
# Digital Economy and Society Index (DESI) 2022

## Bulgaria

# About the DESI

*Since 2014, the European Commission has monitored Member States' progress in digital and published annual Digital Economy and Society Index (DESI) reports. Each year, the reports include country profiles, which help Member States identify areas for priority action, and thematic chapters providing a EU-level analysis in the key digital policy areas. The DESI Index ranks Member States according to their level of digitalisation and analyses their relative progress over the last five years, considering their starting point.*

*The Commission has adjusted DESI to align it with the four cardinal points set out in the Commission proposal for a decision 'Path to the Digital Decade Policy Programme' which is being negotiated by the European Parliament and the Council. The proposal sets targets at EU level to be reached by 2030 to deliver a comprehensive and sustainable digital transformation across all sectors of the economy. Of the DESI 2022 indicators, 11 measure targets set in the Digital Decade. In the future, the DESI will be aligned even more closely with the Digital Decade to ensure that all targets are discussed in the reports.*

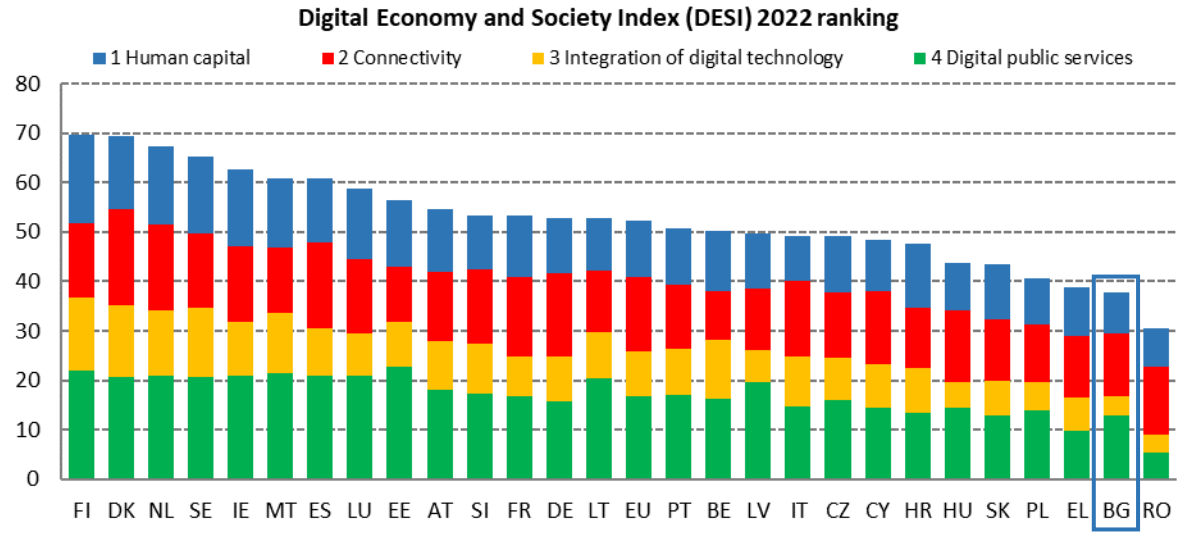
*To date, digitalisation in the EU is uneven, although there are signs of convergence. While the frontrunners have remained unchanged, there is a substantial group of Member States that cluster around the EU average. Importantly, the majority of Member States that had a lower level of digitalisation 5 years ago, are progressing at a faster pace than the rest, indicating an overall convergence in digital in the EU.*

*Reaching the Digital Decade targets depends on a collective effort by all. Each Member State will contribute to this ambitious goal from a different starting point, determined by resources, comparative advantages and other relevant factors such as the population size, the scale of the economy and the areas of specialisation. For example, Member States with large economies or populations will need to perform well to enable Europe as a whole to reach the targets by 2030. Digital frontrunners will need to continue progressing to lead on digitalisation worldwide, while all Member States' digitalisation efforts will be driven by their economic and societal needs.*

*The DESI scores and rankings of previous years are re-calculated for all Member States to reflect changes in the underlying data. For further information, see the DESI website.*

# Overview

| | Bulgaria | | EU |
|---|---|---|---|
| | rank | score | score |
| DESI 2022 | 26 | 37.7 | 52.3 |




Bulgaria ranks 26th of the 27 EU Member States in the European Commission Digital Economy and Society Index (DESI) in 2022. Bulgaria's DESI score grew at an annual average of 9% over the past five years[1]. Given the positioning of Bulgaria, this growth rate is not sufficient for the country to catch up with the other EU Member States.

On digital skills, despite recent increased efforts, the country remains significantly below the EU average, having a score of 32.6 versus the EU average of 45.7. The proportion of individuals with at least basic skills and above basic digital skills is well lower than the EU average, the latter significantly so (8% versus the EU average of 26%). Considering the EU's ambitous target of 80% of adults having at least basic digital skills by 2030, the country needs to step up efforts, as more than two thirds of its population lack such skills. Bulgaria also underperforms on the proportion of ICT specialists in the workforce (3.5% versus 4.5% EU average). However, the proportion of female ICT specialists is high.

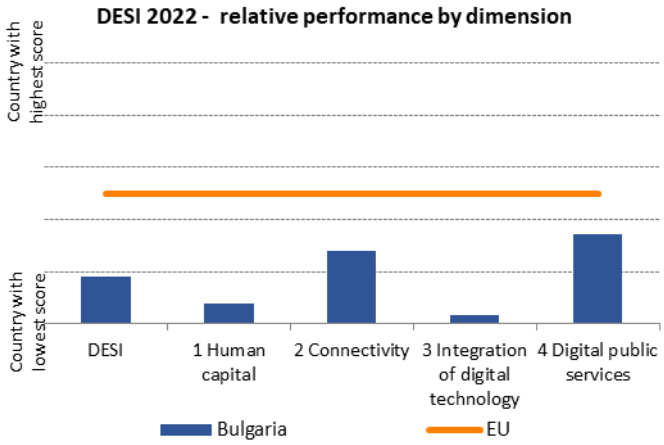
On Connectivity, Bulgaria score very well on Fibre to the premises coverage (85% of households vs 50% in the EU), it has low prices, but both fixed and mobile broadband take-up is low. In addition, only 25% of 5G spectrum has been assigned (EU average: 56%).

On the business side, the adoption of digital technologies by SMEs remains almost half the EU average. Only 6% of Bulgarian enterprises use big data, 10% cloud and 3% artificial intelligence (AI), as opposed to the EU 2030 targets of 75% for each technology. To support business digitalisation, Bulgaria is making use of European Digital Innovation Hubs. Four European Digital Innovation Hubs proposed by the country received a successful evaluation result[2] and another eight proposals got a Seal of Excellence.

[1] Refer to section 1.3 of the DESI 2022 horizontal chapter.
[2] Four proposals are invited for grant agreement preparation (which is not a formal commitment for funding).

Bulgaria is facing many challenges regarding the digitalisation of its public services, as it underperforms in most indicators, with the exception of open data, which is on par with the EU average. Only 34% of internet users interact with the government online (65% in the EU). The supply of digital public services for citizens (with a score of 59 versus an EU average of 75) needs to improve significantly to enable Bulgaria to contribute to the 2030 Digital Decade target of all key public services offered fully online. To achieve this goal, Bulgaria has launched the National Registry reform and defined the path to enhance digital transformation.

To overcome the shortcomings in Bulgaria's digital transformation and to put it on a par with the other EU Member States, there needs to be a continued, sustained effort at political and administrative level that builds on the country's strenghts to deliver on the reforms and investments in all four dimensions. The recent political instability may have significantly affected attempts in this area.




Concerning Bulgaria's digital-related response to Russia's invasion of Ukraine, major mobile operators offered free international calls from Bulgaria to Ukraine from the first week of the conflict to help the affected people and their relatives. The measures were also extended to offer free roaming, including short messages (SMS) and mobile internet, to mobile service subscribers located in Ukraine. To further ease those in need, prepaid cards and data cards were provided to people fleeing Ukraine who went in Bulgaria. In parallel, Bulgaria's cybersecurity experts working at the Ministry of e-Government and the cybercrime department in the Ministry of Interior took precautionary measures to filter out or completely block traffic potentially leading to attacks to electronic systems or networks originating from over 45 000 internet addresses. In addition, to strengthen the fight against disinformation campaigns during the Russia's invasion of Ukraine, Bulgaria's competent authorities blocked the distribution of the Russia Today channels.

## Digital in Bulgaria's Recovery and Resilience Plan (RRP)

The total budget of the Bulgarian Recovery and Resilience Plan is nearly EUR 6.9 billion, of which EUR 6.3 billion will be financed in the form of non-repayable grants by the Recovery and Resilience Facility. The plan is overall composed of twelve components, in four policy pillars: 1) Innovative Bulgaria, 2) Green Bulgaria, 3) Connected Bulgaria, and 4) Fair Bulgaria.

For the digital transition, the allocated budget is, in total, EUR 1.6 billion[3] (25.8%[4] of the plan's total allocation). Relevant measures, i.e. reforms and investments, are included in multiple components, with a particular focus in digital connectivity (under pillar 3) and the digitalisation of the public sector (pillar 4).

In particular, the Innovative Bulgaria pillar (total investments for digital of approx. EUR 330 million) includes measures for modernising the digital facilities and content of the education system, the digital upskilling of the workforce, enhancing digital connectivity and the innovation capacity of the Bulgarian Academy of Sciences, and fostering the digital transition of small and medium-size companies.

The Green Bulgaria pillar (total investments for digital of approx. EUR 405 million) includes investments in the digital transformation of the electricity transmission grid, that include the extension and upgrade of the telecommunication network together with a comprehensive cybersecurity system. In addition, it includes measures to facilitate the automated data exchange between the administration and farmers with a view to ensuring a more efficient and uniform flow of data, as well as in digital transformation of the agricultural sector.

The Connected Bulgaria pillar (total investments for digital of approx. EUR 632 million) includes measures focusing on building a modern and secure digital infrastructure and maximising the access to online services for citizens, enterprises, public administrations and institutions, especially in rural and remote areas. The investments concern the large-scale deployment of digital infrastructure, development and optimisation of the digital TETRA system and radio relay network, and support the development of the State backbone network by increasing its transmission capacity. The measures also aim at ensuring connectivity to all municipal centres and support the deployment of Very High Capacity Networks in sparsely populated, remote and rural areas. In addition, there are investments in digitalisation of railways and the Bulgarian Post, and digitalisation of integrated management, control and efficient use of water.

Finally, the Fair Bulgaria pillar (total investments for digital of approx. EUR 248 million) includes measures for the digital transformation of the construction sector, and the establishment, maintenance and digitalisation of registration data in public administration. There are also investments dedicated to building up the Unified Information System of Courts, the Single Case Management Information System and the information and communication infrastructure at the Public Prosecutor's Office. Moreover, digitising content of museums, libraries and archives to improve accessibility and foster preservation is part of the RRP. Lastly, measures focus on the development of e-health and of the National Health Information System.

[3] Each recovery and resilience plan has to dedicate at least 20% of the plan's total allocation to digital objectives. To this end, the plans had to specify and justify to what extent each measure contributes fully (100%), partly (40%) or has no impact (0%) on digital objectives, using Annex VII of the RRF Regulation. Combining the coefficients with the cost estimates of each measure allows assessing to what degree the plan contributes to digital objectives and whether it meets the 20% target.

[4] Source: table 8 of SWD(2022) 106 final.

# 1 Human capital

| 1 Human capital | Bulgaria | | EU |
|---|---|---|---|
| | rank | score | score |
| DESI 2022 | 26 | 32.6 | 45.7 |

| | Bulgaria | | | EU |
|---|---|---|---|---|
| | DESI 2020 | DESI 2021 | DESI 2022 | DESI 2022 |
| **1a1 At least basic digital skills**<br>% individuals | NA | NA | 31%<br>2021 | 54%<br>2021 |
| **1a2 Above basic digital skills**<br>% individuals | NA | NA | 8%<br>2021 | 26%<br>2021 |
| **1a3 At least basic digital content creation skills**[5]<br>% individuals | NA | NA | 44%<br>2021 | 66%<br>2021 |
| **1b1 ICT specialists**<br>% individuals in employment aged 15-74 | 3.1%<br>2019 | 3.3%<br>2020 | 3.5%<br>2021 | 4.5%<br>2021 |
| **1b2 Female ICT specialists**<br>% ICT specialists | 28%<br>2019 | 28%<br>2020 | 28%<br>2021 | 19%<br>2021 |
| **1b3 Enterprises providing ICT training**<br>% enterprises | 10%<br>2019 | 7%<br>2020 | 7%<br>2020 | 20%<br>2020 |
| **1b4 ICT graduates**<br>% graduates | 3.8%<br>2018 | 4.0%<br>2019 | 4.6%<br>2020 | 3.9%<br>2020 |

In the Human capital dimension, Bulgaria ranks 26th out of the 27 EU countries. Only 8% of individuals have above basic digital skills (versus the 26% EU average), and only 31% have at least basic digital skills (versus the 54% EU average). 7% of enterprises provided ICT training to their staff in 2020, significantly below the EU average of 20%. However, Bulgaria scores well on female ICT specialists (representing 28% of all ICT specialists versus an EU average of 19%), while the proportion of ICT graduates is also high.

Bulgaria's digital skills strategy is embedded in the country's Digital Transformation by 2030 plan. The principal measures of the plan target the education and training system at all levels to improve the digital skills of the workforce. Bulgaria allocated EUR 2 million from the 2021 national budget to launch projects for training academic staff, teachers and practitioners. Bulgaria also invested EUR 2.9 million to set up 21 personal development centres for the digital literacy of students and young people. These youth centres will provide free of charge formal and non-formal training in digital skills, including cybersecurity and best practices for browsing the internet safely.

To support learning activities during the pandemic and to increase children's and students' access to education, over 85 000 devices, such as laptops and tablets were procured partially under the government budget and the national ICT plan. The Ministry of Education and Science has projects focusing on complementary and alternative approaches to work and study for children with disabilities and special educational needs.

Bulgaria's vocational education and training (VET) scheme explicitly targets students who drop out of formal education including vulnerable groups such as the Roma population. All VET curricula include

[5] Break in series for indicators 1a1, 1a2 and 1a3. Figures are not comparable with those in earlier DESI reports.

classes in information technologies, independently of the nature of the studies. Furthermore, in 2021, Bulgaria approved a national programme to integrate IT classes into curricula that are not related to computer science. IT training starts from the third and fourth grade with 1 hour per week, where pupils can develop their computational thinking. As of the 2021 – 2022 academic year, sixth and seventh grade students can learn high-level programming languages such as Python. IT classes are complusory at high-school level.

The national Human Resources Development Operational Programme aims to increase the workforce's level of digital skills in various sectors through digital skills courses funded by the European Social Fund+ and the Recover and Resilience Facility during the 2021 – 2027 programming period. The overall budget of around EUR 400 million intends to cover the skills deficit of 168 000 people, mainly from vulnerable groups such as the unemployed or elderly people. Since 2019, the Ministry of Education has allocated EUR 1.6 million from the national budget to reform and modernise kindergartens and schools with inclusive educational technologies, such as hearing aids, braille machines and other specialised software for children and students. An adult education platform providing basic digital skills training for 500 000 individuals is up for approval in 2022. Bulgarian SMEs are set to benefit from the reskilling and upskilling of the workforce, which is expected to raise digital competency levels. The latter is a measure included in the National Strategy for SMEs 2021-2027.

Classes for AI programmers and robot programmers are offered under the Learning for IT skills national career programme, alongside professional training provided by non governmental organisations (NGOs). More specifically, NGOs, financially supported under the EFSI Skills & Education Guarantee Pilot in Bulgaria, have launched an IT training programme to help students and professionals pursue a career in software engineering. This initiative is supported by private companies to ensure that these programmes fulfill the requirements of the industry and the market. Currently, Bulgaria has 35 000 employed software engineers and 2 000 ICT specialists graduating annually. In 2021, the National Coalition organised a hackathon for Girls in AI and completed a project on media literacy and fake news funded by Erasmus+.

There were 460 events that took place in Bulgaria for EU Code Week in 2021, which corresponds to 66.4 activities per 1 million inhabitants. In total, 17 707 people participated, 44% of which were female. Most of the activities (71%) took place in schools.

The percentage of Bulgarians with basic digital skills remains particularly low. This requires extensive and targeted action, also in view of the ambitious Digital Decade 2030 targets. Bulgaria's shortage of ICT specialists in employment is a further obstacle to enterprises having a highly skilled workforce. The country is taking concrete steps to improve the digital skills of its workforce and students, but swift implementation is essential to help Bulgaria tackle its shorcomings in this area.

**Human capital in Bulgaria's Recovery and Resilience Plan**

The Bulgarian Recovery and Resilience Plan includes measures that are entirely or partially linked to digital skills. They have a total digital budget of about EUR 299 million. The measures mainly address challenges linked to education and digital skills training for adults and include:

- The setting up of a national online platform for adult learning, free of charge, which aims to up- and re-skill the workforce and support the acquisition of digital skills (EUR 164 million).
- The promotion of science, technology, engineering and mathematics (STEM) and the setting up of STEM centres and laboratories in schools (EUR 122 million dedicated to

digitalisation), to promote interest and skills in subjects related to natural and engineering sciences, artificial intelligence, robotics, and natural sciences.

- Additional investments in youth centres (EUR 32 million) enhance the employability and social inclusion of young people, including from vulnerable groups. These centres will provide a number of activities, also promoting digital equality through access to education and training.

# 2 Connectivity

| 2 Connectivity | Bulgaria | | EU |
|---|---|---|---|
| | rank | score | score |
| DESI 2022 | 19 | 50.7 | 59.9 |

| | Bulgaria | | | EU |
|---|---|---|---|---|
| | DESI 2020 | DESI 2021 | DESI 2022 | DESI 2022 |
| **2a1 Overall fixed broadband take-up**<br>% households | 58%<br>2019 | 59%<br>2020 | 63%<br>2021 | 78%<br>2021 |
| **2a2 At least 100 Mbps fixed broadband take-up**<br>% households | 11%<br>2019 | 15%<br>2020 | 22%<br>2021 | 41%<br>2021 |
| **2a3 At least 1 Gbps take-up**<br>% households | 0.26%<br>2019 | 0.27%<br>2020 | 0.42%<br>2021 | 7.58%<br>2021 |
| **2b1 Fast broadband (NGA) coverage**<br>% households | 84%<br>2019 | 88%<br>2020 | 93%<br>2021 | 90%<br>2021 |
| **2b2 Fixed Very High Capacity Network (VHCN) coverage**<br>% households | 65%<br>2019 | 75%<br>2020 | 85%<br>2021 | 70%<br>2021 |
| **2b3 Fibre to the Premises (FTTP) coverage**<br>% households | 65%<br>2019 | 75%<br>2020 | 85%<br>2021 | 50%<br>2021 |
| **2c1 5G spectrum**<br>Assigned spectrum as a % of total harmonised 5G spectrum | 0%<br>04/2020 | 25%<br>09/2021 | 25%<br>04/2022 | 56%<br>04/2022 |
| **2c2 5G coverage**[6]<br>% populated areas | NA | 0%<br>2020 | 40%<br>2021 | 66%<br>2021 |
| **2c3 Mobile broadband take-up**<br>% individuals | 60%<br>2018 | 60%<br>2018 | 73%<br>2021 | 87%<br>2021 |
| **2d1 Broadband price index**<br>Score (0-100) | 72<br>2019 | 78<br>2020 | 86<br>2021 | 73<br>2021 |

In 2021, Bulgaria surpassed the EU average in both Fast broadband (NGA) coverage (93% versus 90% in the EU) and Fixed Very High Capacity Network (VHCN) coverage (85% versus 70% in the EU). VHCN is provided by Fibre to the Premise (FTTP) technology. FTTP, increased from 75% in 2020 to 85% in 2021 (from 49% to 61% in rural areas). However, Bulgaria still ranks very low in overall fixed broadband take-up (63% of households, EU 78%) and is also lagging behind in the take-up of fixed broadband of at least 100 Mbps (22%, EU 41%). In addition, take-up of 1Gbps broadband is still at an extremely low level (0.42%). The mobile broadband indicators are also below the EU average: 25% of 5G spectrum has been assigned (EU: 56%), while 5G coverage is 40% of populated areas (EU: 66%). 73% of people use mobile broadband (EU: 87%). Low fixed and mobile take-up does not seem to be correlated with high prices, as Bulgaria performs well (ranking 5th) in the Broadband Price index.

Adopted in August 2020, the latest version of Bulgaria's Broadband plan (Connected Bulgaria) is aligned with the EU's 2025 gigabit society targets, but not yet with the Digital Decade targets (gigabit for everyone and 5G for all populated areas by 2030). Connectivity is identified as a key enabler for

[6] The 5G coverage indicator does not measure users' experience, which may be affected by a variety of factors such as the type of device used, environmental conditions, number of concurrent users and network capacity. 5G coverage refers to the percentage of populated areas covered by at least one operator as reported by operators and national regulatory authorities.

competitive enterprises, social inclusion as well as for developing and offering digital public services. The main pillars of the plan, which aims to bring Bulgaria closer to the average DESI connectivity score, are: broadband infrastructure, VHCN deployment, making more efficient use of the spectrum, improving coverage in rural areas, bridging the digital divide and enhancing network security. The plan also identifies 5G as a central technology to provide high-speed connectivity through-out the entire country, particularly in cities.

In terms of volume, mobile broadband traffic[7] (49.8%) has grown faster than fixed broadband traffic (36.5%), which indicates that usage patterns are continuing to change as a results of the COVID-19 pandemic. While this could be an opportunity to shift focus towards 5G, Bulgaria is still making slow progresses in both 5G coverage and mobile broadband take-up.

The successful deployment of 5G, and whether, as a consequence, connectivity targets can be met, depend in particular on the availability and assignment of the 5G pioneer bands, which has been significantly delayed. Overall, Bulgaria has only allowed the use of 25% of total harmonised 5G (pioneer) spectrum, against the EU average of 56%.

On 6 April 2021, Bulgaria completed the auction of the 3.6 GHz band (3.5-3.8 GHz awarded). Although there is commercial interest in all pioneer bands, 5G coverage is at 40%. The three main operators report coverage mainly in cities and resorts as follows: A1 covers 75 cities and resorts, BTC covers over 200 populated places and resorts and Telenor covers 63 cities and resorts.

Operators have expressed an interest in deciding on investments subject to the full release of the 700 MHz band, which is still delayed. Following national consultations, there are plans to release the entire band (2 x 30 MHz), with the exception of 2 x 0.5 MHz, which will be reserved for non-civil use until 2031. The national regulatory authority (CRC) intends to launch a public consultation on the use of spectrum in the 700 MHz band in 2022, with the aim of assigning the band (or portion thereof) in 2023.

In 2021, three undertakings (A1, Telenor and BTC) obtained spectrum in the 2.6 GHz band (2x20 MHz each) with an obligation to cover at least 50% of the population. In the 3.6 GHz band, the same providers were each awarded the rights to use 100 MHz in 2021, with an obligation to cover at least 95% for major cities, such as Sofia, Plovdiv, Varna, Burgas, Ruse and Stara Zagora at an average download speed of 100 Mbps during the first two years, and 90% of populated areas for cities with 30 000 to 90 000 people, with an average download speed of 50 Mbps, and 70% of the entire population with an average download speed of 30 Mbps up to 5 years from the date the authorisation enters into force. The operators are free to use their existing rights in other bands (900 MHz, 1800 MHz, 2 GHz and 2.6 GHz) to reach these objectives.

As with the 700 MHz band, the 26 GHz band is also partly used for military purposes. The CRC plans to put in place a public consultation for the use of resources and to explore market demand in the 26 GHz band during this year.

Compared to the EU weighted average for 5G pioneer bands, until the beginning of April 2022, Bulgaria has authorised the use of 0% (EU 64%) of the 700 MHz band, 75% (EU 75%) of the 3.4-3.8 GHz band, and 0% (EU 29%) of the 26 GHz band.

Bulgaria plans to use financing under the Recovery and Resilience Facility for a major connectivity project. The current investment gap is estimated at EUR 600 million (up from an estimated EUR 500

[7] Source: Bulgarian Communications Regulations Commission

million last year), part of which will be covered by the RRF plan, focusing on developing the state-owned connectivity network and deployment of VHCN in rural and sparsely populated areas. In 2021, the European Investment Bank (EIB) and EnduroSat, a fast-growing Bulgarian company providing solutions for the global Space market, announced a venture debt financing agreement of up to EUR 10 million in the area of space data.

Bulgaria has expressed an interest in playing an active role in the CEF-financed 5G corridors flagship project, building on the agreement between Bulgaria, Greece and Serbia for connectivity along the Thessaloniki, Sofia and Belgrade corridor.

In the area of public wi-fi networks, Bulgaria is among the frontrunners in WiFi4EU, with 97% (257 of 265) of the country's municipalities having taken part in the four calls for applications held between 2018 and 2020. The 242 successful municipalities were awarded EUR 3.63 million.

### Main market & regulatory developments

No significant developments (entries, consolidations) took place in 2021 in the fixed telephony, fixed internet and mobile markets and market shares remain near identical to those of 2020. In fixed telephony, BTC (the incumbent) has the largest market share (58.9%), followed by A1 (25.3%) and Telenor (13.5%). In fixed internet (offered by 659 companies, figures as of July 2021) BTC had a market share of 27.2% and A1 26.5%. 47.4% of companies have a market share of above 1%. In the mobile market, the market shares were (as of July 2021) A1 at 38%, Telenor at 31.1% and BTC at 30.8%.

No zero-rated services were offered to Bulgarian consumers (private or business) in 2021.

The number of bundled services and their composition have remained stable in recent years. Three new enterprises started offering these services in 2021, bringing the total to 90 (compared to 87 the year before). Consumers continue to show a preference for fixed broadband and TV bundles, which make up 55.9% of bundle subscriptions, followed by voice and mobile bundles at 36.3%.

Bulgaria notified full transposition of the European Electronic Communications Code (EECC) on 29 March 2021. The Commission therefore closed the related infringement case in April 2022.

Bulgaria has, in the context of the Connectivity Toolbox, implemented a number of measures, including (i) streamlining the process for granting permits, (ii) increasing the use of the Single Information Point (SIP), (iii) extending the right of access to existing physical infrastructure, (iv) facilitating the CRC dispute resolution mechanism, (v) monitoring the correct implementation of EMF and public health (in the competence of the Ministry of Health), (vi) improved incentives for investment (reduced fees for spectrum) and (viii) carrying out closer coordination of the spectrum used for cross-border industry use. Best practices in the Connectivity Toolbox that have not been explicitly addressed are already covered in Bulgaria and their best practices form part of the Bulgarian submission to the Toolbox.

During the first 11 months of 2021, 1 805 end user complaints were received by the Bulgarian NRA, a small increase (6%) compared to the same period in 2020 (1 708 complaints). As in previous years, most complaints regard charges for services, access to and payment of digital content, termination of contract and border roaming issues.

Bulgaria has clearly stated its ambition to converge toward the EU average in the DESI connectivity dimension and reach the 2030 Digital Decade targets. Although many legal instruments have been put in place, in particular the transposition of the EECC, not enough concrete measures have been taken, notably to accelerate 1 Gbps and 5G take-up, building on the country's comparatively good fixed VHCN coverage and competitive broadband prices. The insufficient assignment of 5G spectrum and the long delays in successfully awarding use of spectrum in the 5G pioneer bands has an impact on both the availability and use of high speed connectivity in the entire country, and especially in rural areas. Although there is commercial interest in investing in both 5G and last-mile connectivity in rural and sparsely populated areas, not all the necessary measures have been put in place to make this happen. The speedy implementation of the Recovery and Resilience Plan will play a key role.

**Connectivity in Bulgaria's Recovery and Resilience Plan**

The Bulgarian Recovery and Resilience Plan includes significant measures linked to digital connectivity. They have a total budget of about EUR 272 million. The measures mainly address challenges linked to efficient use of the spectrum and an effective policy and regulatory framework. Some of these measures are:

- An investment (EUR 269 million) for the upgrade and the extension of coverage of the state backbone network to all municipal centres to offer coverage with very high capacity networks (VHCNs) in areas where relevant infrastructure is not going to develop soon, due to no or little market interest ("white areas").
- The provision of access points for ultra-fast connection to Bulgaria Academy of Science (BAS), the National Supercomputing Centre and the universities and scientific institutes to join European research networks such as GEANT.
- The reduction of the administrative burden and the streamlining of procedures and fees associated with the deployment of 5G networks.

# 3 Integration of digital technology

| 3 Integration of digital technology | Bulgaria | | EU |
|---|---|---|---|
| | rank | score | score |
| DESI 2022 | 26 | 15.5 | 36.1 |

| | Bulgaria | | | EU |
|---|---|---|---|---|
| | DESI 2020 | DESI 2021 | DESI 2022 | DESI 2022 |
| **3a1 SMEs with at least a basic level of digital intensity**<br>% SMEs | NA | NA | 25%<br>2021 | 55%<br>2021 |
| **3b1 Electronic information sharing**<br>% enterprises | 23%<br>2019 | 23%<br>2019 | 22%<br>2021 | 38%<br>2021 |
| **3b2 Social media**<br>% enterprises | 10%<br>2019 | 10%<br>2019 | 13%<br>2021 | 29%<br>2021 |
| **3b3 Big data**<br>% enterprises | 7%<br>2018 | 6%<br>2020 | 6%<br>2020 | 14%<br>2020 |
| **3b4 Cloud**<br>% enterprises | NA | NA | 10%<br>2021 | 34%<br>2021 |
| **3b5 AI**<br>% enterprises | NA | NA | 3%<br>2021 | 8%<br>2021 |
| **3b6 ICT for environmental sustainability**<br>% enterprises having medium/high intensity of green action through ICT | NA | 68%<br>2021 | 68%<br>2021 | 66%<br>2021 |
| **3b7 e-Invoices**<br>% enterprises | 13%<br>2018 | 10%<br>2020 | 10%<br>2020 | 32%<br>2020 |
| **3c1 SMEs selling online**<br>% SMEs | 7%<br>2019 | 8%<br>2020 | 10%<br>2021 | 18%<br>2021 |
| **3c2 e-Commerce turnover**<br>% SME turnover | 2%<br>2019 | 3%<br>2020 | 4%<br>2021 | 12%<br>2021 |
| **3c3 Selling online cross-border**<br>% SMEs | 3%<br>2019 | 3%<br>2019 | 4%<br>2021 | 9%<br>2021 |

The Integration of digital technology in business activities remains a weakness for Bulgaria as it ranks 26th among EU countries. The adoption of cloud services (10%), AI (3%) and big data (6%) by enterprises are all among the lowest in the EU. Only 25% of SMEs have a basic digital intensity. They are lagging behind also in online selling as only 10% of SMEs sell online, around half the EU average.

To improve the situation, a voucher-based funding programme started in 2021 to promote and increase the ICT capacity of micro, small and medium-sized enterprises and to encourage them to become more sustainable and competitive. 516 enterprises have benefited from the voucher scheme. This improved their ICT systems, applications, and optimised their business management processes. The scheme also facilitates the digitalisation of SMEs and further encourages the development of knowledge transfers between participating enterprises.

Bulgaria is also taking measures to support the cooperation between R&D institutes and SMEs. For example, Bulgaria allocates funding through the 'Innovation and competitiveness' operational programme to promote entrepreneurship and help set up and develop new sustainable businesses and high-tech companies. The national fund incorporates BGN 318 million (EUR 163 million) through four equity instruments, including acceleration, seed, venture capital and mezzanine funding. In 2021, these four instruments facilitated investments of BGN 92 million (EUR 47 million) in 150 companies.

In 2021, 16% more SMEs participated in joint R&D projects and technology transfers to either public or private R&D institutions, according to the reporting figures for the implementation of the National Programme '2025 Digital Bulgaria'. Other strategic measures to increase digitalisation in enterprises include the establishment of training innovation centres for the green and digital transitions, as well as the creation of European Digital Innovation Hubs. These Hubs are one of the most highly visible national measures. Four European Digital Innovation Hub proposals received a successful evaluation result[8] and another eight proposals got a Seal of Excellence.

Bulgaria is actively represented in the European Blockchain Partnership and a project under the Connecting Europe Facility (CEF) European Blockchain Services Infrastructure is being developed which will run until March 2023.

In the last quarter of 2021, Bulgaria also presented a draft proposal for the implementation of the 'Cybersecurity Bulgaria 2030' National Security Strategy. In 2021, the National Computer Security Incident Response Team updated its roadmap for amending the national Cybersecurity Regulation in accordance with EU directives in order to secure the funding of the projects included in the strategy. As of 2022, the new Bulgarian government is expected to have finalised the adoption of the Cybersecurity Law and to have set out the cybersecurity measures for administrative authorities and institutions.

In summary, Bulgaria plays a prominent role in high-performance computing in Europe with its petascale supercomputer (see highlight below). Nonetheless, the adoption of digital technologies by enterprises remains low and the adoption of advanced technologies like AI and Cloud is even lower. Building on the country's strengths, policies targeting the deployment of these technologies in SMEs should be put in place and implemented so that Bulgaria can reach the EU average.

**Highlight: Petascale supercomputer**

Bulgaria, as a founding member of the European High Performance Computing Joint Undertaking (EuroHPC JU), has supported the establishment of a petascale supercomputer located in Sofia Tech Park. The supercomputer costed EUR 11.5 million and was inaugurated in October 2021. It will be subsidised by EU and national funding. The supercomputer, together with other high-performance systems and the Distributed Computing Grid Clusters, is openly accessible to the research community and other private and public users. Bulgaria is also a member of the EuroQCI initiative to upgrade its national cybersecurity infrastructure with quantum-level cryptographic keys. A project called QUASAR for the establishment of a competence centre in quantum communication and intelligent security is ongoing.

**Integration of digital technology in Bulgaria's Recovery and Resilience Plan**

The plan includes a number of measures aimed at supporting businesses to adapt their operations to the digital environment, some of which are:

- Improving the quality of research and innovation through investments in digital technologies at research institutions, and supporting the digitalisation of business

[8] Four proposals are invited for grant agreement preparation (which is not a formal commitment for funding).

through a grant scheme for information and communications technology solutions and cybersecurity in SMEs (EUR 15 million).

- Investments in the deployment of advanced technologies such the creation of a quantum platform (EUR 0.5 million).

Lastly, it also includes an investment for the deployment of advanced technologies such as the Euro Quantum Communication Infrastructure (QCI) network at the Bulgarian Academy of Sciences (EUR 0.5 million).

# 4 Digital public services

| 4 Digital public services[9] | Bulgaria | | EU |
|---|---|---|---|
| | rank | score | score |
| DESI 2022 | 25 | 51.9 | 67.3 |

| | Bulgaria | | | EU |
|---|---|---|---|---|
| | DESI 2020 | DESI 2021 | DESI 2022 | DESI 2022 |
| **4a1 e-Government users**<br>% internet users | 36%<br>2019 | 36%<br>2020 | 34%<br>2021 | 65%<br>2021 |
| **4a2 Pre-filled forms**<br>Score (0 to 100) | NA | NA | 58<br>2021 | 64<br>2021 |
| **4a3 Digital public services for citizens**<br>Score (0 to 100) | NA | NA | 59<br>2021 | 75<br>2021 |
| **4a4 Digital public services for businesses**<br>Score (0 to 100) | NA | NA | 76<br>2021 | 82<br>2021 |
| **4a5 Open data**<br>% maximum score | NA | NA | 78%<br>2021 | 81%<br>2021 |

Bulgaria performs low on Digital public services, ranking 25th in the EU. 34% of internet users interacted with the government online. The country scores 58 points out of 100 for the amount of data that is pre-filled in public service online forms, below the EU average of 64 points. Bulgaria also ranks below the EU average in terms of digital public services available to citizens (with a score of 59) and businesses (with a score of 76). The use of open data is also somewhat lower than the EU average.

In April 2021, the National Strategy for e-Government was updated in order to encompass innovative technologies - such as AI, cloud computing, and blockchain - to improve digital public services. Bulgaria plans to embed a user-centric development principle in the strategy. The State e-Government Agency (SEGA) had been implementing the strategy until the end of 2021, while as of 2022, the implementation of the strategy has been handed over to the Ministry of e-Government.

In 2021, SEGA held several events to disseminate information on the available digital services and ICT solutions to the public. Participants could provide feedback, following a user-centric principle. SEGA also certifies compliance with the national Electronic Governance Act and certifies that the information systems used by the administrative authorities are developed and upgraded in compliance with this Act. In addition, SEGA is responsible for the related software copyrights and supports the use of open source solutions. Bulgaria offers a portal for developers and an open-source repository publicly available for e-government applications.

Bulgaria has established an eID scheme[10] and Bulgarian citizens aged 14 and older can acquire an eID to use for both private and public transactions. The current eID scheme is not notified under the electronic Identification, Authentication and Trust Services (eIDAS) Regulation and it is not mandatorily issued to all citizens. However, Bulgaria has introduced measures to issue an electronic identification scheme in compliance with the eIDAS Regulation. Currently, the procurement procedure

[9] There is break in the series for indicators 4a2, 4a3, 4a4 and 4a5. As a result, no comparison of indicator and dimension results is possible over time.
[10] National eID scheme name: Evrotrust eID

for the national electronic identification scheme is still ongoing as an appeal was lodged against the procedure. In August 2021, SEGA was appointed as the competent authority for the verification and notification of the compatible electronic identification schemes. The system will be implemented by the Ministry of e-Government and will be in full compliance with the requirements of the eIDAS Regulation. Bulgaria has introduced measures to provide key public administrative services online. By the end of 2021, more than 852 electronic administrative services were available online and the national public administration registries can now exchange information electronically. The measures include the upgrade of a single national portal that will include all available e-services. 21 of these services are considered key -such as birth certificates, residence, retirement, the opening and closing of a business -and have been available to EU countries under the Single Digital Gateway (SDG) since December 2021. Furthermore, the introduction of a single digital services portal fulfils the requirements on accessibility for people with disabilities, in compliance with EU Directive 2016/2102 on the accessibility of the websites and mobile applications of public sectors bodies. There are plans for a national data strategy and a regulatory framework for data policy in a data-driven governance.

Bulgaria has set up a Big Data for Smart Society Institute (GATE) in partnership with SEGA. It is working on a pilot project for the creation of a Digital Twins lab for public administration and industrial and business processes and products. The aim of the lab is twofold. First, to support the digital modelling and testing of different use case scenarios, and second, to strengthen interoperability with data exchange between different administrations.

Via the national electronic portal for public consultations, Bulgaria promotes participatory actions for the public, businesses, Institutions and NGOs. The portal aims to enable consultation and to provide recommendations on policy proposals and administrative decisions. SEGA uses software tools to support the decisions by providing public statistics and open data to the population.

Bulgaria provides guarantees for the secure exchange of messages and documents between individuals and the administration pursuant to Regulation 2014/90 by embracing a secure electronic delivery system, which has recently been updated. Moreover, in 2021, information campaigns for the general public were conducted, as well as for public sector employees, on various aspects of cybersecurity, focusing on secure access to public e-services, personal data privacy and trust in services. Although the country has set out the conditions for automated decision-making in its national legislation, AI decision-making has not yet been introduced in the public sector. Since June 2021, the State Hybrid Private Cloud (SHPC) started offering ICT services to 50 administrative e-government systems and there are plan for its connection with EU cloud infrastructures, such as GAIA-X and GEANT. In 2020, a measure was introduced by the municipality of Sofia for the development of digital solutions for the public sector; this includes the GovTech ecosystem, which consists of 40 private companies and 120 other organisations based in the capital.

Another positive development is the upgrade in the National Health Information System, which introduced electronic medical records for all people. In 2021, Bulgaria recorded a strong take-up of e-prescriptions, with over 4 800 doctors and 3 550 pharmacists participating and issuing 11 million e-prescriptions. In addition, the use of e-medical records in the national health-care systems facilitates efficient medical checks and interventions.

In summary, Bulgaria launched several initiatives for the digitalisation of the public services, unfortunately without yet tangible effects on its DESI performance, potentially due also to the political instability. The adoption of electronic identification and the digitalization of National registries remain at the top in the list of priorities for the new Ministry of e-Government. Targeted actions have been

taken to encourage citizens and businesses to further take up e-Government services while offering training in cybersecurity to raise the trust levels of the users in adopting public e-services.

**Digital public services in Bulgaria's Recovery and Resilience Plan**

The Bulgarian Recovery and Resilience Plan includes measures linked to e-government and digital public services. They have a total budget of about EUR 985 million. The measures aim at the digitalisation of the public administration and digitalisation of justice forms and court decisions. Also, enhancements of e-health and digital innovation in healthcare, is supported. Some of these measures are:

- Digitalisation of paper registries (EUR 49 million).
- Transformation of the information and communication infrastructure at the Public Prosecutor's Office (EUR 15 million).
- The development of the digital TETRA system and radio relay network (EUR 64 million), a unified communication environment for the management, interaction and coordination in crisis prevention accidents, disasters and national security issues.
- Strengthening, further developing and building up the Unified Information System of Courts (EUR 10 million).
- Digitalisation of key litigation processes in administrative justice (EUR 3.6 million).
- National digital platform for medical diagnostics (EUR 12 million).
- Modernisation of the Employment Agency (EUR 11 million).
- Spatial monitoring, control and management through upgrading the Aerospace Monitoring Centre (EUR 57 million).
- Digital transformation of Bulgarian Post and delivery of new digital services (EUR 35 million).