European digital guidelines as a basis for the digitalization process in Bosnia and Herzegovina - a review of current state

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Abstract

The development of information society and broadband Internet is key indicators of social and economic change. They transform the way companies, political systems, and citizens communicate with each other. Today, we talk about various regional and national initiatives to first stabilize and then improve the economies of countries through the development of the Internet and information society. The European Union has recognized information technology as a major factor influencing economic growth and innovation. Among the seven flagship initiatives of the Europe 2020 economic strategy is the Digital Agenda for Europe. This shows the importance that information technologies have in the development of the modern economy. In this paper, we analyze the current state of development of the information society and broadband Internet access in Bosnia and Herzegovina. We highlight the necessity of considering mechanisms for the development of broadband access. We analyzed the current situation and progress in the implementation of the Digital Agenda guidelines in EU countries. The aim of this research is to highlight the advantages of using EU strategic guidelines to improve and develop the current situation in the field of broadband Internet in Bosnia and Herzegovina

***Keywords**: Digital Agenda, broadband Internet, guidelines, strategy*

1 Introduction

New technologies based on artificial intelligence, large data spaces, and the development of digital service platforms are affecting all areas of society. Today, we talk about a “fully connected” society. Internet technology has evolved in ways that are difficult to predict. Therefore, digital infrastructure is the backbone of the digitization process. Owing to the close connection of the Internet with economic and social development, it is necessary to strategically plan the development of a more powerful, mobile, intuitive, and accessible Internet. Broadband internet access is no longer an exclusive measure of a society's technological development. This shows social development as a whole. The term "basic broadband internet" or "basic broadband networks" means networks with basic functions based on technological platforms. These networks include (A)symmetric (D)igital (S)ubscriber (L)ines (up to ADSL2 + networks), mobile networks, and satellite systems. Under fast and ultrafast access, universal broadband access is considered at speeds of 30 Mbps and 100 Mbps, respectively [1].

This paper aims to identify priority steps for the integrated and effective implementation of broadband Internet development strategies in Bosnia and Herzegovina (B&H). Some previous studies have investigated the process of digitalization in this area [2], [3]. However, to the best of our knowledge, the process of digitization process has not been systematically investigated in the calculated domain in the B&H space. The rest of the paper is structured as follows. We first analyze European standardization for the Internet and the guidelines necessary for the digitization process. Second, we analyze the current situation in B&H from the aspect of strategies and policies for digitalization, that is broadband Internet, which is its basis. In the third part, we critically compare and present the results of the state of broadband Internet in B&H s and the EU, followed by a discussion of what they mean for decision-making. The last section concludes the study and suggests pathways for future research.

2 EU digital single market: EU strategic guidelines, recommendations, and policies

The digital economy is growing seven times faster than the rest of the economy [4]. Traditional networks connect and converge allowing access from all devices and in all places using mobile and smart devices sensor networks are increasingly present. Cities are equipped with various communication and information technologies and thus become smart cities. Research and innovation in this field will certainly be a fundamental driver of Europe's future prosperity and quality of life. However, policy inconsistencies at the European level are a factor that slows down and impedes development to its full potential. Therefore, it was necessary to create a coherent and advanced framework for action within the digital economy.

Efforts in the digitalization process of the EU and its Member States are largely shaped by three, partly overlapping areas: the integration agenda, the regional agenda, and the digital agenda [5]. In this paper, we will focus on the digital agenda and its guidelines.

The period of digital development in Europe can be observed in two parts:

- The first digital period (2010. – 2020) – Digital Agenda for the first period.
- Second digital period (2020. – 2030.) – Digital Agenda for the second period.

In response to the global economic crisis, following the 2010 Lisbon Strategy, Europe presents a strategy for economic growth and development. Among the seven flagship initiatives of the Europe 2020 economic strategy is the Digital Agenda for Europe [6]. The Digital Agenda for Europe flagship initiative aims to help the EU and its Member States reap the benefits of a competitive digital single market. Digital potential needed to be unleashed and digital culture expanded across the EU. To achieve such a goal, seven pillars were identified around which 101 measures have been deployed. Following a review of the initiative in December 2012, seven key new measures were adopted. These measures mainly emphasize the importance of fostering digital infrastructure, improving the regulatory environment, promoting digital skills and jobs, and implementing strategies focused on cybersecurity, cloud computing, and microelectronics. The Digital Agenda for Europe contains a plan to ensure broadband with internet access up to 30 Mbps and more [6]. Measures to encourage the European Commission to expand high-speed broadband networks are:

- ✓ adoption of new rules on cost reduction;
- ✓ recommendation on the next generation of access networks;
- ✓ revised guidelines on state aid for broadband networks;
- ✓ proposal to complete the single market for telecommunications services – *Connected Continent.*

However, all these goals have not been achievable and the digital single market is not yet a reality and additional investments in high-speed infrastructure are needed.

In September 2015, the United Nations General Assembly launched the 2030 Agenda for Sustainable Development made up of 17 goals, 169 targets, and 232 indicators [7]. Building on these insights, the Commission sets out the direction of 'Europe's Digital Decade'. The European Digital Agenda for the Decade 2020-2030 aims to create secure digital spaces and services, a level playing field in digital markets with large platforms, and strengthen Europe's digital sovereignty [4]. At the same time, it will affect the ultimate European goal of climate neutrality by 2050. The four main goals of this idea are: [8]

a) Digitally skilled citizens and highly skilled digital professionals;
b) Secure, performant and sustainable digital infrastructures;
c) Digital transformation of businesses;
d) Digitalisation of public services.

To meet these EU targets, the Commission has defined two basic preconditions, namely: gigabit coverage for all households and 5G in all populated areas [9]. These targets are significantly higher for broadband, compared to 2020. As Fig. 1. shows, the EU still has a lot of work to do on the path to digitalization.

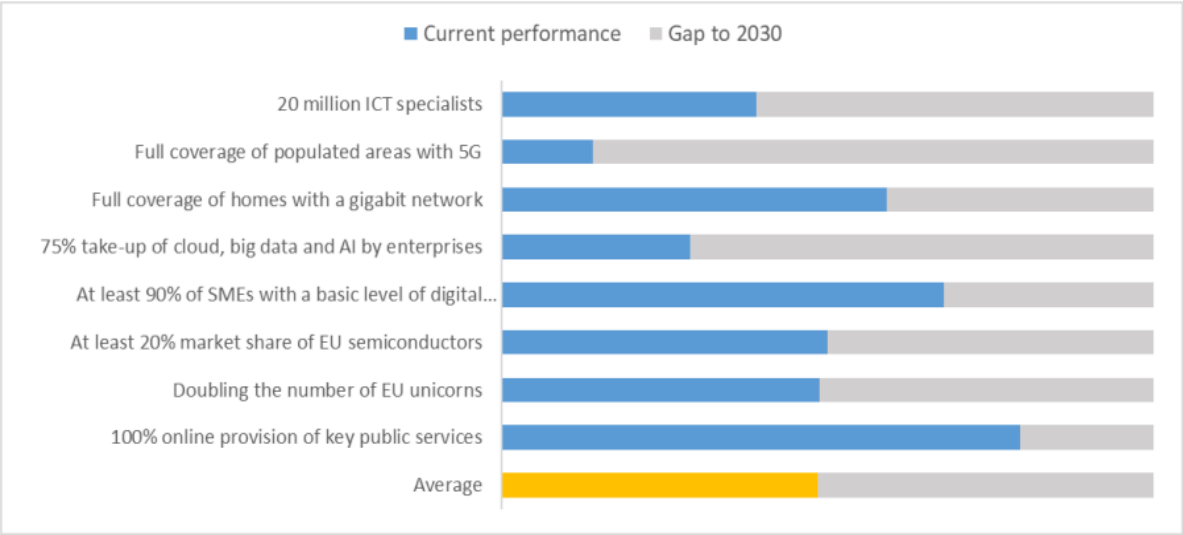

Fig. 2 Distance toward the digital decade targets [10]

EU allocates € 7.5 billion in strategic funds for 2021-2027 to support projects in five areas [4]: supercomputing, artificial intelligence, cybersecurity, advanced digital skills, and ensuring the widespread use of digital technologies throughout the economy and society, including through digital innovation centers. The EU has defined concrete objectives for each of the four cardinal points:

- ✓ Monitoring system - to measure the progress of the EU against the key targets for 2030;
- ✓ Assessing the areas with insufficient development at the level of Member States;
- ✓ An enhanced DESI report - the underlying indicators for monitoring the targets at the EU level and the digitalization trends at the national level;
- ✓ The European Commission will be responsible for the analysis and overall reporting on the progress to identify in which areas progress lags behind and how the identified gaps can be addressed through measures and recommendations at the European and/or the national level.

Progress in the implementation of digitalization at the EU level is monitored using the Digital Economy and Society Index (DESI). DESI provides insight into the economic and social challenges of the member states and monitors the national reform efforts carried out in the European Semester. The European Semester is a cycle of economic, fiscal, labor, and social policy coordination within the EU [10]. We analyzed the DESI 2021 report, which presents data from the first or second quarter of 2020, giving some insight into key developments in the digital economy and society during the first year of the COVID-19 pandemic. The impact of COVID-19 on the use and supply of digital services and the results of policies implemented since then are not covered by the data and will be more visible in 2022 [9]. According to DESI 2021, all EU Member States have made progress in the field of digitization. However, there are unequal levels of development in some Member States i.e Denmark has the highest score, followed by the Netherlands and Spain, while Greece and Bulgaria have the lowest performance [9]. This results in different priorities in the policies and activities of these countries. The Member States must work together to reach the 2030 targets.

The data on connectivity shows an improvement in very high-capacity networks (VHCN) available in 59% of the households in the EU [11]. This is an improvement up from 50% a year ago, but still far from universal coverage of Gigabit networks. The rural VHCN coverage went up from 22% in 2019 to 28% in 2020. Moreover, 25 Member States have assigned some 5G spectrum, compared to 16 one year ago. 5G has been launched commercially in 13 Member States, mainly covering urban areas.

The EU wants to reach the world market, so it voila budget of € 723.8 billion under the largest program under the Next Generation EU the Recovery and Resilience Facility (RRF) [8].

3 Bosnia and Herzegovina digital market: guidelines and policies

According to the ITU 2020 report, developing countries such as B&H should implement policies to maximize broadband, as a major digital technology that contributes to economic development [12]. B&H signed the Stabilization and Association Agreement back in 2008. Fourteen years later, B&H has still not met the conditions for applying for EU membership. The EU Council emphasizes the importance of improving and strengthening the efficiency of the functioning of the state and its institutions. This means that the country will have to be able to adopt and implement the laws and regulations of the European Union. These regulations apply to all branches of the economy, including telecommunications as the core of the development of modern society as a whole. To achieve a European perspective for B&H, it is necessary to reform the telecommunications sector.

To harmonize its political and regulatory framework for electronic communications with the EU, in 2016 the B&H Council of Ministers submitted to the Council of Ministers an initiative for the procedure of harmonization and adoption of the "Information Society Development Policy in Bosnia and Herzegovina". The policy is the basis for the development strategy of the information society of B&H. It was a key document for the development of information and communication technologies.

Relevant policies and procedures in the telecommunications sector in B&H include:

- Law on Communications in B&H (2003) (still in force),
- B&H Electronic Communications Sector Policy for the period 2017-2021,
- B&H Information Society Development Policy for the period 2017-2021.

These Policies are designed to encourage the investment process. This process should accelerate the development of electronic communication infrastructure, which would provide citizens with a more diverse and high-quality offer of services [13].

One of the leading problems for the digitization process is that there is no country-wide operational organization that coordinates the Internet and other communication infrastructures. In previous years, several government strategies and documents have been adopted, such as ICT infrastructure, ICT industry, e-business, e-education, e-healthcare, e-government, e-laws, 30 e-environment, Strategy, and action B&H Information Society Development Plan (based on the 2002 Information Society Development Program in Southeast Europe). The main drawback in the adoption of these documents is their practical implementation.

According to the Digital Quality of Life Index, which is calculated every year by Surfshark for 2020 [14], B&H is among the leading countries that do not have the will the government to take advantage of the technologies offered by artificial intelligence and their range of services provided.

The Draft Framework Strategy for the Development of Broadband Access in Bosnia and Herzegovina for the period 2019-2023 is currently in force. The strategy is based on the guidelines and priorities of the B&H Electronic Communications Sector Policy for the period 2017-2021. This strategy has set a goal of 75% coverage of the population in B&H by December 2023 with high-speed fixed broadband internet speeds higher than 30Mbps, which are also EU targets. In terms of mobile broadband, according to the draft strategy, the goal is to achieve coverage of the territory of B&H with 4G/LTE of 70%. The main task of this Strategy is to enable the elaboration of some of the previously defined goals in the Policy of the Electronic Communications Sector of B&H for the period 2017 – 2021 and to propose concrete measures for its implementation.

3. Analysis of digital development of Bosnia and Herzegovina according to EU guidelines

In recent years, the B&H telecommunications market has been characterized by uneven and unsystematic development at the state level. There is a decline in investment in this area [13]. Although certain private operators show slightly higher investment activity, this is insufficient. Most of the operators are mostly in public ownership, and the decline in investment activity on their part causes a decline in total investment in the telecommunications market in B&H in

recent years. As a broadband access strategy has not been adopted, the development of networks designed to access high-speed internet services in the fixed, mobile, and satellite networks is largely based on the entrepreneurship of the operators themselves. The whole process of progress further challenges the complex regulatory and legislative framework. The framework should be addressed in the form of harmonization of key laws, acts, and processes at different administrative levels. B&H is obliged to harmonize its regulations with the legislation of the European Union (EU), including the telecommunications sector. By adopting the Broadband Access Development Strategy in B&H for the period 2019-2023. meets one of the seven leading European economic strategy initiatives "Europe 2020".

The number of Internet users in B&H is growing (Fig. 3). The penetration of broadband subscribers in 2020 compared to 2013 is 21.39% [15]. However, B&H lags behind the EU in terms of basic broadband penetration, 61% versus 78%. Fast and ultra-fast broadband penetration is less than 0.1% [13].

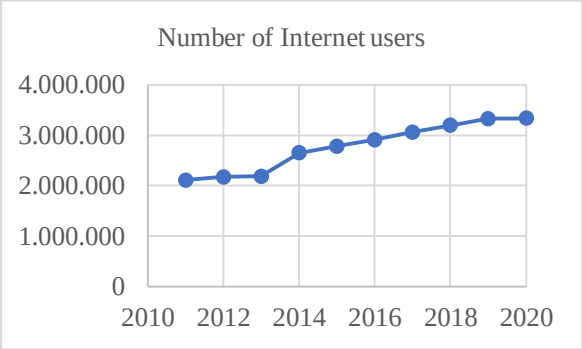

Fig. 2 Number of Internet users in B&H (2011-2020.) [15]

In the structure of broadband connections, ADSL (Asymmetric Digital Subscriber Line) access leads with 54.51% of the total number of broadband fixed connections (Fig. 3). There is an increase in cable and FTTx (Fiber to the x) Internet access compared to the previous year, and a decrease in FWA (Fixed wireless access) users. If we talk about access speed, 50% of subscribers have access to the Internet at speeds higher than 10 Mbit/s [15].

In the EU Internet access at home has a stable coverage of 97%. Among these technologies, xDSL continued to have the largest footprint (90%) followed by FWA (56%), DOCSIS 3.0 cable (45%) and FTTP (Fiber to the Premises) (42%) [11]. Coverage of Next-generation access (NGA) technologies capable of delivering download speeds of at least 30 Mbps reached 87% in 2020 [9].

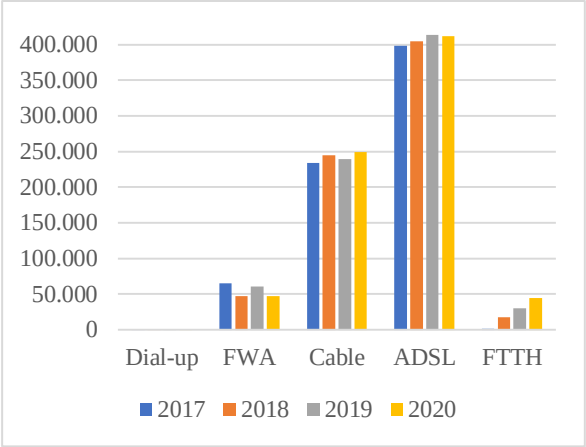

Fig. 3 Internet subscribers by types of access for the period 2011-2020. [15]

Now, if we look at mobile technologies, the level of penetration (number of mobile subscribers per 100 inhabitants) of mobile telephony at the end of 2020 was 99.39% [15]. As Fig. 4 - Fig. 6 show, the three mobile operators provide different types of coverage reports in [15]. There is no data on a single coverage of the entire B&H territory.

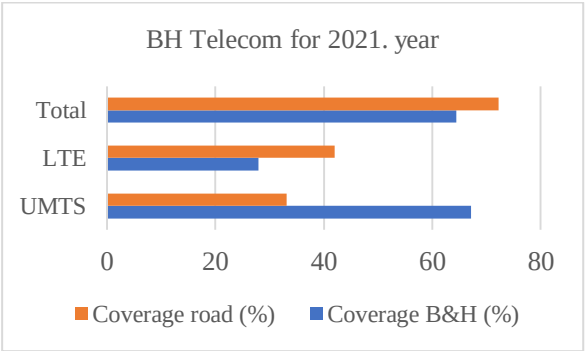

Fig. 4 Coverage for mobile networks of operator BH Telecom

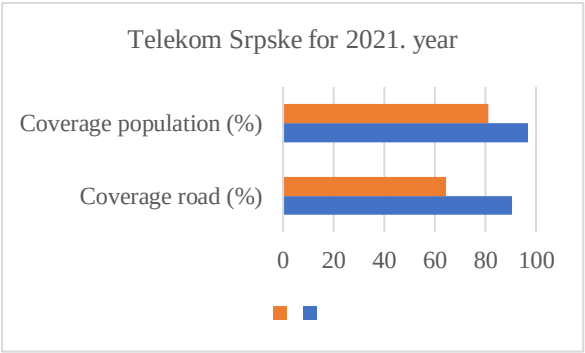

Fig. 5 Coverage for mobile networks of operator Telekom Srpska

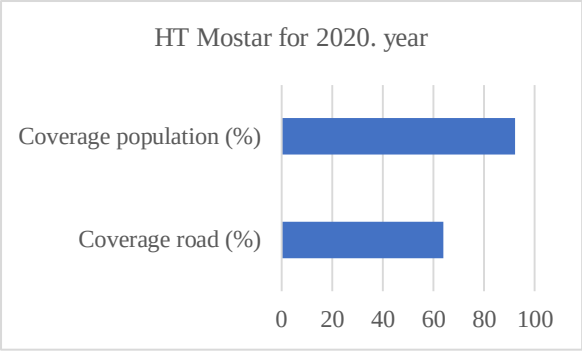

Fig. 6 Coverage for mobile networks of operator HT Eronet

In the EU 4G is almost universal reaching 99.7% of populated areas, and 5G commercial services were launched in about half of the member states by mid-2020 covering 14% of populated areas [9].

Analyzing this market situation of B&H, in the field of telecommunications, we notice the following problems:

- Uneven conditions for the establishment of new generation networks;
- Lack of awareness of the importance of broadband for society and the economy as a whole;
- difficult to obtain approval for the construction of telecommunications networks;
- Uneven construction and design standards;
- Inability to share infrastructure, which significantly slows down the replacement of obsolete and the establishment of new high-speed networks;
- Establishment of an orbital 5G network, thus entering into serious competition with ground-based services.

M2M (Machine to machine) services, smart vehicles, and communication with emergency services Internet access, and therefore all services available on it, including voice services, data transmission, and multimedia content require much greater investment in B&H. The latest EU report on B&H (2019) regarding information technologies emphasized that B&H:

- there is still no broadband strategy;
- the law enabling the liberalization of the telecommunications and electronic media sectors is not in force;
- does not have a single Strategy or Action Plan for the development of the information society throughout the country;
- must adopt a national strategy for the security of networks and information systems.

As the trend of increasing use of digital content is ubiquitous, there is a significant need to invest in infrastructure that will meet the needs of the digital age. B&H has some positive sides and evidence that digitalization is possible with a slightly more orderly political and legislative system. As Surfshark points out [14], a pleasant surprise is the functioning of the Internet in the Balkan countries during the pandemic, when many countries got a "jump" on the Internet. B&H remained in the first period of Europe's development and every effort should be made to catch up with Europe in its race for the digital decade.

Conclusion

The aim of the Digital Agenda is not just to keep every European online but to help people find their way into the digital world. Computers, mobile phones, and digital technologies are central parts of our daily lives. They can highlight many of the challenges we face, from road safety to healthy old age and from better public service to a stable and sustainable environment.

This paper emphasizes the theoretical potential as well as the practical challenges of implementing the goals of the Digital Agenda for Europe, which promotes broadband access in B&H. Bosnia and Herzegovina are in a difficult situation from the perspective of the systemic development of broadband Internet at the state level.

Realistic and achievable coverage and penetration targets in line with the Digital Agenda for Europe need to be adopted. These goals must be considered in the current situation. This is aggravated by the fact that B&H is still awaiting EU candidate status. As a result, B&H cannot access the funds made available by the EU. Funds for the development of networks in rural areas stand out, and the EU is happy to provide funding for good projects. Until they can use these funds, domestic operators will have to use their resources to cope with growing

competition and foreign private capital entering the domestic market. The future economy will be a network-based knowledge economy with the Internet at its center. Therefore, B&H s should follow the EU on their path to digitalization.

References

[1] D. Elixmann and K.-H. Neumann, "The broadband State aid rules explained An eGuide for Decision Makers FINAL REPORT," 2013. DOI: 10.2759/40068.

[2] Z. Tarik, Z. Azra, and M. Arnela, "Bosnia and Herzegovina Telecommunication Sector Outlook," *Procedia - Soc. Behav. Sci.*, vol. 195, pp. 82–92, 2015, DOI: 10.1016/j.sbspro.2015.06.332.

[3] M. Pale and H. Ćatić, "Innovation and Digitalisation in SMEs in Bosnia and Herzegovina," 2020.

[4] E. Commission, "Digital Agenda for Europe," 2021. [Online]. Available: https://www.europarl.europa.eu/ftu/pdf/en/FTU_2.4.3.pdf

[5] M. Okano-Heijmans and W. Vosse, "Promoting open and inclusive connectivity: The case for digital development cooperation," *Res. Glob.*, vol. 3, p. 100061, 2021, DOI: 10.1016/j.resglo.2021.100061.

[6] European Commission, "A Digital Single Market Strategy for Europe," *COM(2015) 192 Final*, p. 20, 2015, DOI: 10.1017/CBO9781107415324.004.

[7] A. A. Londoño Pineda and J. A. Cano, "Economic Regulation Oriented to the sharing economy: An approach from target 10.3 of the 2030 agenda," *J. Clean. Prod.*, vol. 308, no. May, 2021, DOI: 10.1016/j.jclepro.2021.127342.

[8] European Commission, "Europe's Digital Decade: Commission sets the course towards a digitally empowered Europe by 2030," *Press Release*, no. March, pp. 1–2, 2021, [Online]. Available: https://ec.europa.eu/commission/presscorner/detail/en/IP_21_983

[9] European Commission, "Digital Economy and Society Index (DESI) 2021," 2021. [Online]. Available: https://digital-strategy.ec.europa.eu/en/policies/desi

[10] E. Commission, "European Semester." https://www.consilium.europa.eu/en/policies/european-semester/

[11] European Commission, "Digital Economy and Society Index (DESI) 2021. Digital infrastructures," 2021, [Online]. Available: https://ec.europa.eu/digital-single-market/en/desi

[12] G. E. M. – E. Report, "How broadband, digitization, and ICT regulation impact the global economy," 2020. DOI: https://www.itu.int/dms_pub/itu-d/opb/pref/D-PREF-EF.BDR-2020-PDF-E.pdf.

[13] "Nacrt okvirne strategije razvoja širokopojasnog pristupa u B&H za period 2019 – 2023." [Online]. Available: https://ekonsultacije.gov.ba/legislativeactivities/details/8970

[14] Surfshark, "Digital Quality of Life Index 2020," 2021. [Online]. Available: https://surfshark.com/dql2020-slides.pdf

[15] Communications Regulatory Agency, "ANNUAL REPORT OF THE COMMUNICATIONS REGULATORY AGENCY FOR 2020," 2021. [Online]. Available: https://docs.rak.ba//documents/f8910d22-e538-4b11-9b21-4f7cfd0e0b88.pdf