BACKGROUND PAPER

THE STATUS OF CONNECTIVITY IN 9 NON-EU COUNTRIES OF EUROPE REGION

Version 1.0

Living Document

ACKNOWLEDGMENTS

Table of Contents

Figures

Background Paper on the Status of Connectivity in 9 non-EU countries of Europe region

1. Introduction

1.1   Background and context

Since January 2020, the Covid-19 pandemic has led governments to impose lockdowns introducing physical limitations to freedom of movement. In various areas of the world and at different points in time, this has posed severe constraints to active participation in social and economic life. In all settings, Information and Communication Technologies (ICTs) have played a fundamental role in offsetting these necessary measures and have come to the rescue by extending the availability of products and services and by empowering citizens, workers and students in their daily engagements and needs.

As 2020 has been characterized by an increased reliance on ICTs, the transition to the virtual environment has not benefitted all equally. While dependence on the Internet and the Digital Economy has become an enabler for many, it has complementarily exacerbated existing gaps and created new ones. According to the latest Broadband Commission's State of Broadband Report from September 2020, the sole shift to remote learning and remote working for students and employees during the COVID-19 pandemic has laid bare differences in network infrastructure, safety and readiness, as well as in access to connectivity in both developed and developing countries.[1]

In the global scenario, Europe region[2] leads globally on many connectivity and digitalization indicators according to the latest ITU Measuring Digital Development Report from 2020,[3] thereby demonstrating ICT-enabled resilience. However, disparities and barriers in infrastructure development remain substantial within this very heterogeneous region, as reported in the Digital Trends for Europe report 2017-2021.[4]

To address these challenges, the ITU Office for Europe is operating to facilitate high-speed connectivity with resilient and synergistic infrastructure development, deployment and sharing, in line with the implementation of ITU Regional Initiative for Europe 1 on "Broadband Infrastructure, Broadcasting and Spectrum Management" adopted by the ITU World Telecommunication Development Conference 2017 (WTDC-17).[5]

Countries that are particularly under the focus of ITU activities in Europe are Albania, Bosnia and Herzegovina, Georgia, Moldova, Montenegro, North Macedonia, Serbia, Turkey, and Ukraine. These countries are also of strategic interest in the context of United Nations Resident Coordination mechanisms, to which the ITU Office

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[1] Broadband Commission "The State of Broadband 2020: Tackling digital inequalities - A decade for action" (2020), p.49 (https://www.itu.int/dms_pub/itu-s/opb/pol/S-POL-BROADBAND.21-2020-PDF-E.pdf)

[2] According to ITU regional breakdown, ITU Europe region comprises 46 countries: https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Pages/MemberCountriesinEurope.aspx

[3] ITU Measuring Digital Development: Facts and Figures (https://www.itu.int/en/ITU-D/Statistics/Documents/facts/FactsFigures2020.pdf)

[4] ITU Digital Trends in Europe 2021: ICT Trends and Developments in Europe 2017-2020 (https://www.itu.int/en/ITU-D/Conferences/WTDC/WTDC21/Documents/RPM/EUR/Digital-Trends_Europe-E.pdf)

[5] ITU Regional Initiatives for Europe 2018-2021 (https://www.itu.int/en/ITU-D/Documents/RI_Europe.pdf)

for Europe contributes, in line with the "*One UN*" approach. In this context, UN Resident Coordinators have acted substantially in response to Covid-19 and continuing work in this area will be a fundamental component of *building back better*, a process to which the ITU Office for Europe provides expertise in ICT-related matters, in line with its mandate and in response to increasing demand for the active engagement of so-called 'non-resident' specialized agencies in the work of United Nations Country Teams (UNCT).

With the aim of feeding more accurate and up to date information into this process, a clearer picture of where these 9 countries stand in terms of connectivity development is essential for all stakeholders, not only to address current challenges in the context of UNCTs, but also to accelerate the achievement of Sustainable Development Goals by 2030[6], in line with the UN's Secretary General Roadmap for Digital Cooperation[7], the Connect 2030 Agenda[8], and the proceedings of the World Summit on the Information Society.[9]

1.2   Purpose of the paper

The purpose of this paper is not to address the status of connectivity in selected countries vis-à-vis the global pandemic. The impact of Covid-19 on official indicators, in fact, is not yet measurable due to the 1-year delay resulting from gathering, validating and presenting verified data at the national level first, and then at the international level.

Instead, this elaboration will seek to provide the most accurate snapshot of the 9 countries for identified official indicators of connectivity as of December 2019, thereby establishing a baseline for the countries in the context of the UN Coordination mechanism. This approach is a starting point for future analyses of the impact of Covid-19 and, more importantly, it enables stakeholders to identify where each of the 9 countries stood when entering the pandemic in comparison to regional indicators and identify the pre-existing gaps which presumably have been exacerbated by the pandemic over the course of 2020.

Beyond constituting a reference at the level of UN Coordination, this piece of work is also aimed at being a reference for national, regional and global stakeholders from public and private sectors, NGOs, academia, and civil society, endowing different stakeholders with valuable information supporting decision-making processes aimed at enhancing connectivity and use of ICTs in the 9 countries.

1.3   Methodology

Analysing connectivity development requires defining what is in scope of the analysis in relation to the objectives since "connectivity" is a broad term with many nuances and can be intended differently according to different standpoints and different contexts.

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[6] https://sdgs.un.org/goals
[7] https://www.un.org/en/content/digital-cooperation-roadmap/
[8] https://www.itu.int/en/mediacentre/backgrounders/Pages/connect-2030-agenda.aspx
[9] https://www.itu.int/net4/wsis/forum/2020/en

Background Paper on the Status of Connectivity in 9 non-EU countries of Europe region

The authors of this paper are fully aware of the complexity of measuring "connectivity" from a statistical standpoint and are fully aware of the ongoing processes aimed at defining parameters for "Meaningful and Inclusive Connectivity", currently underway at the UN level and involving multiple stakeholders in the context of the UN Secretary General's Roadmap for Digital Cooperation.[10] This paper does not intend enter this ongoing discussion.

Instead, the aim is to provide a picture of the trends up to the beginning of 2020 in the nine selected non-EU countries to facilitate the discussion at the UN Coordination level and among stakeholders within the countries. Therefore, the focus will be given to three main aspects of connectivity addressing the respective questions:

- Available Connectivity: "is connectivity available?"
- Affordable Connectivity: "is connectivity affordable?"
- Connectivity Uptake: "what is connectivity uptake?"

The analysis of these three main areas will be elaborated in Chapter 2. For each focus area, indicators will be introduced and data for the 9 countries presented. Analysis will take into consideration data back to 2015, whenever possible, and consider regional averages for the 46 countries of ITU Europe region (EUR-46) or for the 27 countries of the European Union (EU-27) to identify areas most in need of action. The paper will draw upon official ITU statistics that were updated in December 2020 up to the year 2019.[11]

Chapter 3 will finally briefly discuss the main findings, outline the ITU's expertise in the region and discuss the synergies and strengthened ITU delivery in the context of the UN Coordination mechanisms.

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[10] https://www.un.org/en/content/digital-cooperation-roadmap/

[11] World Telecommunication/ICT Indicators Database 2020: https://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx (24th Edition/December 2020)

2. Country overview

2.1   Available connectivity

As highlighted in the "Digital Trends in Europe, 2021" report,[12]the increased deployment of ICT infrastructure continues to contribute to, and oftentimes accelerate, the digital transformation of society. Europe region is no exception, and data indicate that the availability of connectivity has expanded since 2015; all 9 Member States in consideration have witnessed an extension of services, both demographically and geographically.

Three indicators prove particularly revelatory with regards to the availability of connectivity:

1) **Percentage of the population covered by at least an LTE/WiMAX mobile network**: this refers to the percentage of inhabitants that live within range of LTE/LTE-Advanced, mobile WiMAX/WirelessMAN or other advanced mobile-cellular networks commonly known as "4G", irrespective of whether or not they are subscribers. This is calculated by dividing the number of inhabitants covered by the previously mentioned mobile-cellular technologies by the total population and multiplying by 100. It excludes people covered only by HSPA, UMTS, EV-DO and previous 3G technologies, and also excludes fixed WiMAX coverage.

2) **Estimated proportion of households with Internet access at home**: For the purposes of this indicator, the Internet is defined as a world-wide public computer network, which provides access to a number of communication services including the World Wide Web and carries email, news, entertainment and data files. Access in this indicator is not assumed to be only via a computer; it may also be by mobile phone, games machine, digital TV etc. The proportion of households with Internet access at home is calculated by dividing the number of in-scope households with Internet access by the total number of in-scope households.

3) **Number of fibre connections per 100 in habitants**: This number is derived by dividing the indicator for total number of fibre subscriptions in the country per total population. It seeks to provide an indication on reliable Internet penetration at the home/building level relative to the number of citizens, identified as the most reliable technology to ensure quality of service in times when networks are put under pressure due to increase demand for bandwidth. Similarly to indicator 1), this indicator provides insight into not only the availability of reliable fixed broadband telecommunication services, but also access to it, since availability and uptake in fixed services often overlap greatly due to the higher costs of deployment relative to mobile coverage.

Defining available connectivity as "the presence of services" on the level of physical infrastructure provides a solid foundation for the region-wide analysis on connectivity, as the availability of services is a prerequisite for any significant interaction and participation on-line. Together, they aim to unveil the multiple facets of

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[12] https://www.itu.int/en/ITU-D/Conferences/WTDC/WTDC21/Documents/RPM/EUR/Digital-Trends_Europe-E.pdf

available connectivity by investigating to what extent Internet connections are available, whether or not they are available in the home, and with what technology households are predominantly connected.

2.1.1   Country-level data

Percentage of the population covered by at least an LTE/WiMAX mobile network

In 2019, seven out of the nine Member States in consideration have achieved 95% or greater in this index, indicating that over 95.0% of their population is covered by 4G-speed mobile networks or faster (Figure 1). With a total population of over 109 million in the nine countries, this a remarkable realization of available connectivity, although 15.7 million people still remain without access to 4G in the countries in the scope of the study.

One of the two Member States with less than a 95% coverage rate, Ukraine, nevertheless exhibited extraordinary growth in coverage over the period from 2015 to 2019, departing from no 4G coverage in 2015 and bringing 4G to78.1% of Ukrainians in 2019. The other Member State, Bosnia and Herzegovina, continues to demonstrate a large gap in the availability of 4G connectivity; none of its over 3 million inhabitants have 4G mobile connectivity available. This may be a product of the fact that Bosnia and Herzegovina has the second highest proportion of rural populaton in the entirety of Europe region: with almost 60% of individuals living outside cities in Bosnia and Herzegovina, ensuring available connectivity can be particularly challenging.

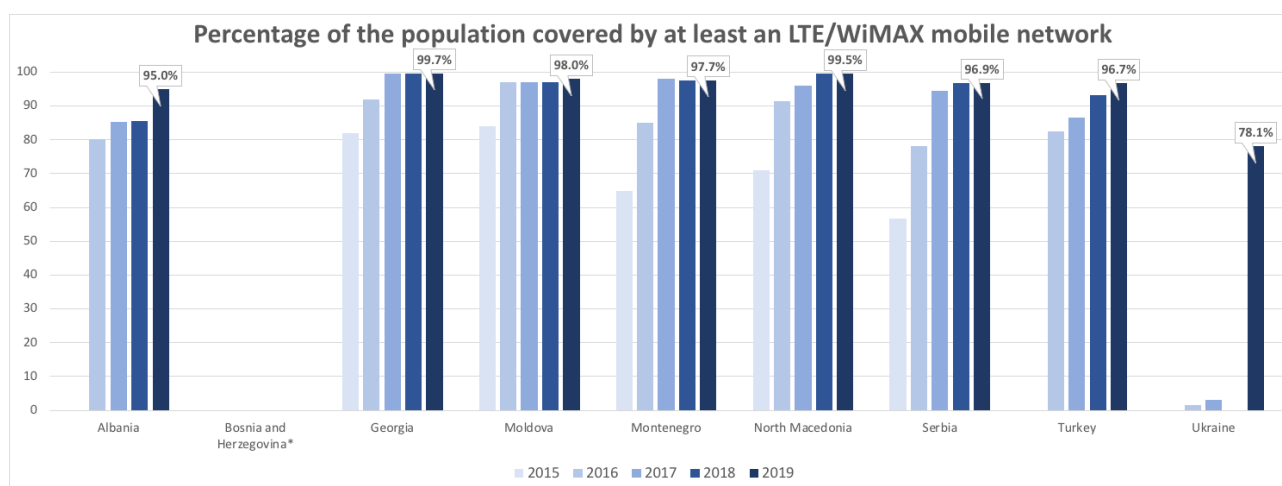*Figure 1: Percentage of the population covered by at least an LTE/WiMAX mobile network*

*Figure 1: Bar chart depicting Percentage of populaton covered by at least an LTE/WiMAX mobile network across 9 countries in study over period from 2015-2019. *Bosnia and Herzegovina has implemented 4G/LTE in the country in 2019 although official ITU data is not yet available.*

Source: ITU, Based on WTI Database

Estimated proportion of households with Internet access at home

As with other indicators, and commensurate with the regional, urban versus rural, and gender disparities identified in the Digital Trends 2021 report,13 the availability of Internet in the home continues to prove an area of challenge for most of the nine Member States in consideration. This is particularly pronounced in Albania, where more than 76.0% of households remained without Internet as of 2018, and in Moldova, where the annual growth rate (CAGR) amounted to -7.2% from 2017 to 2019, indicating a loss of households with available Internet relative to two years prior.

One extraordinary development regarding household availability and our nine Member States, however, is Turkey's surpassing of both Europe region *and* EU averages in 2019, with 88.2% of households having access to the Internet at home.   With over 18 million households in 2018, this is a notable achievement for the deployment of ICT infrastructure in Turkey.

Figure 2: Estimated Proportion of Households with Internet Access at Home, 2015-2019
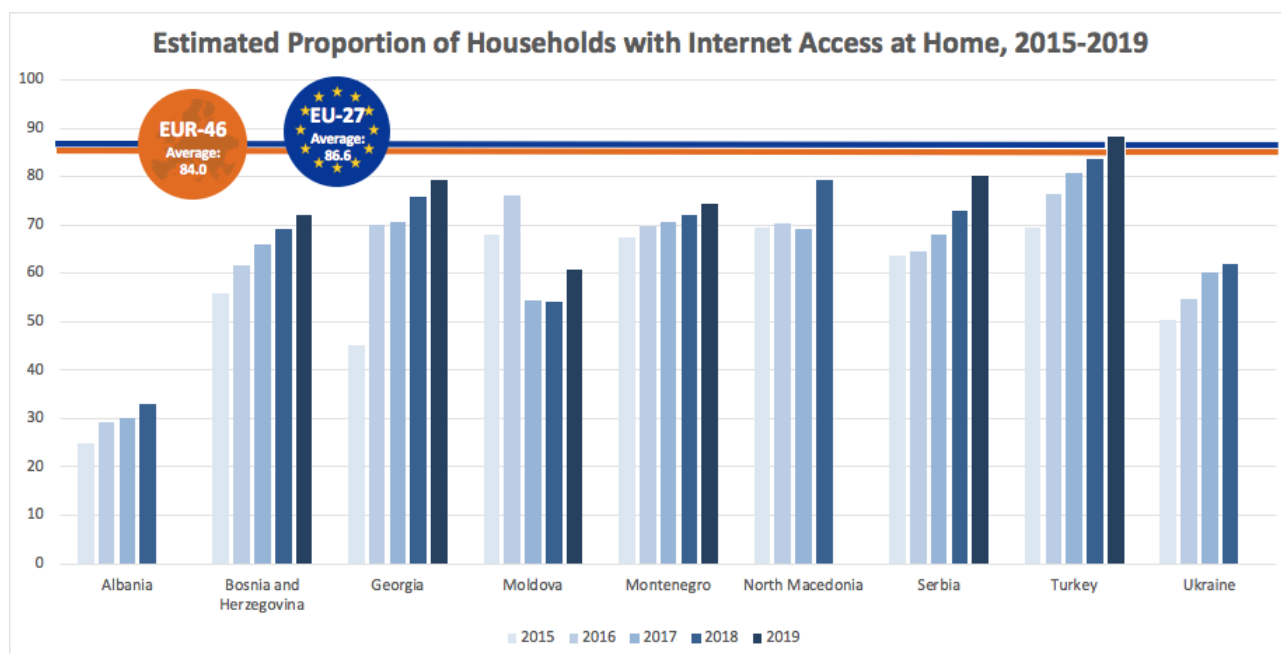
Figure 2: Bar chart depicting Estimated proportion of households with Internet access at home across 9 countries in study, over the period from 2015-2019, with comparisons to European Union average (27 countries) and Europe region average (44 countries: Liechteinstein and the Vatican excluded due to lack of data). The EUR-46 and EU-27 averages are calculated with the latest available figures in each country between 2017 and 2019.

Source: ITU, Based on WTI Database

Number of fibre subscriptions per population

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13   https://www.itu.int/en/ITU-D/Conferences/WTDC/WTDC21/Documents/RPM/EUR/Digital-Trends_Europe-E.pdf

Background Paper on the Status of Connectivity in 9 non-EU countries of Europe region

In order to give a better overview of the availability of fixed broadband services, beyond looking at data for Internet access at home, it is worth assessing the reach of the type of technology that grants the most reliable connectivity, similarly to the discussion on coverage of 4G services for mobile. According to the recent ITU Discussion Paper on "Economic Impact of Covid-19 on Digital Infrastructure" launched at GSR-20, "*accessible ultra-broadband technologies such as fibre-to-the-home (FTTH) appear to be better prepared to respond to spikes in broadband traffic. Countries with the largest deployments of accessible ultra-broadband have exhibited less slowdown in latency and download speed* [during the outbreak of the Covid-19 pandemic]".[14]

By no means does dividing fibre subscriptions by the population provide an accurate picture of the availability of fibre technology in each country, since the data draws from already existent subscriptions (including those activated by businesses for example) rather than addresses or households passed, which would be ideal. Moreover, this indicator is also not representative of the fixed broadband availability in the country since other high speed fixed broadband services based on DSL or cable, for example, may be available.

However, considering that there is often a very close match between fibre availability and its actual uptake (as the investment would not be viable in the first place otherwise), this indicator can be used to frame availability of fixed broadband networks of the highest quality across countries and make some comparisons to regional averages.

Taking a closer look at the data from Figure 3, all countries have been making progress on Fibre deployment over the past five years, albeit at different pace and scale. Georgia emerges as a leader among the nine countries considered, reporting almost 20.0 FTTH/B subscriptions per 100 inhabitants, that is close to EU countries leaders. In fact, it is worth mentioning that in 2019 Moldova, Montenegro and Ukraine also are slightly above the EU27 average for 2019 indicating that much work has been done in these countries. Considering the group of 9 together, however, what was a small gap in 2015 has become wider in 2019 with 2.2 subscriptions per 100 inhabitants less, meaning that the pace of FTTH/B has been more consistent over time.

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[14]   https://www.itu.int/en/ITU-D/Conferences/GSR/2020/Documents/GSR-20_Impact-COVID-19-on-digital-economy_DiscussionPaper.pdf

Figure 3: Number of FTTH/B subscriptions per 100 inhabitants

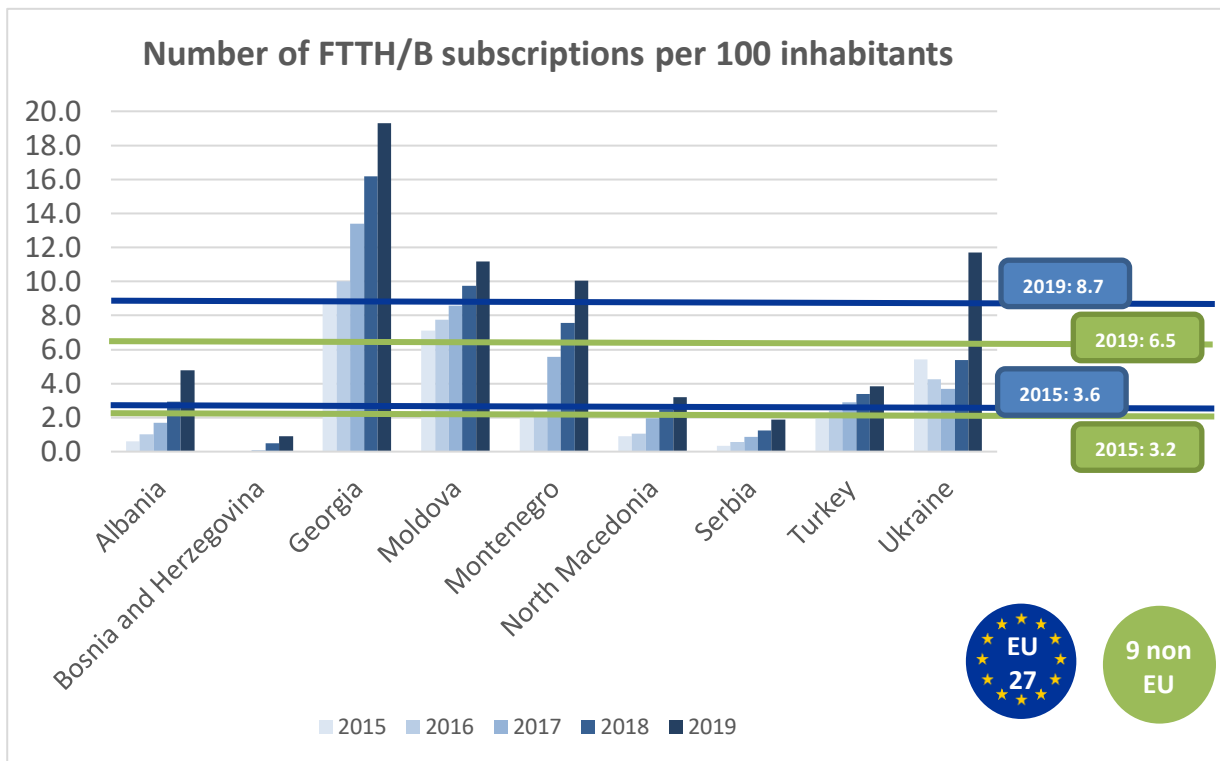*Figure 3: Bar chart depicting Number of FTTH/B subscriptions per 100 inhabitants across 9 countries in study over the period from 2015-2019, with comparisons to EU averages (27 countries) and the aggregate 9-country averages from 2015 and 2019.*

Source: ITU, Based on WTI Database

As is highlighted in Figure 4, EU27 fibre subscriptions activation rates in relation to total fixed broadband connections have been more consistent over time. However, while growth in relative weight of fibre subscriptions in relation to total subscriptions has been stable in the EU for the past 5 years, in these 9 countries there has been a spike between 2018 and 2019 which has brought the total number of fibre subscriptions at 37.7% of total subscriptions compared to 18.4% of total subscriptions in EU countries.

Figure 4: Per cent growth rate in FTTH/B subscriptions as total fixed broadband subscriptions
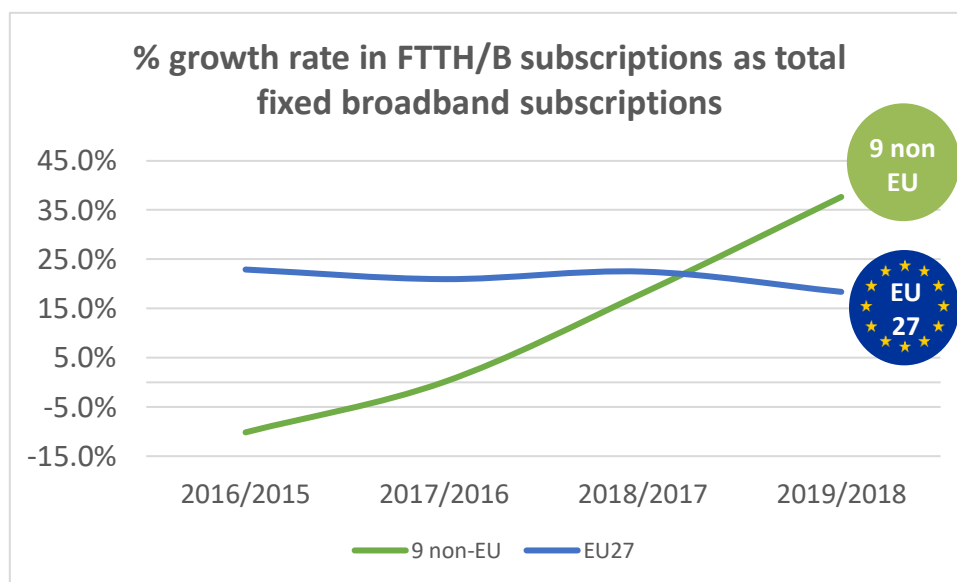

Figure 4: Line graph depicting the average annual per cent growth rate in FTTH/B subscriptions as total fixed broadband subscriptions in both the 9 countries in the scope of the study and the European Union (27 countries) since 2015.

Source: ITU, Based on WTI Database

While the number of fixed broadband subscriptions in relation to the entire population remains significantly lower than in the EU, as it is the case for fixed broadband subscriptions (more in section 2.3), this relative data signals the potential for the 9 countries to leapfrog and continue having a fibre-led expansion of the penetration of fixed broadband.

Raising the availability of fibre connections per household is critical to ensure resiliency at the national level and will be dependent on detailed broadband mapping enabling infrastructure sharing and co-investment and make efficient use of public resources whilst avoiding distortion in the competition.

2.1.2   Main takeaways

Despite some variations across the identified subregion pertaining to the uptake of mobile connectivity, the mobile network can be considered at an advanced and relatively uniform state of availability throughout Europe region. This advanced state of the mobile market stands in contrast with Internet access in the home, where data indicate deeper regional divides in the availability of connectivity.

It is important to note, however, that despite a developmental lag in home Internet access, and generally in fixed broadband subscriptions (as it will be argued later) a larger proportion of fibre connections relative to total connections suggests the possibility of fibre-led broadband deployment strategies, and in the long-term, more resilient and reliable infrastructure networks.

Finally, as will be delineated and explored in subsequent sections of this report, the rate of convergence between the nine countries and the average of Europe region in the presented indicators denotes an accelerated catch-up despite existing disparities.

The physical availability of infrastructure and services, however, does not guarantee uptake. Although availability is a prerequisite for connectivity, the following two sections will explore indicators in affordability and access in order to determine whether or not said services, where available, are actually facilitating connectivity.

2.2 Affordable connectivity

Even where connectivity is available there may be barriers to accessing said connectivity which, in turn, compound inequalities in cyberspace. This idea is emphasized in the "State of Broadband 2019" Report from UNESCO and ITU's Broadband Commission for Sustainable Development, which states, "even if network access is available in a given geography, costs of devices or service... [may] remain prohibitive for low-resourced individuals to participate online."[15]

As reported in the "Digital Trends in Europe 2021" report,[16] ITU data shows that broadband connectivity is becoming more affordable across the region. In a global context where prices have generally followed a downward trend, Europe region paves the way in terms of cost of broadband, and the nine Member States in the scope of this paper have scored significant improvements over the past years.

Two indicators are important to gain a better picture of the affordability of connectivity at the country level:

1) **"Data-only mobile broadband 1.5 GB" (as a % of GNI per capita)**: this indicator represents the cheapest price with the largest operator for a data plan with a monthly allowance of at least 1.5 GB, irrespective of the device used, over a 3G or higher data transmission network.[17]

2) **"Fixed-broadband Internet 5GB" (as a % of GNI per capita)**: this indicator is based on the cheapest fixed-broadband subscription offered in a country with as a minimum a 5 GB monthly usage and an advertised download speed of at least 256 Kbit/s.[18]

Adopting an approach which divides the data for GNI per capita allows to present the data in a standardized way. According to the Broadband Commission's definition of "affordable connectivity", prices should remain under 2% of GNI per capita for both mobile and fixed broadband, a target previously set at 5%.[19]

While this is a more stringent price target it is important to recognize that after "availability" of service, "affordability" is the second fundamental factor facilitating uptake and daily exploitation of connectivity to ensure improved social and economic activity.

2.2.1   Country-level data

Mobile broadband

The data presented in Figure 5 shows that 6 out of 9 countries in scope of the study have experienced a price decrease between 2018 and 2019, in line with the global trend of price reduction in mobile broadband

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[15] Broadband Commission "The State of Broadband 2019: Broadband as a Foundation for Sustainable Development" (2019), p.55 (https://www.itu.int/dms_pub/itu-s/opb/pol/S-POL-BROADBAND.20-2019-PDF-E.pdf).

[16] https://www.itu.int/en/ITU-D/Conferences/WTDC/WTDC21/Documents/RPM/EUR/Digital-Trends_Europe-E.pdf

[17] https://www.itu.int/en/ITU-D/Statistics/Documents/publications/prices2019/ITU_ICTpriceTrends_2019.pdf, p 32.

[18] Ibidem, p. 53.

[19] https://www.broadbandcommission.org/Pages/targets/Target-2.aspx

services. Despite small exceptions for North Macedonia and Ukraine and no data available for Moldova in 2019, it is possible to observe that all the 9 countries are stably below the 2% target of the Broadband Commission, indicating that mobile broadband is generally affordable in these countries. In particular, Turkey and Montenegro find themselves in line with Europe region averages, while Georgia has reported figures for 2019 which are close to the EU 27.

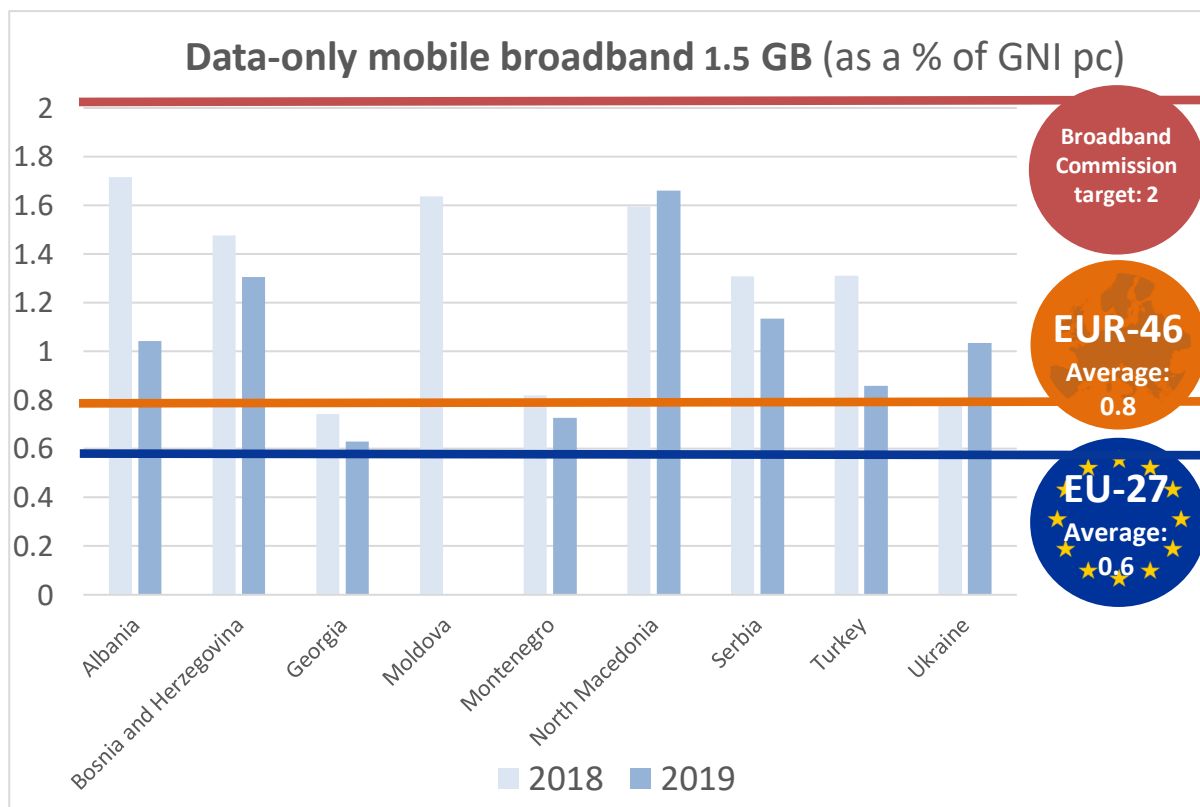*Figure 5: Data-only mobile broadband (1.5 GB) as a per cent of GNI per capita*

Figure 5: Data-only mobile broadband 1.5 GB (as per cent of GNI per capita) in the nine countries in the scope of the study from 2018-2019, with comparisons to EU average (27 countries), Europe region average (45 countries) and Broadband Commission target.

Source: ITU, Based on WTI Database

Notably, the rate of price reduction between 2018 and 2019 for the EU average is 5.9%, while the average for the 9 countries is 17.1%,[20] suggesting a positive trend in aligning with the highest standards in Europe region. Unfortunately, the data can be presented only for the years 2018 and 2019, because the two types of indicators have been updated in 2018, as a handset-based, prepaid subscription of at least 500 MB was the previous benchmark.[21]

In addition, assuming a relatively small discrepancy is present in the nine countries, and considering the increasing coverage and subscription rates outlined in section 2.1 strengthens the view that mobile

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[20] Authors' computations based on the ITU World Telecommunication/ICT Indicators Database
[21] https://www.itu.int/en/ITU-D/Statistics/Documents/publications/prices2019/ITU_ICTpriceTrends_2019.pdf, p. 32

broadband is a fundamental component of affordable connectivity and will continue to be determinant for these 9 countries for the foreseeable future.

Fixed broadband

The data presented in Figure 6 show that 8 out of 9 countries in the scope of the study have experienced a price decrease between 2018 and 2019, in line with the global trend of price reduction in fixed broadband services. Despite the exception of Moldova, for which 2019 data is not available, it is possible to remark that many countries remain above the 2% target of the Broadband Commission, indicating that fixed-broadband services are not always affordable in these countries. However, Albania, Montenegro, Turkey and Ukraine find themselves in line with Europe region averages, which is still 50% higher than the EU-27 average.

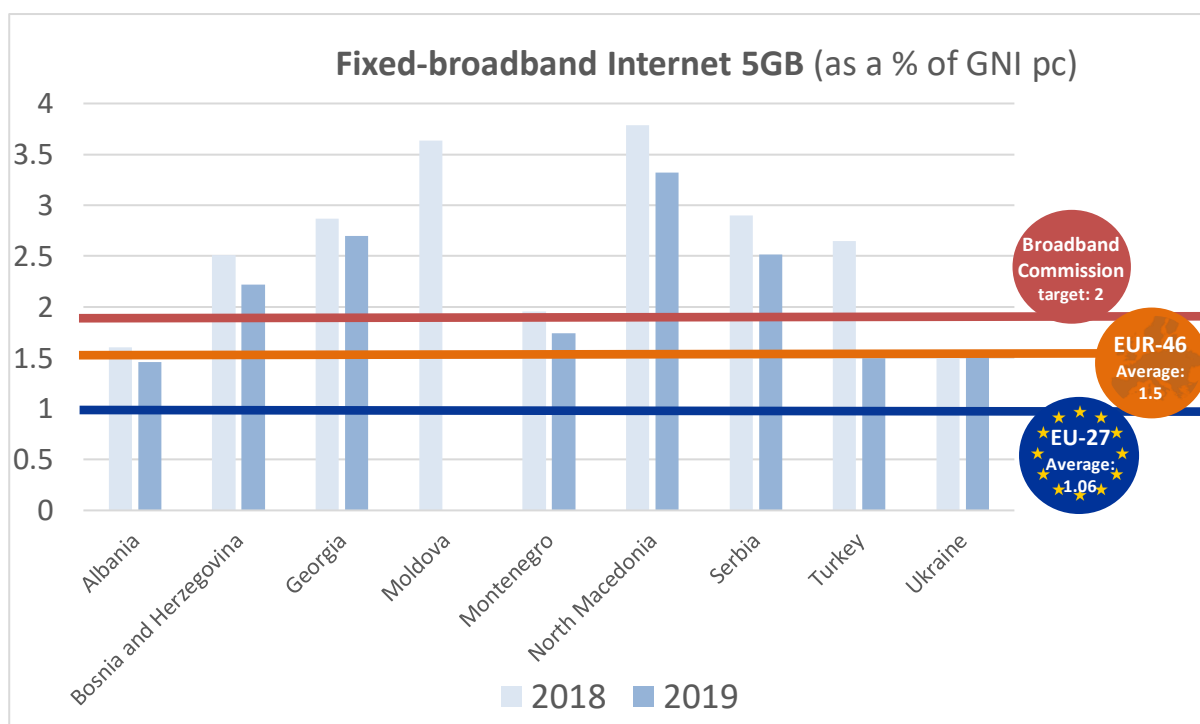*Figure 6: Fixed-broadband Internet (5 GB) as a per cent of GNI per capita*

Figure 6: Fixed-broadband Internet 5GB (as per cent of GNI per capita) in the nine countries in the scope of the study from 2018-2019, with comparisons to EU average (27 countries), Europe region average (45 countries) and Broadband Commission target.

Source: ITU, Based on WTI Database

The rate of price reduction between 2018 and 2019 for the EU average is 14.5% while the average for the 9 countries is 18.4%, suggesting that this group of nine countries is facing accelerated price reductions leading towards regional averages. Similarly to the mobile indicator, the data can be presented only for the years 2018 and 2019. Previously, instead of a minimum 5 GB monthly plan, the parallel indicator was a USB/dongle, computer-based, post-paid subscription of at least 1 GB.[22]

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[22] https://www.itu.int/en/ITU-D/Statistics/Documents/publications/prices2019/ITU_ICTpriceTrends_2019.pdf, p. 32

As it will be confirmed in section 2.3, the rollout of fixed broadband services has been slower, and often, the virtuous circle of lower prices, higher demand, and lower cost of deployment and coverage has not materialized in these countries. An important aspect is that these countries have a substantial component of rural population (even beyond 40% in some cases) where fixed broadband services are more difficult to deploy than mobile broadband, hence the slower reduction in prices and slower uptake in subscriptions.

2.2.2   Main takeaways

Affordability remains a critical component of connectivity and often a consistent barrier that is exacerbated by geographical, economic and social factors. The Covid-19 pandemic has only augmented the size of this barrier and many governments across the globe have taken measures to ensure that all households had the chance to afford broadband connectivity or devices.

Regarding the data presented in this section, a key takeaway is that mobile broadband connectivity remains relatively cheaper than fixed broadband for all nine countries in scope of this study and that the gaps with EU 27 and EUR-46 averages remains lower in absolute terms. However, it is important to stress that price reductions in both mobile and fixed broadband services are similar, at around 18% yearly, which is a greater pace than EU-27 countries, suggesting that the gap is shrinking.

With the aim of providing a synthesis between availability and affordability, the next section will look at "connectivity uptake", presenting data for selected indicators in the attempt of providing tangible information into the actual penetration of connectivity and use of ICTs in each country.

2.3 Connectivity uptake

Connectivity uptake cannot occur in a vacuum; it necessitates both a subscription to it and a device with Internet-connectivity capability. While additional indicators on the devices used to access the Internet and the main ways this takes place are lacking, we must focus on looking at what are the structural outcomes of the ICT ecosystem in the country to respond to the question "What is connectivity uptake". Therefore, to analyse the levels of connectivity uptake and connectivity/ICT penetration in the 9 countries, the following five indicators are investigated:

1) **Fixed broadband subscriptions per 100 inhabitants:** this indicator is calculated by dividing the fixed broadband subscriptions by population and multiplying by 100.

2) **Active mobile-broadband subscriptions per 100 inhabitants**: this indicator refers to the sum of standard mobile-broadband and dedicated mobile-broadband subscriptions to the public Internet. It covers actual contracts including a broadband plan, and not potential subscribers, even though the latter may have broadband enabled-handsets.

3) **Estimated proportion of households with a computer**: In this indicator, "Computers" includes desktops and portable or handheld computers (e.g., a personal digital assistants), but not equipment with some embedded computing abilities such as mobile phones or TVs. The proportion of households with a computer is calculated by dividing the number of in-scope households with a computer by the total number of in-scope households.

4) **Proportion of Individuals who used a Computer (from any location) in the last 12 Months**: As in indicator [3], a computer refers to a desktop computer, a laptop (portable) computer or a tablet (or similar handheld computer), but does not include equipment with some embedded computing abilities, such as smart TV sets and devices with telephony as their primary function, such as smartphones.

5) **Internet users (as per cent of the population):** The number either reflects the total population of the country, or at least individuals of 5 years and older. If this is not available (i.e., target population reflects a more limited age group) an estimate for the entire population should be produced; otherwise, the age group reflected in the number (e.g., population aged 10+, or population aged 15-74) is indicated.

Together, the aforementioned indicators provide a comprehensive view of the state of connectivity uptake in the nine countries examined in this report. The first two indicators capture the number of subscriptions to broadband plans, providing insight into how many people are accessing Internet connectivity. Varying the indicators by taking into account both fixed broadband infrastructure and mobile broadband subscriptions in relation to the population helps capture the emphasized role of Internet penetration in these countries. Moreover, by investigating the ubiquity and use of Internet-capable devices in each Member State, the third and fourth indicators provide another perspective into uptake, not through subscriptions but through use of

devices. The fifth unveils some demographic questions about connectivity uptake, providing information about what proportion of the population, irrespective of subscriptions and devices, is managing to access the Internet. It is important to note that Internet use is defined by the ITU and UN as the population using Internet in the last 3 months (based on a sample in the range of age 16-74). Although the development of more specified indicators may be pursued in the future, it is the best indication currently agreed upon internationally, and thus stands as the Internet-user metric best enabled for the comparison of standardized data across borders.

2.3.1 Country-level data

Fixed broadband subscriptions per 100 inhabitants

All nine countries involved in this study have seen an increase in fixed broadband subscriptions per 100 inhabitants over the period from 2015 to 2019. This is particularly pronounced in Albania, which oversaw an almost 80.2% increase in fixed broadband subscriptions since 2015. Other notable examples of growth include Montenegro and Georgia, which saw increases of 58.8% and 49.1%, respectively. Despite such growth, disparities in the availability of connectivity are evident; as shown in Figure 7, all nine countries in consideration fall short of both the EU average and the average of Europe region as a whole.[23] These disparities, compounded with the evidence of remarkable growth since 2015 in certain Eastern Partnership and Western Balkans countries, indicate potential for further development.

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[23] https://www.itu.int/en/ITU-D/Statistics/Pages/publications/wtid.aspx

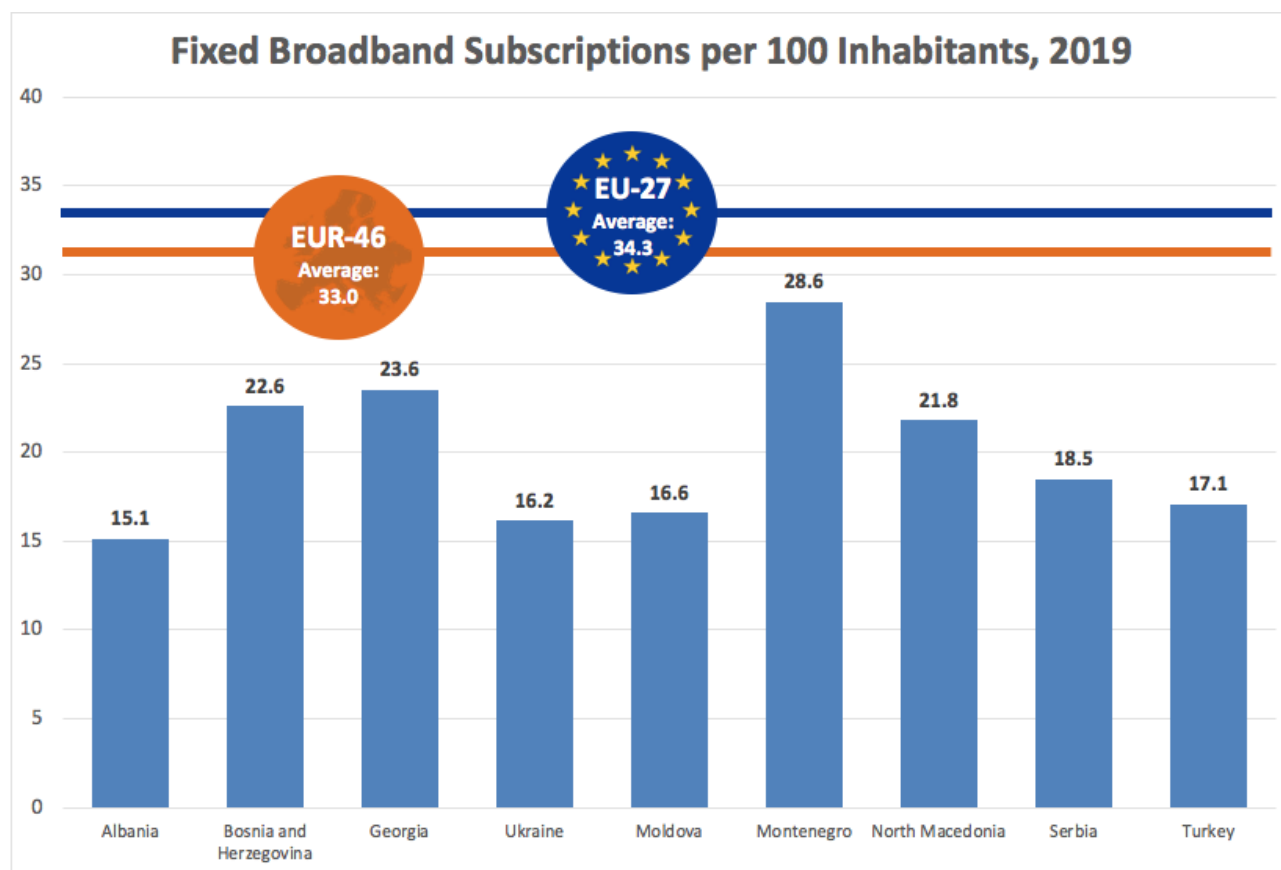*Figure 7: Fixed-broadband subscriptions per 100 inhabitants, 2019*

Figure 7: Bar chart depicting Fixed Broadband Subscriptions per 100 inhabitants across 9 countries in study, with comparisons to European Union average (27 countries) and Europe region average (45 countries: the Vatican is excluded due to a lack of data).

Source: ITU, Based on WTI Database

Another interesting trend is revealed through the calculation of the compound annual growth rate ("CAGR") of fixed-broadband subscriptions in Europe region Member States. On average, the 46 countries of Europe region increased fixed-broadband subscriptions with a CAGR of 3.4%, and the 27 Member States of the European Union experienced moderately slower annual growth with a CAGR of 3.2%. This annual growth pales in comparison to the average CAGR of the nine countries in the scope of this study, whose fixed-broadband subscriptions grew at an average of 8.7% each year from 2015 to 2019. Commensurate with the rates of change outlined above, Albania, Montenegro, and Georgia stand out with CAGRs of 15.9%, 12.3%, and 10.5%, respectively. Such growth rates demonstrate the fact that, while infrastructure gaps exist they are closing quickly, fuelled by growth rates over 2.7 times greater in the nine countries than those witnessed in the 27 EU countries over the same period.[24]

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[24] Author's calculation based on WTI Database data, 2020.

Active mobile-broadband subscriptions per 100 inhabitants

Across Europe region, growth in active-mobile broadband subscriptions per 100 inhabitants between 2015 and 2019 stands as a testament to the advanced nature of the mobile market in Europe. Ukraine, in particular, exhibited growth in the mobile market, with a considerable connectivity increase of 490.1% from 2015 to 2018. However, it remains the Member State with the lowest active mobile-broadband subscriptions as of 2018, noting room for further improvement. Other noteworthy examples of growth are Turkey, which increased its active mobile broadband subscriptions per 100 inhabitants by 50.3% from 2015 to 2019, and Georgia, which increased its subscriptions by 47.9% over the same period. Such growth has not been consistently positive, however. As evident in Figure 8, Albania achieved its peak of subscriptions in 2017, and has thus experienced a decrease of 11.8% in the period from 2017 to 2019. Similarly, Bosnia and Herzegovina achieved its peak in 2018 and saw a setback of -14.6% in the last year, despite overall positive growth from 2015.

Figure 8: Active mobile broadband subscriptions per 100 inhabitants
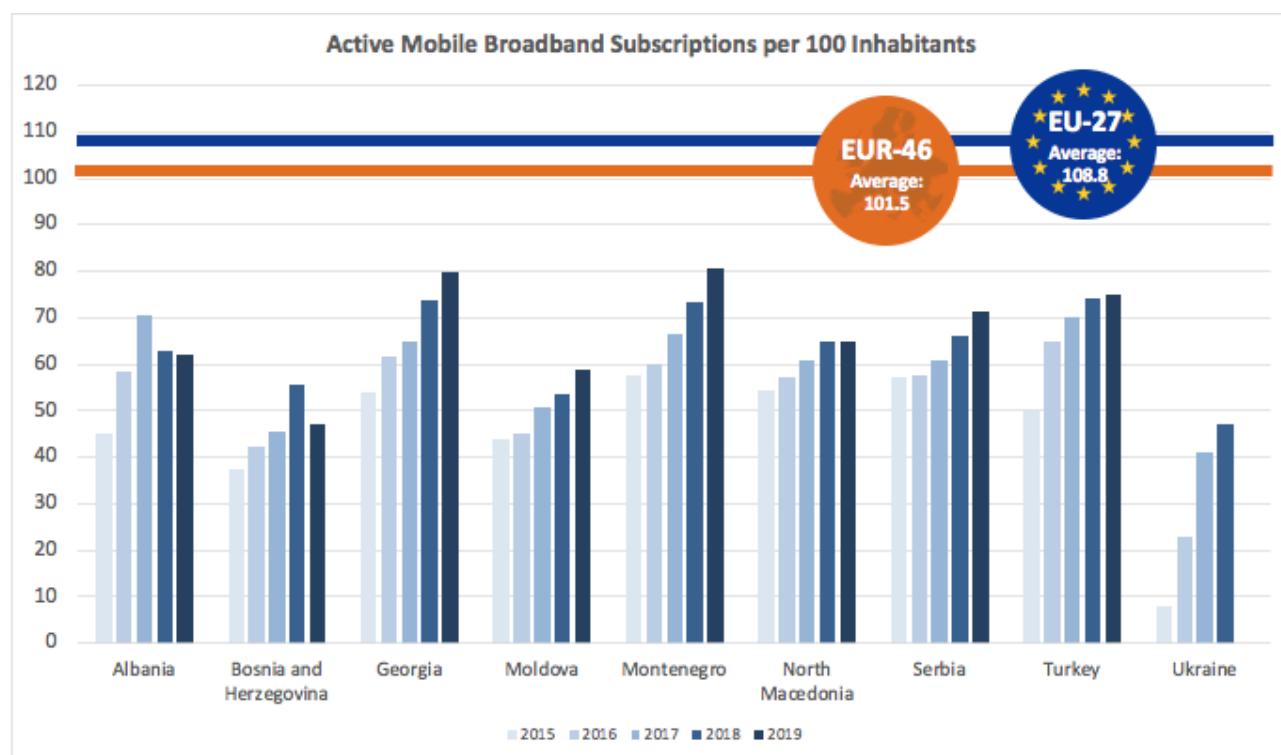

Figure 8: Bar chart depicting Active Mobile Broadband Subscriptions per 100 inhabitants across 9 countries in study over period from 2015-2019, with comparisons to 2019 European Union average (27 countries) and Europe region average (45 countries). Note: the Europe region average exludes Andorra and Ukraine, for which 2019 data is unavailable.

Source: ITU, Based on WTI Database

As with fixed broadband subscriptions, the nine non-EU countries in question—Albania, Bosnia and Herzegovina, Georgia, Moldova, Montenegro, North Macedonia, Serbia, Turkey, and Ukraine—still fall beneath the averages of both the 27 EU countries and the 45 countries comprising the Europe region. However, these gaps are closing quickly, due to the accelerated annual rates of growth of the nine countries in the scope of the study relative to their Europe region peers. Five out of nine countries had a CAGR above

the average CAGR for the Europe region (calculated without the notable outlier of Ukraine). Albania, Georgia, Montenegro, Turkey, and Ukraine all grew at an annual rate above the average 7.9% of Europe as a whole, with Ukraine's rate amounting to an outstanding 55.9%.[25] Nevertheless, unlike any of the nine countries, both the EU and Europe region have achieved the notable achievement of *over* 100 active mobile broadband subscriptions per 100 inhabitants. This indicates more than one subscription per person and testifies the use of mobile broadband for business, thus drawing attention to the disparities that exist within Europe and the space for continued infrastructure development in the region.

Estimated proportion of households with a computer

As mentioned above, accessing the Internet is not only about the choice to subscribe; it also inherently requires the use of a device. Figure 9 depicts the Estimated proportion of households with a computer in the nine countries from 2015-2019.

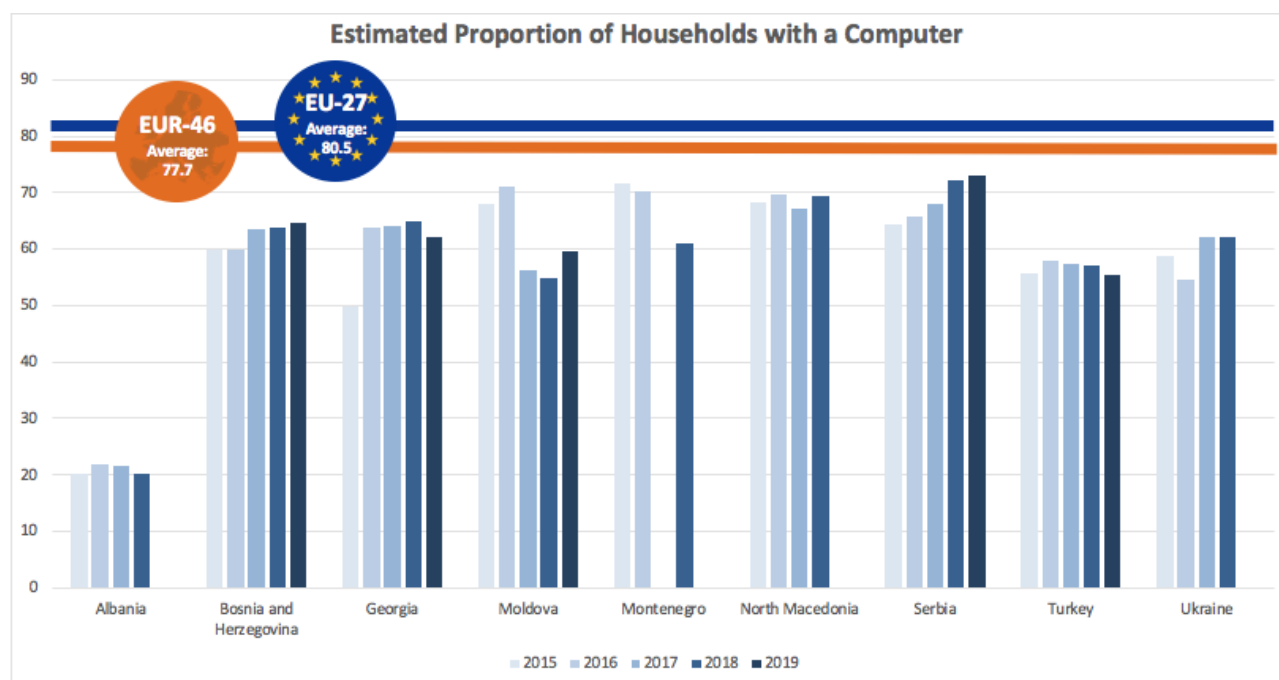*Figure 9: Estimated proportion of households with a computer*

Figure 9: Bar chart depicting Estimated proportion of households with a computer across 9 countries in study, with comparisons to European Union average (27 countries) and Europe region average (45 countries). Note: both averages are calculated using the latest available figures from 2016-2019. The Vatican is excluded due to a lack of data.

Source: ITU, Based on WTI Database

Out of the access indicators presented, proportion of households with a computer is the one metric where growth has not only been negligible throughout the region since 2015, in some cases, it has even been negative. Between 2015 and 2018, the years for which data is available for all nine countries in the scope of

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[25] Author's calculation based on WTI Database data.

the study, the average CAGR for the nine countries in consideration was 0.57%. Moldova and Montenegro experienced decreases in the estimated proportion of households with a computer, with Moldova witnessing a -3.3% annual growth rate between 2015 and 2019 and Montenegro witnessing a -5.2% annual growth rate between 2015 and 2018. With the exception of Georgia, which oversaw a 24.7% increase in the proportion of households with a computer—a notable CAGR of 5.7% from 2015 to 2019—the remaining six countries all demonstrated limited, albeit positive, growth. It is important to note, moreover, that Serbia does not remain far from the Europe region average of 77.7%, with 73.1% of Serbian households having access to the internet through a computer in 2019. Nevertheless, with 41.4% of households in the nine countries still without a computer at home, computer access in approximately 20.5 million households remains a connectivity challenge.[26]

Proportion of Individuals who used a Computer (from any location) in the last 12 Months

Embedded in this indicator are many facets of access, including both the physical access to a computer as well as the digital skills required in order to use it. As evidenced in Figure 10, four out of the six countries for which data is available in our set of countries have experienced growth in computer use in the years presented.

Figure 10: Proportion of individuals who used a computer (from any location) in the last 12 months*
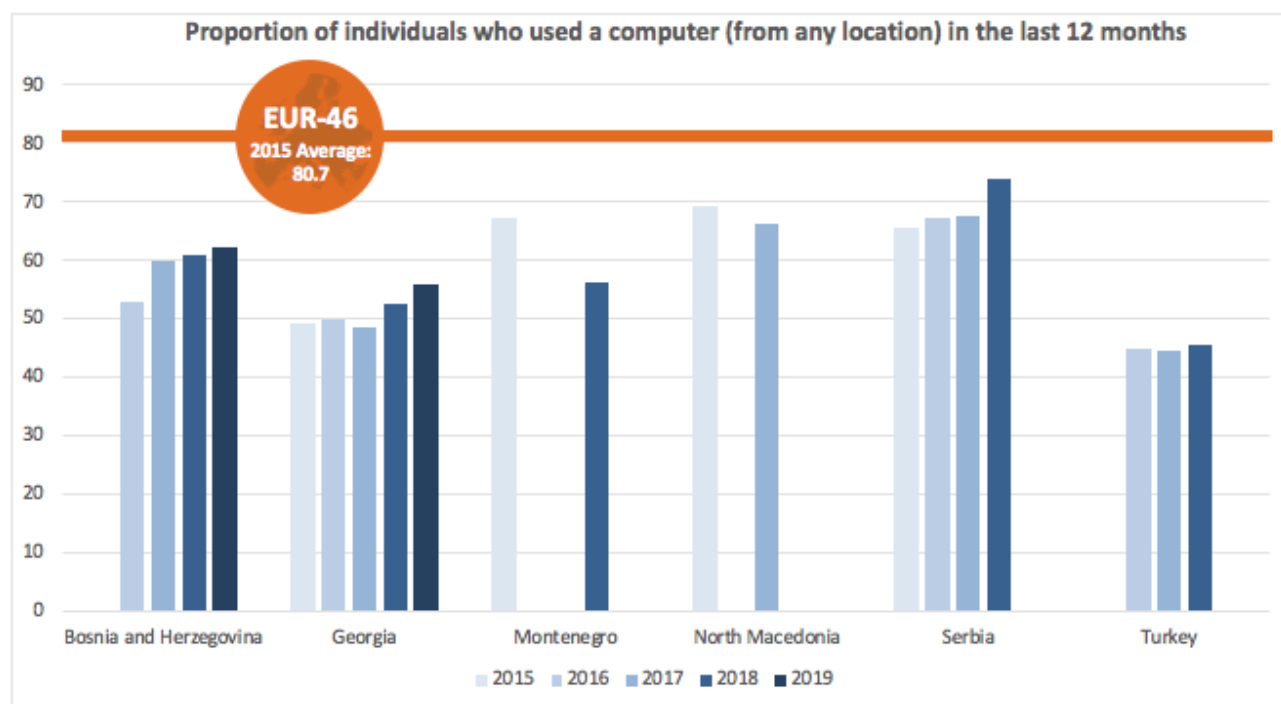
Figure 10: Bar chart depicting Proportion of individuals who used a computer (from any location) in the last 12 months* across 9 countries in study, with comparison to the 2015 EUR-46 average. Note: [1] Albania, Moldova, and Ukraine are not depicted due to a lack of data; [2] Georgia's reference population are those aged 6 years and older; [3] Data from North Macedonia and Serbia

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[26] Author's calculation based on WTI Database data.

However, it is important to note the downward trend witnessed in both Montenegro and North Macedonia, both of which saw lower proportions of individuals having accessed a computer since 2015. The effects of this trend may be offset in Montenegro by the fact that, already in 2015, 94.5% of Montenegrins had used a mobile cellular telephone. However, the development gap is North Macedonia remains a challenge, where only 61.5% of the population used a mobile cellular telephone in 2017. Turkey presents another ripe opportunity for development, with less than half of the Turkish population having accessed a computer in 2018.

Internet users (as per cent of the population)

As highlighted by the Digital Trends in Europe 2021 report, Europe is the global leader in the proportion of Internet users. However, as with many indicators outlined in sections 2.1 and 2.2, access and overall ICT penetration is another facet of connectivity in which the nine countries in the scope of the study have not yet reached levels commensurate with either the Europe region average or the average of EU neighbours. This is evident in Figure 11. Moreover, the divide in Internet users between the nine countries considered and the peer states of Europe region is diminishing at an accelerating rate. Eight out of the nine countries experienced annual growth rates (CAGR) above the average Europe region CAGR for the years in which data is available, with Turkey's CAGR more than four times the regional average, and Georgia's CAGR almost five times the annual growth rate of its peers.[27]

Figure 11: Internet users as per cent of population

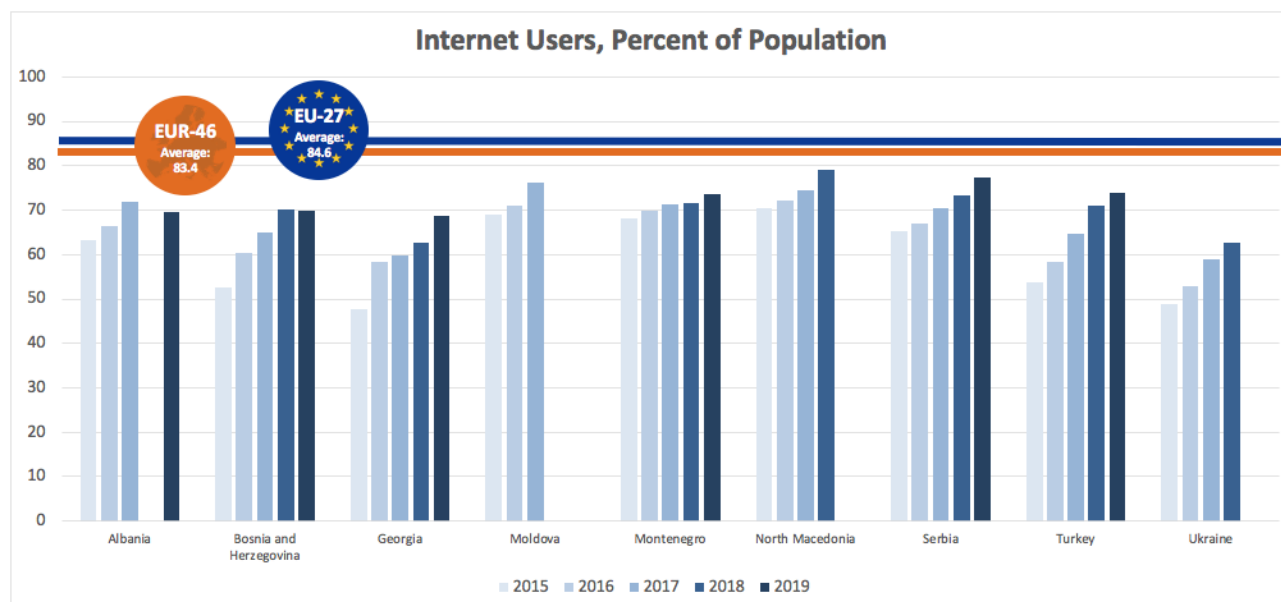[27] Author's calculation based on WTI Database data.

Figure 11: Bar chart depicting Internet users as per cent of population across 9 countries in study over period from 2015-2019, with comparisons to European Union average (27 countries) and Europe region average (45 countries). Note: the EU-27 average was calculated based on the latest available figure from each country since 2018. The EUR-46 average was calculated using latest available figure from each country since 2017 and excludes the Vatican, for which data is not available.

Source: ITU, Based on WTI Database

2.3.2 Main takeaways

This section explored the state of connectivity in the nine countries from a point of view of access, which includes both access to Internet-connected devices and access to the Internet through broadband subscriptions. There are four main points regarding access which prove imperative to understanding the baseline state of connectivity in the Eastern Partnership and Western Balkans countries prior to the onset of the Covid-19 pandemic which provide a good overview into the degree of penetration of ICTs.

First, as with availability, gaps exist between the nine countries in the scope of the study and their Europe region peers. If data on broadband subscriptions is taken as a proxy to measure uptake to ICTs in a given country, gaps are particularly pronounced when the nine countries are compared to the Member States of the European Union, which, on average, are ahead of their non-EU Europe region neighbours in every uptake indicator. Second, these gaps are less extreme in indicators examining the mobile market, highlighting the importance of mobile technology as an enabler of connectivity in the nine countries, particularly in rural areas where the deployment of fixed broadband may be hardly viable. Third, despite the promising data showing notable growth in the availability of Internet access in the home (Figure 2) in section 2.1.1, access to computers within the home remains a connectivity challenge in the countries in the scope of the study (Figure 9), a problem likely exacerbated by the d-19 pandemic, where multiple people per household may be lacking a proper device with which to access remote working and distanced education. Finally, despite these gaps, the rate of convergence between the nine countries and Europe region's average is accelerating, providing an opportunity for development partners to close the disparities.

3. Status and opportunities

3.1 Summary of takeaways

In answering the three questions, "is connectivity available?"; "is connectivity affordable?"; and "what is connectivity uptake?", this report has attempted to provide a snapshot of the status of connectivity in nine non-EU countries of the Europe region prior to the onset of the Covid-19 pandemic. An analysis of ten indicators across the nine countries since 2015 has revealed three cross-cutting trends which characterize the status of connectivity in Albania, Bosnia and Herzegovina, Georgia, Moldova, Montenegro, North Macedonia, Serbia, Turkey, and Ukraine.

First, **mobile** has been the cornerstone of broadband development in the 9 countries, with the number of connections, 4G coverage rates and prices converging towards the EU and Europe region averages. This will continue to be the case in the future as increased demand for connectivity can be addressed easily by mobile due to easier deployment, lower price burden on GNI/capita, and facilitated reachability of rural areas. Rural reachability will prove particularly vital in Bosnia and Herzegovina, Moldova, Georgia, Serbia, North Macedonia and Albania, as each have 40% or more of their populations living in rural areas.

Second, while fixed deployment still lags behind in terms of connections per household in the 9 countries, there has been a spike in **FTTH/B** adoption between 2018 and 2019, despite prices remaining higher than EU and Europe region averages. This indicates that countries have the opportunity to continue improving these percentages as they align the total number of subscriptions per capita/per household, and as they lower prices, to EU and Europe averages, while simultaneously having the possibility of leapfrogging directly to fibre technology making it the principal technology adopted, thus providing more reliable and resilient national networks.

Thirdly, even as Internet access in the home catches up to Europe region averages, disparities in device availability, access and usage may preclude advances in connectivity. The general, global trend identified in the Broadband Commission's "State of Broadband 2019" report regarding the impact of economically prohibitive devices on connectivity may also be true on national scales in the nine countries, as computer usage and computer presence in households lag behind EU and Europe region averages. Moreover, the relative **affordability** of mobile devices compared to PCs reinforces the claim that mobile broadband will continue being the main enabler for connectivity in these nine countries.

Finally, indicators for the **penetration** of broadband subscriptions among the population, both fixed and mobile, as well as for **device usage** reflect the challenges and the points just mentioned, suggesting that while growth rates are improving on almost all fronts since 2015, substantial gaps still remain in terms of final outcomes. In conjunction, these disparities and expedited growth rates indicate promising opportunities for

development intervention in the nine countries, especially in the context of COVID-19 and the imperative to *building back better*.

As such, the following sections will outline the activities of the ITU Office for Europe and accord them with identified areas of need, with the goal deploying support in the context of the UN Resident Coordination mechanism.

3.2   ITU Office for Europe areas of action on connectivity

ITU activities dedicated to addressing the connectivity-related challenges outlined above are undertaken under the framework of the ITU Regional Initiative for Europe 1 on "Broadband Infrastructure, Broadcasting and Spectrum Management" adopted by the ITU World Telecommunication Development Conference 2017 (WTDC-17).[28] The 9 South Eastern European countries in scope of this study are priority areas for the ITU Office for Europe.

Past and present experiences in working directly with the countries to implement the Regional Initiatives for Europe are aimed at facilitating high-speed connectivity with resilient and synergistic infrastructure development, deployment and sharing. In this context, two main types of activities are undertaken: technical assistance to the countries and capacity building.

Technical assistance

As the UN Agency in charge of ICTs, the ITU provides technical assistance in a variety of fields relating to the digital sphere. The following areas are particularly important for connectivity:

- National broadband strategies: a systematic approach to broadband development is needed at the national level in order to set the tone, establish a dialogue with key stakeholders, and create an enabling environment for a flourishing electronic communications sector. ITU provides technical assistance in the assessment of the market and strategy elaboration in coordination with government authorities in charge of ICTs and National Regulatory Authorities.
- Broadband mapping: information on the location and capacity of networks is essential to National Regulatory Authorities and Government Ministries in charge of ICTs to ensure efficient monitoring and funding of electronic communication networks at the country level whilst protecting competition and fostering transparency in the market. ITU collaborates with NRAs to facilitate the exchange of information on backbone networks at the global level and provides technical assistance to the countries regarding the harmonization with the EU regulatory framework for broadband mapping and technical/project setup for establishing or strengthening mapping systems at the country level.

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[28]   ITU Regional Initiatives for Europe 2018-2021 (https://www.itu.int/en/ITU-D/Documents/RI_Europe.pdf)

- Last Mile Connectivity: rural broadband is a challenging area of action for all countries as market failures in rural areas are frequent. ITU has developed the Last Mile Connectivity toolkit and is developing an analytical tool to estimate the technical requirements needed in relation to societal needs. ITU will provide technical assistance on last mile connectivity projects at the country level to strengthen governments and National Regulatory Authorities in their activities in this field.

- IPv6: Internet Protocol version 6, with its 128 bit address space is particularly aimed at addressing the shortage of public IPv4 addresses relative to the growing global demand for connectivity. ITU provides technical assistance to countries by supporting smooth and well managed transition from IPv4 to IPv6 through capacity building activities such as trainings and/or workshops aimed at training experts who will continue the implementation at the country level.

- Spectrum policy planning: the development and adoption of a of a nation-wide spectrum policy aims to promote the efficient management of radio spectrum resources which, in particular, shall ensure the availability of a sufficient frequency spectrum for the continuous development of public broadband terrestrial mobile electronic communications networks and services, technology and next-generation services implementation and ensuring medium- and long-term predictability regarding policy of radio spectrum resources. ITU provides technical assistance in elaborating spectrum policy plans aimed at creating the conditions of trust in the market and facilitating long terms investment in electronic communications.

- Frequency coordination: frequency coordination is a very important asset preventing service interference at the national level and along the borders. The need for frequency coordination plans arises whenever technical changes are required as they affect all market players as well as coordination with neighbouring countries. For example, ITU provides technical assistance to National Regulatory Authorities in the context of releasing the 700MHz band from broadcasting services in favour of mobile communications, which requires a detailed assessment as well as analytical tools and capabilities.

- In addition, the ITU has expertise in implementing capacity building activities such as events, workshops or specialized trainings in a variety of fields relating to the digital sphere creating the platform for the fostering exchange of information among stakeholders. Please see the **Annex 1** containing a list of events and trainings.

3.3   ITU in the UN coordination process in Europe

Bridging the connectivity divide has been recognized as priority area by the 46 countries of Europe region for the period 2018-2021 and adopted by the World Telecommunication Development Conference (WTDC-17) for implementation.[29] It was also identified as top priority for the next implementation period of 2022-

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[29] https://www.itu.int/en/ITU-D/Documents/RI_Europe.pdf

2025, [30] thereby providing continuity to the activities outlined above which will be expanded and strengthened. This is particularly important in the context of the nine countries in scope of this study, which will also benefit from the work of the ITU being part of the UN Country Teams.

In follow up to the redesign of the UN Sustainable Development system and reinforced collaboration between the ITU and the Resident Coordinators (RC) system, the ITU Office for Europe seeks to contribute to the process, serving as a trusted partner to support the digital transformation in all nine countries and beyond, and acts as a collaborator and implementer for joint projects, capacity building and training activities. Moreover, ITU co-chairs with UNECE the United Nations Group on Digital Transformation for Europe and Central Asia (UN-DTG4ECA), the layer of UN Cooperation dedicated to digital development that provides additional coordinated input into the RC process. Finally, the ITU Office for Europe co-facilitates the UN Brussel's Team Taskforce on Digitalization for Sustainable Development, focusing on creating liaison on digital matters between the European Union and the UN.

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[30] https://www.itu.int/md/meetingdoc.asp?lang=en&parent=D18-RPMEUR-C-0034

4. Conclusion

This report has departed from the wider assessment on "Digital Trends in Europe 2021" and has focused on outlining the status of connectivity in nine non-EU countries of Europe region as of early 2020, zooming on the fundamental aspects of "available connectivity", "affordable connectivity" and "connectivity uptake". Despite the overall progress demonstrated on most indicators over the past five years, and particularly from 2018 onwards, it is evident that there remain considerable gaps between the nine countries and Europe region averages as well as the aggregate computations for the European Union countries. These gaps are in turn expected to have been exacerbated by Covid-19 over the course of 2020.

This overview is a starting point but, as confirmed by the data, the ITU Office for Europe is prompted to act to improve connectivity at all levels in the nine countries assessed and strengthen the delivery of technical assistance and implementation of capacity building activities and other projects. Based on the expertise developed in the past and benefitting of increased collaboration and synergies at the UN Coordination level, ITU looks forward to strengthening its presence and delivery in these nine countries and other countries most in need in Europe region.

Background Paper on the Status of Connectivity in 9 non-EU countries of Europe region

Annex 1

ITU Office for Europe – Capacity Building Activities on Connectivity

Events

- 5G
  - ITU Regional Forum for Europe on 5G strategies, policies and implementation (Oct-20)
    - Background paper on "5G implementation in non-EU countries of the Europe Region"
    - Background paper on "Implementing 5G for Good: Does EMF Matter?"
  - ITU Regional Workshop for Europe and CIS on "ICT Infrastructure as basis for Digital Economy"(May-19)
  - ITU Forum on "Towards 5G Enabled Gigabit Society" (Oct-18)
    - ITU publication on "Setting the scene for 5G: opportunities and challenges"

- Broadband mapping
  - ITU Regional Regulatory Forum for Europe on Regulation Supporting Digital Transformation (Dec-20)
    - Background paper on "Broadband Mapping Systems in Europe and Regional Harmonization Initiatives"
    - Background paper on "Infrastructure sharing and co-deployment in Europe: good practices based on collaborative regulation"
  - ITU Regional Workshop for Europe on "Mapping of Terrestrial Broadband Infrastructure and Services" (Jul-19)

- Spectrum and broadcasting
  - ITU Seminar for Europe and CIS on Spectrum Management and Broadcasting (Jul-20)
  - 3rd Annual CIS and CEE Spectrum Management Conference and ITU Workshop "How to achieve interference free communication at the current technological stage" (Apr-19)
  - ITU Workshop on "The Future of Television for Europe" (Jun-19)

Trainings:

- Special training for Europe on ICT Infrastructure business planning (2021)