecurity risks effectively.
3. **Collaboration**:
   - Highlights the need for public-private and international cooperation and information sharing among stakeholders to enhance cybersecurity resilience.
4. **Incident Response**:
   - Highlights effective incident response strategies and the need for preparedness to handle cybersecurity breaches.
5. **Compliance and Standards**:
   - Stresses adherence to international standards and regulatory requirements to ensure uniform security measures.
6. **Technological Advancements**:
   - Encourages the adoption of advanced technologies and best practices to strengthen cybersecurity defenses.
7. **Capacity Building**:
   - Stresses the importance of capacity building and continuous training for cybersecurity professionals to stay updated with evolving threats.

For more detailed information, you can access the full report here.

Digital Skills and Adoption:

- **Central Communication Plan:** Develop a plan to promote the benefits of high-speed broadband.

[104] https://www.itu.int/hub/publication/d-stg-sg02-03-2-2023/

- **E-Government Services and Digital Skills:** Implement e-gov services and enhance digital literacy across various demographics.
- **Enhancing Digital Literacy**: Focus on providing comprehensive digital literacy programs, especially in low-income and rural areas, to bridge the digital divide.
- **Public-Private Partnerships**: Encourage collaborations between governments, private sector, and educational institutions to create sustainable digital skills development programs.
- **Targeted Initiatives**: Implement targeted initiatives to support under-represented groups, including women, youth, and persons with disabilities.
- **Regular Updates and Assessments**: Establish mechanisms for regularly updating digital skills strategies and conducting assessments to ensure they meet evolving technological and market needs.

Box 8: Policies, Recommendations, and Guidelines on Digital Skills Development and Internet Adoption

The period from 2020 to 2024 has seen significant efforts by international organizations to develop policies, recommendations, and guidelines aimed at enhancing digital skills and promoting internet adoption. Key players such as the ITU, GSMA, and the European Commission have been at the forefront of these initiatives, focusing on bridging the digital divide and equipping individuals and communities with the necessary digital competencies to thrive in the digital age.

Key Initiatives and Recommendations

ITU Digital Skills Toolkit 2024[105]:

- **Objective**: To provide policymakers and stakeholders with practical guidance on developing national digital skills strategies.
- **Components**: Engaging stakeholders, assessing existing policies, developing strategies for various proficiency levels, and focusing on under-represented groups.
- **Implementation**: The toolkit offers step-by-step guidance and examples from global programs to serve as models for developing and implementing digital skills strategies.

2. **Digital Skills Insights 2021**:
   - **Focus**: Examines the impact of COVID-19 on digital skills development and anticipates future digital skills requirements.
   - **Key Messages**: Emphasizes the need for digital skills as a key enabler for digital transformation and economic resilience. Highlights the importance of adapting digital skills frameworks to local contexts, particularly in developing countries.
3. **Digital Transformation Centres (DTC) Initiative**:
   - **Objective**: To strengthen digital capacities in underserved communities through training in basic and intermediate digital skills.
   - **Impact**: Over 100,000 people trained, with a focus on marginalized groups including women and youth.

GSMA

1. **GSMA Innovation Fund for Mobile Internet Adoption and Digital Inclusion**:
   - **Purpose**: To address key barriers to mobile internet adoption and deliver life-enhancing mobile internet services.
   - **Achievements**: Funded startups and SMEs across Africa and Asia, focusing on closing the mobile internet usage gap and delivering sustainable impact to local communities.
2. **Mobile Internet Skills Training Toolkit (MISTT)**:
   - **Objective**: To teach basic mobile digital skills using a 'train the trainer' approach.
   - **Content**: Includes short lessons in PDF and video format to help users effectively and safely use mobile internet services.

[105] https://academy.itu.int/itu-d/projects-activities/research-publications/digital-skills-toolkit

European Commission

1. **Digital Education Action Plan (2021-2027)**:
    - **Aim**: To ensure universal access to high-quality digital education and training.
    - **Recommendations**: Develop national strategies for digital education, invest in digital infrastructure, and provide targeted training for educators to use digital technologies effectively.
    - **Future Steps**: Launch surveys to gather insights, create guidelines for digital education content, and facilitate the recognition of digital skills certifications.
2. **Council Recommendations on Digital Skills**:
    - **Key Actions**: Boost digital skills at all education levels, from basic to advanced and specialist skills, including AI.
    - **Support for Educators**: Develop guidelines to help teachers and trainers understand and confidently use digital tools.

Areas for Improvement and Suggested Measures

1. **Enhancing Digital Literacy**: Focus on providing comprehensive digital literacy programs, especially in low-income and rural areas, to bridge the digital divide.
2. **Public-Private Partnerships**: Encourage collaborations between governments, private sector, and educational institutions to create sustainable digital skills development programs.
3. **Targeted Initiatives**: Implement targeted initiatives to support under-represented groups, including women, youth, and persons with disabilities.
4. **Regular Updates and Assessments**: Establish mechanisms for regularly updating digital skills strategies and conducting assessments to ensure they meet evolving technological and market needs.

Sources

ITU Digital Skills Toolkit https://academy.itu.int/itu-d/projects-activities/research-publications/digital-skills-toolkit
ITU Digital Skills Insights 2021 https://www.itu.int/en/mediacentre/backgrounders/Pages/skills-development-digital-economy.aspx ; https://academy.itu.int/itu-d/projects-activities/research-publications/digital-skills-insights/digital-skills-insights-2021
GSMA Innovation Fund for Mobile Internet Adoption and Digital Inclusion https://www.gsma.com/solutions-and-impact/connectivity-for-good/mobile-for-development/gsma-innovation-fund-mobile-internet-adoption/
European Education Area ; https://education.ec.europa.eu/news/european-council-adopts-two-recommendations-on-digital-education-and-skills

Objectives and targets for broadband development

In recent years, Montenegro has made significant strides in setting comprehensive objectives and targets to advance broadband infrastructure and broadband demand development. These efforts align with the broader goals of digital transformation and economic growth, aiming to provide universal access to high-speed internet, enhance digital literacy, and foster a competitive digital economy. This section outlines the strategic, operational, and specific targets set forth by Montenegro in its Broadband Plan, detailing the progress made and the ongoing efforts to achieve these ambitious goals. The objectives span infrastructure development, demand stimulation, and the establishment of robust legal, policy, and institutional frameworks. These efforts are supported by key strategic documents such as the Digital Transformation Strategy 2022-

2026, the Strategy for the Development of 5G Mobile Communication Networks 2023-2027, the Government Economic Reform Programme 2024-2026, and others.

Existing objectives and targets for broadband development

The three following tables below show a summary (non-exhaustive) overview of the **current objectives and corresponding targets** for broadband development and the status, where available.

Broadband infrastructure development objectives and targets

Montenegro has set ambitious objectives to expand its broadband infrastructure, focusing on achieving universal high-speed broadband coverage and advancing 5G network deployment. Key achievements include significant progress in 5G rollout, covering 85.37% of the population with a basic 5G signal by the end of 2023. The establishment of a national plan for high-speed broadband is ongoing. These initiatives are detailed in the Digital Transformation Strategy 2022-2026 and the Strategy for the Development of 5G Mobile Communication Networks 2023-2027. Table 6 below sets out current objectives and targets in relation to broadband infrastructure development.

Table 6: Objectives and Targets relating to Broadband Infrastructure Development

Strategic Objectives	**Operational Objectives**	**Targets**	**Achieved**	**Source Document**
Increase coverage of high-speed broadband networks	Develop high-speed broadband networks	86.4% coverage of population with 100 Mbps or more of fixed broadband access by 2026	Ongoing	Digital Transformation Strategy
	Develop high-speed broadband networks	99% coverage of population with 10 Mbps or more of mobile broadband access by 2026	Ongoing	Digital Transformation Strategy
	Establish national plan for high-speed broadband networks	Plan established by 2024	Ongoing	Digital Transformation Strategy, Economic Reform Programme 2024-2026
Develop 5G infrastructure	Accelerate 5G network rollout	85.37% population coverage with basic 5G signal by end of 2023	Ongoing	5G Development Strategy
	Ensure 5G coverage for all urban areas and major roads	Uninterrupted 5G coverage for all urban areas by 2025	Ongoing	5G Development Strategy
	Develop and implement the Strategy for the Development of 5G Mobile Communication Networks	Strategy implemented by first quarter of 2023	Yes	5G Development Strategy

Increase coverage and modernisation of electronic communication infrastructure	Prescribe goals, measures and models for broadband access development	Goals aligned with European Gigabit Society by 2025	Achieved	Digital Transformation Strategy 2022-2026
	Introduce a high level of 5G network coverage and increased use of Internet access	High level of 5G coverage and usage by 2025	Ongoing	Digital Transformation Strategy 2022-2026
	Increase communication link speeds between key state institutions from 1Gbit/s to 10Gbit/s	10Gbit/s links established by 2025	Ongoing	Digital Transformation Strategy 2022-2026
	Establish encrypted communication between key state institutions	Encrypted communication established by 2025	Ongoing	Digital Transformation Strategy 2022-2026

Source: Digital Transformation Strategy, Economic Reform Programme 2024-2026

Broadband demand development objective and targets

Efforts to increase broadband demand in Montenegro are underway. The table below provides an overview of key existing strategic and operational objectives aimed at increasing internet usage, enhancing e-services, and promoting digital literacy within the framework of national digital transformation efforts. It outlines targets for improving citizens' digital skills, increasing broadband penetration in educational and public institutions, and fostering greater engagement with e-government services. The table highlights ongoing initiatives to strengthen digital awareness, boost the ICT sector, and enhance the digital competitiveness of the economy. Progress toward these goals is tracked through specific targets, many of which are scheduled for completion by 2026, as outlined in documents such as the Digital Transformation Strategy.

Table 7: Broadband demand development objective and targets

Strategic Objectives	**Operational Objectives**	**Targets**	**Achieved**	**Source Document**
Increase internet usage among citizens	Improve digital literacy and accessibility	89% of citizens using the Internet by 2026	Achieved	Digital Transformation Strategy
Enhance use of e-services	Improve the quality and quantity of eServices	The Online Services Index (OSI) should achieve a target of 20% by 2026	Ongoing	Digital Transformation Strategy
	Improve the quality and quantity of eServices	50% of unique users who used an ID card for identification / signature when using eServices by 2026	Ongoing	Digital Transformation Strategy
	Improve the quality and quantity of eServices	27,084 users of electronic identification	Ongoing	Digital Transformation Strategy

		and trust services by 2026		
	Increase broadband penetration in educational and public institutions	High-speed broadband in all schools, hospitals, and public institutions by 2025	Ongoing	Digital Transformation Strategy
Encourage digital literacy and skills	Develop and improve digital knowledge and skills of Montenegrin Society	15% of graduates of study programmes in the IT field by 2026	Ongoing	Digital Transformation Strategy
	Develop and improve digital knowledge and skills of Montenegrin Society	600 trained citizens from a vulnerable group of citizens who attended ITU trainings by 2026	Ongoing	Digital Transformation Strategy
Strengthen the information society	Strengthening Digital Awareness of Montenegrin Society and Digital Competitiveness of the ICT Sector	75% of state authorities are actively involved in communication campaign by 2026	Ongoing	Digital Transformation Strategy
	Strengthening Digital Awareness of Montenegrin Society and Digital Competitiveness of the ICT Sector	65% of citizens consider themselves mostly or fully familiar with electronic services by 2026	Ongoing	Digital Transformation Strategy
	Strengthening Digital Awareness of Montenegrin Society and Digital Competitiveness of the ICT Sector	95% of economy consider themselves mostly or fully familiar with electronic services	Ongoing	Digital Transformation Strategy
	Improvement and development of the ICT Sector	1,230 active ICT companies by 2026	Ongoing	Digital Transformation Strategy
	Improvement and development of the ICT Sector	5,500 employees in ICT companies	Ongoing	Digital Transformation Strategy

Source: Digital Transformation Strategy

Broadband legal, policy, and institutional objectives and targets

Significant progress has been made in strengthening the capabilities of regulatory bodies and relevant ministries, with the Directorate for Broadband Internet Access established in 2023. The country is also focused on promoting investment and competition in the broadband sector, with measures in place to encourage private sector participation and public-private partnerships. The implementation of the Digital Transformation Strategy and the Cyber Security Strategy is ongoing, with a focus on creating a robust cybersecurity framework and enhancing the interoperability of public services. The Strategy for the Development of 5G Mobile Communication Networks 2023-2027 emphasizes removing barriers to 5G deployment, increasing academic-industrial projects, and educating the public on 5G safety.

Table 8: Broadband legal, policy, and institutional objectives and targets

Strategic Objectives	**Operational Objectives**	**Targets**	**Achieved**	**Source Document**

Improve regulatory framework for broadband development	Establish clear and supportive legal and regulatory environment	New Law on Electronic Communications adopted by end of 2023	Achieved	Digital Transformation Strategy
Support digital transformation	Implement digital government initiatives	Digital Transformation Strategy fully implemented by 2026	Ongoing	Digital Transformation Strategy
Improve cybersecurity infrastructure	Establish a robust cybersecurity framework	Cyber Security Strategy implemented by 2026	Ongoing	Cyber Security Strategy
Remove barriers to 5G network deployment	Simplify legal and administrative procedures for EC infrastructure	10% reduction in deployment time for 5G equipment within a year	Ongoing	Strategy for 5G Mobile Communication Networks 2023-2027
	Remove harmful interference from the 700 MHz band	Harmful interference removed by 2025	Ongoing	Strategy for 5G Mobile Communication Networks 2023-2027
Encourage 5G network development	Increase academic-industrial projects based on 5G networks	30% increase in projects compared to previous year	Ongoing	Strategy for 5G Mobile Communication Networks 2023-2027
Inform and educate public about 5G	Conduct national level educational campaigns on 5G safety and impacts, including NGOs and academia (final year students)	Increased public awareness on 5G safety by 2025	Ongoing	Strategy for 5G Mobile Communication Networks 2023-2027

Source: 5G Strategy, Digital Transformation Strategy, Cyber Security Strategy

EU Objectives and Targets

As Montenegro advances its EU accession talks, aligning with the European Commission's broadband and connectivity objectives becomes increasingly important. The EU's connectivity and broadband targets are crucial for Montenegro as they support the nation's digital transformation, economic growth, and integration into the European digital single market. Achieving these targets will ensure Montenegro remains competitive and fully benefits from the digital economy. Montenegro's commitment to these goals is reflected in its strategic plans and international agreements aimed at enhancing digital infrastructure and connectivity across the country.[106] Table 9 below sets out the EU connectivity and broadband objectives and targets.

[106] See: https://neighbourhood-enlargement.ec.europa.eu/enlargement-policy/montenegro_en and https://www.aa.com.tr/en/europe/montenegros-eu-accession-talks-at-advanced-stage-says-bloc-commissioner/3149357 and https://www.eesc.europa.eu/en/news-media/press-releases/eu-montenegro-joint-consultative-committee-montenegro-advancing-eu-accession-path

Table 9: Overview of key EU connectivity and broadband objectives and targets

Objective	Target Year	Details
Gigabit connectivity for all socio-economic drivers	2025	All schools, transport hubs, and main public service providers to have access to at least 1 Gbps connectivity.
Uninterrupted 5G coverage	2025	5G wireless broadband coverage for all urban areas and major transport paths.
High-speed internet for European households	2025	All European households to have access to at least 100 Mbps download speeds.
Gigabit network coverage for all households	2030	All European households covered by a Gigabit network.
5G coverage for all populated areas	2030	5G coverage extended to all populated areas.

Source: author, based on information from https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en ;

Montenegro has committed to several international agreements to align with EU broadband and connectivity goals. These agreements underscore Montenegro's dedication to improving broadband connectivity and integrating with the broader European digital infrastructure.

- **Memorandum of Understanding on the 5G Digital Transformation Plan for the Western Balkans**: Aims to facilitate the rollout of 5G networks in the region.
- **Roadmap for Reducing the Price of Roaming Services between the EU and the Western Balkans**: Seeks to reduce roaming charges and enhance regional connectivity.
- **Regional Roaming Agreement**: Supports the development of a common regional digital market.

Box 9 provides a brief description of the European Commission's main connectivity and broadband measures and initiatives.

Box 9: EU connectivity and broadband measures and initiatives

1. **Gigabit Infrastructure Act**[107]:
   - Aims to accelerate the deployment of Gigabit networks by simplifying administrative procedures and reducing costs associated with infrastructure deployment.
2. **Digital Decade Targets 2030**[108]:
   - Envisions a comprehensive digital transformation with a focus on connectivity, digital skills, digital public services, and the digitalization of businesses.
   - Includes specific targets such as Gigabit network coverage for all households and 5G coverage for all populated areas by 2030.
3. **5G Action Plan**[109]:
   - Focuses on the timely rollout of 5G networks across the EU.
   - Encourages member states to facilitate the deployment of 5G infrastructure and remove regulatory barriers.

[107] https://digital-strategy.ec.europa.eu/en/policies/gigabit-infrastructure-act
[108] https://digital-strategy.ec.europa.eu/en/policies/connectivity
[109] https://digital-strategy.ec.europa.eu/en/policies/5g-digital-decade

4. **WiFi4EU Initiative**[110]:
    - Provides funding for the installation of free Wi-Fi hotspots in public spaces across Europe.
    - Aims to promote digital inclusion and improve internet access in underserved areas.
5. **White Paper: How to Master Europe's Digital Infrastructure Needs**[111]:
    - Emphasizes the need for massive investments in digital infrastructure to meet future demands.
    - Calls for the creation of a European Investment Fund for digital infrastructure.
    - Highlights the importance of fostering public-private partnerships and leveraging private sector investments.
    - Recommends developing a regulatory framework that supports innovative digital solutions and infrastructure sharing.
6. **Roaming Policy**[112]:
    - The EU has abolished roaming charges for travelers within the EU, allowing citizens to use their mobile phones across member states without additional fees.
    - The Regional Roaming Agreement extends similar benefits to the Western Balkans, reducing the cost of using mobile phones while traveling within the region.
    - The EU's roaming policy aims to create a seamless digital single market, enhancing connectivity and mobility for all citizens.

National vision and objectives for broadband development 2025-2029

Montenegro has set ambitious goals to expand and modernize its broadband infrastructure, recognizing the importance of digital connectivity for socio-economic development. Based on the analysis and information presented in this document and the challenges and issues identified and considering the aspirations to align with the European Union's strategies for creating a gigabit society, this section presents the vision, strategic objectives, specific objectives, and targets for broadband development, including a proposed timeline.

Vision

The national vision is as follows:

"The upgrade to and development of reliable and secure high-speed and very high-speed broadband infrastructure across Montenegro to build the fundament for a gigabit society."

Strategic Objectives

For the realization of this vision, the following strategic objectives of broadband development are defined:

[110] https://digital-strategy.ec.europa.eu/en/activities/wifi4eu-citizens
[111] https://ec.europa.eu/info/law/better-regulation/have-your-say/initiatives/14168-White-Paper-How-to-master-Europes-digital-infrastructure-needs?_en
[112] https://digital-strategy.ec.europa.eu/en/policies/roaming

- **Strategic Objective 1:** Sustainable development of broadband infrastructure.
- **Strategic Objective 2:** Reducing the digital divide and providing broadband services to all regions.
- **Strategic Objective 3:** Increasing awareness and education on broadband network technologies and stimulating demand for Digital Economy Development and a Gigabit Society.

Specific Objectives and Targets

Table 10 presents the specific national objectives for broadband infrastructure and demand development. With these objectives, Montenegro aims to achieve comprehensive broadband coverage across households, businesses, and public institutions by 2029.[113] The objectives focus on increasing high-speed internet access throughout Montenegro, while ensuring that rural and remote areas also benefit from significant improvements in connectivity. The targets include:

- Expanding high-speed broadband access to 100% of urban households by 2029.
- Ensuring at least 90% broadband coverage in rural and remote areas by 2027.
- Achieving 95% coverage of very high-speed broadband (above 100 Mbps) in public institutions and businesses by 2029.
- Promoting digital literacy and broadband technology awareness among citizens to foster a digitally inclusive society.

Montenegro's commitment to these objectives reflects its dedication to fostering a digitally empowered society, driving economic growth, and enhancing the quality of life for its citizens through advanced digital infrastructure.

Table 10 sets out the specific targets that underpin the specific objectives for broadband development.

Table 10:Specific Objectives and targets for Broadband Development in Montenegro

Specific Objective	**Target Completion Date**	**Specific Target**
Broadband coverage of 100% of households, businesses, and public institutions	2029	- 70% high-speed access (1 Gbps) in urban areas like Podgorica and Budva
		- 100% access at 100 Mbps in all other areas
***Households in rural and remote areas** connected with broadband access (100 Mbps)*	2027	- 90% coverage

[113] It should be noted that the main advantage of coverage indicators based on households or population is that they are more relevant when addressing digital divide issues, since it is the population who ultimately may not be able to access broadband services. See also: https://www.oecd-ilibrary.org/indicators-of-broadband-coverage_5kml8rfg777l.pdf

***Schools** connected with high-speed broadband (1 Gbps)*	2026	- 100% of schools
***Universities** connected with high-speed broadband (1 Gbps)*	2025	- 100% of universities
***Health centers and hospitals** connected with high-speed broadband (1 Gbps)*	2026	- 100% of health centers and hospitals
***Major cities and transport corridors covered with 5G** connectivity*	2027	- Cover all major cities and strategic locations
Free WiFi in public spaces	2028	- 80% of major public spaces
***Internet connectivity for vulnerable populations** (women, elderly, youth, disabled)*	2029	- Women: 90%
		- Elderly: 85%
		- Youth: 95%
		- Persons with disabilities: 80%
Public sector digitalization	2027	- Digitize 100% of key public services and ensure high-speed internet access at all public service points
Support for SMEs	2026	- 95% of businesses with broadband speeds of at least 500 Mbps
Smart cities initiatives	2027	- Implement smart city projects in at least 5 major urban areas
Cybersecurity	2026	- Establish a national cybersecurity framework
Cloud computing and data centers	2027	- Establish at least two national data centers[114]
International connectivity	2028	- Enhance connectivity by establishing a submarine cable landing station[115]
Research and innovation	2029	- Support the establishment of three innovation hubs focused on broadband technologies[116]

Source: author

[114] As of 2024, Montenegro has two data centers currently in operation. These are located in Podgorica and Bijelo Polje. See: https://www.datacentermap.com/montenegro/ and https://www.savills.com/research_articles/255800/306984-0

[115] Montenegro currently does not have a submarine cable landing station. Building a landing station will play a crucial role in connecting Montenegro to the global internet infrastructure, facilitating high-speed data transmission and international communication. See: https://www.submarinecablemap.com/

[116] https://www.itu.int/hub/2020/07/how-montenegro-is-boosting-digital-innovation/

Measures to meet broadband development objectives

To achieve the objectives and targets, Montenegro must put in place enabling conditions and implement several supporting measures. These measures are crucial for creating an enabling environment that fosters the expansion and enhancement of broadband infrastructure, in line with stakeholder priorities.

Table 11: Overview of conditions and supporting measures by broadband target

1. Broadband Coverage of 100% of Households, Businesses, and Public Institutions
Target: By the end of 2029
• **Gigabit access (1 Gbps): 70% in urban areas like Podgorica and Budva**
• **Very high capacity network (VHCN) access at 100 Mbps: 100% in all other areas**
Supporting Measures:
• Investment in fiber-optic infrastructure and public-private partnerships
• **Infrastructure Sharing:** Promote the shared use of existing infrastructure to reduce deployment costs and time. • Review regulatory framework to support infrastructure sharing and reduce deployment costs
• **Public-Private Partnerships (PPPs):** Foster collaborations between government and private entities to invest in underserved areas (leverage outputs from the Feasibility Study on NGA roll-out in un-and underserved areas).
• **Streamline Permits:** Simplify administrative procedures for obtaining construction permits to speed up infrastructure deployment.
• **Geoportal and Registries:** Operate the Geoportal of spatial data infrastructure and the Central Registry of Construction and Utility Lines Cadastre to facilitate planning and deployment.
2. Households in Rural and Remote Areas covered with Very high capacity network (VHCN) Access (100 Mbps)
Target: 90% by the end of 2027
Supporting Measures:
• **Subsidies and Grants:** Create and implement public funding mechanisms and e.g. voucher schemes to reduce the cost of broadband services in rural areas. • **Leverage outputs from the Feasibility Study** on NGA roll-out in un-and underserved areas.
• **Technology-Specific Approaches:** Utilize technologies such as fiber-to-the-home (FTTH) and fixed wireless access (FWA) to reach remote locations.
• **Investment Incentives:** Provide incentives for operators to extend their networks into less profitable rural areas.
3. Schools Connected with Gigabit Network (1 Gbps) access
Target: 100% by the end of 2026
Supporting Measures:

• **Educational Programs:** Develop digital literacy programs for teachers and students to maximize the use of high-speed internet.
• **E-Government Services:** Implement e-government services to support educational infrastructure and digital tools in schools.
4. Universities Connected with Gigabit Network (1 Gbps) access
Target: 100% by the end of 2025
Supporting Measures:
• **Research and Development (R&D):** Encourage academic-industrial projects to leverage high-speed connectivity for research purposes.
• **Infrastructure Funding:** Allocate specific funds for upgrading university IT infrastructure to 1 Gbps connectivity.
5. Health Centers and Hospitals Connected with Gigabit Network (1 Gbps) access
Target: 100% by the end of 2026
Supporting Measures:
• **Telemedicine Initiatives:** Promote telemedicine and digital health services to leverage the high-speed internet in healthcare facilities.
• **Public Health Campaigns:** Educate health professionals on the benefits and usage of digital tools and high-speed connectivity.
6. 5G Connectivity in Major Cities and Transport Corridors
Target: By the end of 2027, cover all major cities, transport corridors and strategic locations
Supporting Measures:
• Strengthen **institutional capacities** to facilitate accelerated deployment of 5G infrastructure. • **The implementation of the Law on non-ionizing radiation protection** and the Law on Environmental Impact Assessments at municipalities must be streamlined and enhanced, especially for new base stations.
7. Free WiFi in Public Spaces
Target: 80% of major public spaces by the end of 2028
Supporting Measures:
• **Municipal Projects:** Encourage municipalities to deploy free WiFi in parks, libraries, and squares.
• **Public Awareness Campaigns:** Promote the availability and benefits of free public WiFi to increase usage.
8. Internet Connectivity for Vulnerable Populations
Target: By the end of 2029
• **Women: 90%**
• **Elderly: 85%**
• **Youth: 95%**
• **Persons with Disabilities: 80%**
Supporting Measures:

• **Inclusive Policies:** Develop policies that specifically address the needs of these groups for internet access, including subsidized terminal equipment to address e.g. affordability.
• **Digital Skills Training:** Provide targeted digital literacy and skills training for women, the elderly, youth, and persons with disabilities.

Additional Measures to support broadband development

Legal and Regulatory Framework
• **Alignment with EU GIA by 2026**.
Investment Environment
• Alignment with EU GIA -
• **Market Analysis:** Conduct regular market analysis to identify gaps and opportunities in broadband deployment.
• **Public Funding:** Establish public funding mechanisms to support broadband projects, particularly in underserved areas, including active and passive infrastructure mapping.
Institutional Support
• **Strengthening Regulatory Bodies:** Enhance the capabilities of the Directorate for Broadband Internet Access and other relevant bodies.
• **Inter-Agency Coordination:** Improve coordination between different governmental and local entities involved in broadband development.

In the following the proposed activities are presented by identified issue, detailing the responsible stakeholder and timeframe.

Addressing administrative and legal barriers to infrastructure development

Proposed activities:

- Introduce “dig once” policy
- Streamline permits by simplifying and harmonizing administrative procedures for obtaining construction permits to speed up infrastructure deployment
- Explore the possibility of centralizing administrative procedures for obtaining construction permits; for example: create and introduce a one-stop-shop portal for construction permits applications, including adequate and harmonized approval procedures and strict deadlines
- Consider introducing exemptions for different types of infrastructure projects, also in the context of small-cell deployments
- To speed up roll-out of 5G infrastructure, the implementation of the Law on Non-Ionizing Radiation Protection and Law on Environmental Impact Assessment must be enhanced.
- Utilizing technologies such as fiber-to-the-home (FTTH) and fixed wireless access (FWA) to reach remote locations

- PPPs - Fostering collaborations between government and private entities to invest in underserved areas.
- Promote and encourage the transition from IPv4-IPv6 and leverage existing work in relation to the IPv6 lab[117]
- Improve the coordination between the Ministry of Spatial Planning, Urbanism and State Property, municipalities, operators, EKIP and other regulatory bodies such as the EPA

Responsibility:
- Ministry of Finance
- MER
- Ministry of Spatial Planning, Urbanism and State Property
- Local municipalities
- EPA
- EKIP
- Network operators

Timing: 2025-2026

Promote the shared use of existing infrastructure

Proposed Activities:
- Address any regulatory barrier to infrastructure sharing
- Implement existing laws, regulations and recommendations on infrastructure sharing (e.g. obligation on electricity companies to provide access to all infrastructure)
- Address access to buildings and address the construction of fibre obtic and very high-capacity networks within buildings
- Ensure an up-to-date inventory of passive and alternative infrastructure owned by electricity companies and relevant public buildings
- Make operational and maintain the Geoportal of spatial data infrastructure and the Central Registry of Construction and Utility Lines Cadastre to facilitate planning and deployment

Responsibility:
- EKIP
- Ministry of Spatial Planning, Urbanism and State Property
- Local municipalities
- Utility companies
- Network operators

Timing: 2025-2027

[117] https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Pages/Activities/2021/IPv6.aspx , https://www.itu.int/hub/2021/07/montenegro-embraces-ipv6-updating-protocols-to-meet-new-web-demand/

Free WiFi in Public Spaces

Proposed Activities:

- Assess available locations, including public and private infrastructure for free WiFi spots
- Promoting the availability and benefits of free public WiFi to increase usage
- Municipal Projects: Encouraging municipalities to deploy free WiFi in parks, libraries, and squares.

Responsibility:

- Operators
- Local municipalities

Timing: 2028

Increase demand for high-speed broadband

Proposed Activities:

- Educational Programs:
  - Basic skills - Providing targeted digital literacy and skills training for individuals who lack digital skills.
  - Developing digital literacy programs for teachers and students to maximize the use of high-speed internet. Responsible: Ministry of Education.
- E-Government Services: Implementing e-government services to support educational infrastructure and digital tools in schools. Responsible: Ministry of Public Administration.
- Research and Development (R&D): Encouraging academic-industrial projects to leverage high-speed connectivity for research purposes. Responsible: Ministry of Science and Technology, Universities.
- Telemedicine Initiatives: Promoting telemedicine and digital health services to leverage high-speed internet in healthcare facilities. Responsible: Ministry of Health.
- Public Health Campaigns: Educating health professionals on the benefits and usage of digital tools and high-speed connectivity. Responsible: Ministry of Health.
- Public Awareness Campaigns: Promoting the availability and benefits of free public WiFi to increase usage. Responsible: Ministry of Economic Development (MoED).

Responsibility:

- Ministry for Economic Development
- Ministry of Public Administration
- Ministry of Education
- Academia

Timing: 2027

Internet Connectivity for Vulnerable Populations

Proposed Activities:

- **Inclusive Policies**: Developing policies that specifically address the needs of vulnerable populations for internet access. Responsible: Ministry of Labour and Social Welfare, Ministry of Economic Development (MoED).
- **Digital Skills Training**: Providing targeted digital literacy and skills training for women, the elderly, youth, and persons with disabilities. Responsible: Ministry of Education, Ministry of Labour and Social Welfare.

Responsibility:

- Ministry of Labour and social welfare
- Ministry for Economic Development
- Ministry of Public Administration
- Ministry of Education
- Academia

Timing: 2029

Strengthening the institutional, policy and legal framework for broadband

Proposed Activities:

- Alignment with EU GIA by 2026
- Strengthening Regulatory Bodies: Enhancing the capabilities of the Directorate for Broadband Internet Access and other relevant bodies. Responsible: Directorate for Broadband Internet Access / Ministry for Economic Development
- Inter-Agency Coordination: Improving coordination between different governmental and local entities involved in broadband development. Responsible: Directorate for Broadband Internet Access (MER), Ministry of Economic Development (MoED), Local Governments.
  Regulatory Support: Simplifying legal and administrative procedures and enhancing implementation of existing legislation and processes to facilitate the rapid deployment of 5G infrastructure.

Responsibility:

- Directorate for Broadband Internet Access / Ministry for Economic Development
- Parliament
- MERS,
- Ministry for Spatial Planning, Urbanism and State Property

- EPA
- Local governments / municipalities,
- EKIP

Timing: 2025-2026

Broadening the financing and funding base of broadband development

Proposed Activities:

- Universal Service Obligation (USO) review / consideration of establishing a Universal Service Fund (USF)
- Use of State Aid
- Use of international / regional development funds
- Public Funding: Establishing public funding mechanisms to support broadband projects, particularly in underserved areas. Responsible: Ministry of Finance, International Financial Institutions.
- Subsidies and Grants: Implementing public funding mechanisms and voucher schemes to reduce the cost of broadband services in rural areas.
- Providing incentives for operators to extend their networks into less profitable rural areas.
- Allocating specific funds for upgrading university IT infrastructure to 1 Gbps connectivity.

Responsibility:

- EKIP (supportive capacity in relation to USF)
- Operators
- Ministry of Finance
- Ministry of Economic Development (MoED) / Directorate for Broadband Internet Access.

Timing: 2025-2027

Addressing Security of Broadband Networks

Proposed Activities:

- Identify legal and regulatory requirements for broadband network security
- Establish a national cybersecurity framework
- Explore the option of regulatory obligations on infrastructure providers to implement and maintain comprehensive cybersecurity policies (e.g. periodic vulnerability assessments, secure configuration of network equipment)
- Update and strengthen the obligation of incident management and reporting
- Align with EU Network and Information Security Directive (NIS2), the EU Toolbox on 5G cybersecurity and the Cybersecurity Assurance Practices

- Explore adopting **ITU Cybersecurity Assurance Practices**[118]
- **Intensify collaboration** and leverage work undertaken by **Montenegro National CIRT**[119]

Responsibility:
- EKIP
- Operators
- Cyber Security Agency

Timing: 2025-2026

By implementing these supporting measures and activities, Montenegro can effectively achieve its national broadband objectives and targets. These efforts will help bridge the digital divide, enhance digital literacy, and promote economic growth through improved broadband infrastructure.

Financing and Funding Models

The development of broadband infrastructure in Montenegro is pivotal for ensuring nationwide digital connectivity and economic growth. To achieve this, it is essential to establish robust financing and funding models that can support extensive broadband deployment, particularly in underserved and rural areas. This section provides an overview of financing and funding mechanisms, incorporating recent strategies and reports from Montenegro, insights from international best practices, and recommendations from global entities such as the UN Broadband Commission and ITU GSR Best Practice Guidelines.

Current Investment Environment

Broadband infrastructure development in Montenegro has primarily been driven by private sector investments. However, to address the digital divide and extend high-speed connectivity to rural and underserved areas, public sector involvement and innovative funding mechanisms are essential. The investment environment faces challenges such as the sole reliance on private sector investments.

Public-Private Partnerships (PPPs)

Public-Private Partnerships (PPPs) are a collaborative arrangement between government entities and private sector companies to finance and deploy broadband infrastructure. This model leverages private sector efficiency and public sector support, offering a viable solution for extensive broadband deployment. In Montenegro, PPPs can be fostered by offering incentives such as tax breaks or subsidies to encourage private investment in underserved areas. Clear regulatory frameworks and risk-sharing mechanisms are critical for successful PPPs.

[118] https://www.itu.int/hub/publication/d-stg-sg02-03-2-2023/
[119] https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2016/Cybersecurity%20Forum%20Bulgaria/Viktor%20Berishaj.pdf

For example, **Scenario 2** (see below) of the broadband expansion plan proposed involving PPPs to deploy fiber optic and 5G networks in rural areas. However, due to the lack of interest from operators in partnering with the government, there is a need to reassess the incentives and regulatory frameworks to make PPPs and the proposed Scenario 2 project more attractive.

Government Grants and Subsidies

Direct financial support from the government in the form of grants or subsidies can significantly boost broadband infrastructure projects. These funds can be targeted towards high-cost areas where private investment alone is insufficient. Government grants can also support the deployment of high-speed networks in essential public institutions such as schools and hospitals. In Montenegro, the Western Balkans Investment Framework (WBIF) provides grants that complement loans from the European Bank for Reconstruction and Development (EBRD), helping to bridge the financing gap for broadband projects.

Voucher Schemes

Voucher schemes are an innovative funding mechanism where vouchers are provided to consumers or businesses to subsidize the cost of broadband services. This approach makes high-speed internet more affordable, driving demand and encouraging network expansion. In Montenegro, a proposed monthly grant aims to reduce the retail prices of superfast and ultrafast internet services for citizens and SMEs, thus fostering broader broadband adoption.

Universal Service Funds (USFs)

Universal Service Funds (USFs) traditionally collect contributions from telecom operators to fund broadband projects in underserved areas. These funds ensure that universal service obligations are met, providing financial support for infrastructure deployment in rural and remote regions. In this regard, the establishment of a USF can be explored coupled with options for broadening the base of contributors and contributions to include a broader base of stakeholders that benefit from the investment. As Montenegro aligns its legislation with the EU Electronic Communications Code, leveraging USFs and State Aid can support broadband expansion, ensuring that all areas, regardless of their economic viability, have access to high-speed internet.

Currently, there is no Universal Service Fund in Montenegro. The obligation to finance the construction of Universal Service base stations falls on all operators with a market share exceeding 2%. At present, there are approximately 10 Universal Service base stations, each serving fewer than 15 users. The appointment of a Universal Service Operator is determined every five years through a public tender process. If no operators apply, MNE Telekom, as the major player in fixed services, is automatically appointed as the Universal Service Operator, with no option to refuse. The process for building a base station under the Universal Service Obligation can be triggered by just one reasonable request from a potential customer.

International Financial Institutions and Donor Agencies

Funding from International Financial Institutions such as the World Bank and regional development banks such as EBRD and EIB and donor agencies is crucial for large-scale infrastructure projects. These institutions provide loans, grants, and technical assistance, facilitating comprehensive broadband development. Coordination with national strategies and leveraging co-financing opportunities are essential for maximizing the impact of these funds. For instance, the World Bank's Balkans Digital Highway initiative aims to improve regional interconnectivity, including in Montenegro, by exploring infrastructure sharing and operationalizing shared utility networks.

Recent and Proposed Strategies

Scenario 2 from WB27-MNE-DII-01 Project Initiation Report Scenario 2 focuses on expanding broadband infrastructure to rural and underserved areas using fiber optics and 5G technologies. This scenario targets specific municipalities and settlements with low or no broadband coverage. The deployment involves a phased approach over several years, aligned with national broadband targets. Funding for this scenario combines public funding, PPPs, and international grants/loans, with an estimated budget that includes both capital expenditure (CAPEX) and operational expenditure (OPEX).

Box 10: Proposed Scenario 2 for Expanding Broadband Infrastructure in Montenegro
(WB27-MNE-DII-01_MONT_01_Project)

Brief Description of Scenario 2
Scenario 2 focuses on deploying a GPON (Gigabit Passive Optical Network) with a combination of underground and aerial FTTH (Fiber to the Home) networks. This scenario targets the expansion of broadband services in both selected white and grey areas, prioritizing main socioeconomic drivers.

Targeted Areas

- **Geographical Focus:** Scenario 2 targets specific white and grey areas, which are regions identified as having no or inadequate broadband infrastructure.
- **Municipalities and Settlements:** This scenario covers 293 settlements, accounting for 66.59% of the identified white and grey areas, aiming to serve 22,746 households and businesses, which represents 92.8% of the target population in these areas.

Technologies Deployed

- **GPON with Mixed FTTH Network:** Utilizing a combination of underground and aerial FTTH networks to ensure comprehensive coverage and efficient deployment.
- **Infrastructure Components:** The network will include core, access, feeder, distribution, and drop segments to connect individual homes and businesses.

Proposed Timeframe
The project is designed to be implemented in phases over several years, with initial deployment focusing on the most underserved areas and progressively expanding to cover additional regions.

Funding Mechanism

- **Public-Private Partnership (PPP):** Initially, the project envisioned significant involvement from private operators in a PPP model. However, due to the lack of interest from operators, alternative funding mechanisms are being considered.
- **Public Sector Financing:** The project will be primarily funded through a combination of public investments supported by grants from the Western Balkans Investment Framework (WBIF) and loans from the European Bank for Reconstruction and Development (EBRD). The state will take a leading role in financing to ensure the project's feasibility and attractiveness to private investors.

Key Costing Aspects

- **Capital Expenditure (CAPEX):** Estimated at €43.76 million, covering the costs of network deployment, including trenching, civil infrastructure, and IP/active equipment in 5 years.
- **Operational Expenditure (OPEX):** Estimated at €45.79 million, encompassing the ongoing costs of network maintenance and operation in 15-20 years.
- **Total Cost:** The combined CAPEX and OPEX bring the total project cost to approximately €89.55 million.

Strategy for the Development of 5G Mobile Communication Networks in Montenegro (2023-2027) This strategy aims to facilitate the deployment of 5G networks through regulatory reforms, infrastructure sharing, and public awareness campaigns. Key actions include removing barriers to 5G deployment, ensuring legal and administrative simplification, and promoting 5G adoption across various sectors. The funding mechanism emphasizes coordinated efforts between the government, private sector, and international bodies.

Box 11: Key components of the 5G Strategy of Montenegro

The Strategy for the Development of 5G Mobile Communication Networks in Montenegro (2023-2027) outlines the country's comprehensive plan to enhance digital connectivity through the deployment of 5G technology. This strategy aims to drive economic growth, improve public services, and position Montenegro as a leader in digital transformation within the region. The strategy highlights the transformative potential of 5G technology, which is expected to significantly impact various sectors such as industrial production, energy, agriculture, trade, financial services, healthcare, education, public safety, tourism, and media. By enabling ultra-reliable low-latency communication and massive Internet of Things (IoT) applications, 5G is set to redefine economic competitiveness and innovation.

Strategic and Operational Goals

The strategy sets forth three main strategic goals, each supported by operational objectives and specific activities:

1. **Enhance Infrastructure and Spectrum Management**:
    - **Eliminate Interference in the 700 MHz Band**: Addressing harmful interference from digital terrestrial television (DTV) systems in neighboring countries to fully utilize the 700 MHz band for 5G.
    - **Simplify Legal and Administrative Procedures**: Streamlining the process for approving the construction of electronic communications (EC) infrastructure and the installation of equipment to ensure uniform application across municipalities.
    - **Introduce IPv6 Protocol**: Implementing IPv6 to support the growing number of connected devices.
2. **Promote Efficient Development and Use of 5G Networks**:
    - **Coordination and Monitoring**: Establishing mechanisms for effective coordination and monitoring of 5G network development.
    - **Quality Personnel**: Ensuring the availability of skilled personnel for the deployment and maintenance of 5G networks.
    - **Encourage Innovation**: Promoting the use of innovative concepts and applications by state institutions and local governments.
3. **Increase Public Awareness and Safety**:
    - **Educational Campaigns**: Conducting national campaigns to inform the public about electromagnetic radiation (EMR) and cybersecurity related to 5G.
    - **Transparency in EMR Measurement**: Increasing the public availability of EMR measurement results to address safety concerns.

Key Challenges and Barriers

The strategy identifies several challenges and barriers to the effective deployment of 5G networks:

- **Regulatory and Administrative Barriers**: Inconsistent application of regulations across municipalities and complex procedures for securing land use and construction permits.
- **Infrastructure Development**: The need for extensive new infrastructure, including high-density small cells, to achieve the required capacity and coverage.
- **Environmental and Health Concerns**: Public mistrust regarding the safety of EMR from 5G base stations and the potential cybersecurity threats posed by the technology.

Action Plan (2023-2024)
The action plan details specific activities, performance indicators, and estimated costs associated with achieving the strategy's goals. It includes timelines for eliminating spectrum interference, simplifying legal procedures, and launching public awareness campaigns.

Areas to be Addressed and Suggested Measures

1. **Streamline Permitting Processes**:
    - Implement centralized and simplified permitting procedures managed by a single agency.
    - Set fixed time frames for the approval of infrastructure applications.
2. **Ensure Uniform Regulatory Application**:
    - Standardize the application of regulations across municipalities to prevent delays and inconsistencies.
3. **Modernize Infrastructure**:
    - Invest in upgrading existing infrastructure to support 5G deployment and facilitate easier sharing.
4. **Promote Public-Private Partnerships**:
    - Encourage collaboration between government entities and private sector organizations to share the costs and benefits of infrastructure projects.
5. **Enhance Public Awareness and Trust**:
    - Conduct comprehensive educational campaigns about the benefits and safety of 5G technology.
    - Increase transparency in the reporting of EMR measurements.

Box 12: WB27-MNE-DII-01_MONT_01_Project Initiation Report Including the Cost and CBA update

In the context of the "WB27-MNE-DII-01_MONT_01_Project Initiation Report Including the Cost and CBA update," the terms "black areas," "grey areas," and "white areas" are used to describe different levels of broadband infrastructure presence and competition within the settlements. Here's what each term means:

1. **Black Areas**:
    - These are areas where there is at least one network providing 100+ Mbps broadband services, and another competing network that is either already providing or planning to provide similar services. Essentially, these areas have a high level of infrastructure competition, with multiple operators present.

2. **Grey Areas**:
    - Grey areas are those where only one network operator is present, providing broadband services of 100+ Mbps. There is no significant competition as no other network offers or plans to offer similar services in these areas.

3. **White Areas**:
    - White areas are regions without any network capable of providing 100+ Mbps broadband services. These areas lack the necessary infrastructure and are considered underserved or unserved regarding high-speed broadband connectivity.

The classification of these areas is critical for planning and implementing broadband infrastructure development projects, as it helps identify where investment is most needed to improve broadband access and stimulate competition. This classification is detailed in various parts of the report, particularly where it discusses the current situation of broadband services and the plans for infrastructure development.

References

Benton Institute for Broadband & Society. (2020). *Analysis of the FCC's Third Report and Order and Declaratory Ruling on Pole Attachments and Wireless Infrastructure Deployment*. Available at: Benton Institute.

Crnogorski Telekom. (2024). *International Capacity Report*. Available at: EKIP Annual Report 2023.

Datacenter Map. (2024). *Montenegro Data Centers*. Available at: Datacenter Map.

Digital Strategy for Europe. (2022). *Digital Public Administration Factsheets - Montenegro*. Available at: Digital Strategy for Europe.

Digital Strategy for Europe. (2022). *Recommendation on Regulatory Promotion of Gigabit Connectivity*. Available at: Digital Strategy for Europe.

Digital Strategy for Europe. (2023). *Connectivity Toolbox*. Available at: Digital Strategy for Europe.

Digital Strategy for Europe. *5G for Europe's Digital Decade*. Available at: Digital Strategy for Europe.

Digital Strategy for Europe. *Gigabit Infrastructure Act*. Available at: Digital Strategy for Europe.

Digital Strategy for Europe. *How to Master Europe's Digital Infrastructure Needs*. Available at: Digital Strategy for Europe.

Digital Strategy for Europe. *Roaming*. Available at: Digital Strategy for Europe.

Digital Strategy for Europe. *WiFi4EU for Citizens*. Available at: Digital Strategy for Europe.

EBRD. (2020). *Digital Public Administration Factsheets 2022*.

EBRD. (2020). *Feasibility Study and Cost-Benefit Analysis for Regional Broadband Infrastructure Development in Montenegro*.

EBRD. (2020). *Initiation Report and Inception Report for the Development of Infrastructure for Broadband Internet Access in Montenegro*.

European Commission. (2020). *Economic and Infrastructure Development Plan for Western Balkans*.

European Commission. (2023). *Commission Announces Next Steps on Cybersecurity of 5G Networks*. Available at: European Commission.

European Commission. *Connectivity Toolbox*. Available at: European Commission Report.

European Commission. *EU Connectivity and Broadband Objectives*. Available at: European Digital Decade.

European Commission. *European Gigabit Society 2025*. Available at: European Gigabit Society.

European Council. *Digital Education and Skills*. Available at: European Education Area.

European Investment Bank (EIB). Available at: EIB.

European Union Agency for Cybersecurity (ENISA). Available at: European Union Agency for Cybersecurity.

Federal Communications Commission (FCC). (2020). *Pole Attachments and Wireless Infrastructure Deployment*. Available at: FCC.

Government of Montenegro. (2022). *Digital Transformation Strategy 2022-2026*.

Government of Montenegro. (2023). *Strategy for the Development of 5G Mobile Communication Networks 2023-2027*.

Government of Montenegro. (2024). *Medium-term Work Program of the Government of Montenegro 2024-2027*.
Government of Montenegro. (2024). *Program of Economic Reforms 2024-2026*.
GSMA. *Innovation Fund for Mobile Internet Adoption and Digital Inclusion*. Available at: GSMA Innovation Fund.
International Telecommunication Union (ITU). *Global Symposium for Regulators (GSR) Best Practice Guidelines*. Available at: ITU GSR.
International Telecommunication Union (ITU). (2023). *Cybersecurity Assurance Practices*. Available at: ITU Report.
International Telecommunication Union (ITU). *Digital Skills Insights 2021*. Available at: ITU Digital Skills Insights.
International Telecommunication Union (ITU). *Digital Skills Toolkit*. Available at: ITU Digital Skills Toolkit.
Ministry of Public Administration, Digital Society and Media. (2023). *E-Government Portal Statistics*.
Montenegrin Electrical Distribution System (CEDIS). (2023). *Stakeholder Questionnaire Response*.
Savills. (2024). *Data Center Research Articles*. Available at: Savills.
State Aid Control Act Law. (2018). Law N° 12/2018. Available at: Congress.gov.
Submarine Cable Map. (2024). *Submarine Cable Map 2024*. Available at: Submarine Cable Map.
United Nations Broadband Commission. Available at: UN Broadband Commission.
WB27-MNE-DII-01. (2020). *Project Initiation Report Including the Cost and CBA update*. Available at: WB27-MNE-DII-01.
Western Balkans Investment Framework (WBIF). Available at: WBIF.
WIPO. (2023). *Global Innovation Index 2023*. Available at: WIPO.
World Bank. (2023). *Balkans Digital Highway Initiative*. Available at: World Bank.
World Economic Forum. (2024). *How the EU's new directive aims to strengthen cybersecurity*. Available at: World Economic Forum.