



# 5G COUNTRY PROFILE



## REPUBLIC OF SERBIA

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Version 1.1

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*Note: Version 1.1 of this document is an advanced draft for possible additional inputs, comments, feedback. The final version of the document is planned to be released after the ITU Regional Forum for Europe.*

## 1. ICT background and current status of broadband

Serbia has made significant progress in the ICT sector over the past years, and recently achieved the status of the country with the highest average Internet speed in the Balkans.<sup>1</sup> Despite being a predominantly rural country, the ICT sector is growing with many business opportunities. For example, between 2008 and 2015, export revenues from IT services tripled while the revenues from computer services have increased by four times.<sup>2</sup> Some of the challenges in the ICT sector remain around the areas of broadband access across the country's regions, fixed-broadband networks in rural areas, and the coordination mechanisms for connecting the actions of different stakeholders remain some of the challenges in the ICT sector in the country.<sup>3</sup> In the ITU ICT Development Index (IDI), Serbia ranks 55<sup>th</sup> out of 176 countries.<sup>4</sup>

The Digital Agenda for Serbia consists of two documents: the "Strategy for the Development of the Information Society in the Republic of Serbia to 2020" and the "Strategy for the Development of Electronic Communication in the Republic of Serbia from 2010 to 2020." These documents cover various aspects of socioeconomic development in relation to ICT such as education, business, security, as well as e-government, e-health, and e-justice. As pertained to broadband, these two strategies include the following goals and targets that Serbia needs to reach by 2020:<sup>5</sup>

- Increase network availability to all users;
- Provide broadband access by FTTH/B/C to all users;
- Offer Broadband services with speed rate of at least 100 Mbps;
- Proceed with harmonization of the Radio frequency allocation plan with the international actors (EU Plan);
- Allocation of 120 MHz of digital dividend frequencies for mobile broadband access;
- Improvement of tariff policy by applying the cost model in pricing of services by operators with significant market share;
- Harmonization tariff of operators with significant market share with the application of the cost model, analysing and defining relevant retail and wholesale markets;
- Formation of the National Network based on IP technology, according to the principles of open networks and open services, which connects all available network state-owned infrastructure;
- Provision of access to the network with special purpose connections, i.e. functional systems, at the level of the passive optical network. The resources of such a network should approach on the principle of multiplex by wavelength;
- Ensuring the distribution of digital television programs using the National Network by expanding it with microwave links;

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<sup>1</sup> See: [https://www.itu.int/en/ITU-D/Innovation/Documents/Publications/eBAT\\_Brochure%E2%80%9393DIP%20Serbia\\_432746\\_.pdf](https://www.itu.int/en/ITU-D/Innovation/Documents/Publications/eBAT_Brochure%E2%80%9393DIP%20Serbia_432746_.pdf)

<sup>2</sup> See:

<https://mtt.gov.rs/en/download/Strategy%20on%20Development%20of%20Information%20Technology%20Industry%20for%20the%20period%20from%202017%20to%202020.pdf>

<sup>3</sup> See: [https://www.itu.int/en/ITU-D/Regional-](https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2016/Broadband%20Mapping/6.%20Tomic%20Serbia_BB_map_2.pdf)

[Presence/Europe/Documents/Events/2016/Broadband%20Mapping/6.%20Tomic%20Serbia\\_BB\\_map\\_2.pdf](https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2016/Broadband%20Mapping/6.%20Tomic%20Serbia_BB_map_2.pdf)

<sup>4</sup> See: <https://www.itu.int/net4/ITU-D/idi/2017/index.html>

<sup>5</sup> See: [https://mtt.gov.rs/download/3/Strategija\\_razvoja\\_informacionog\\_drustva\\_2020.pdf](https://mtt.gov.rs/download/3/Strategija_razvoja_informacionog_drustva_2020.pdf)

- Defining the framework for sustainable development and exploitation of broadband network and service.

These strategies state that these goals shall be based on the following principles: I) Technological neutrality of networks and services; II) Broadband access as a universal service; and III) Development of next-generation networks.<sup>6</sup>

As part of the accession process, a 2019 report by the European Commission provides three recommendations for Serbia, stating that its government should:<sup>7</sup>

- Harmonise its legislative framework in electronic communications with the 2009 EU regulatory framework;
- Ensure financial and operational independence, of the regulators for electronic communication and postal services (RATEL) and for electronic media (REM);
- Take measures to ensure implementation of competitive safeguards and facilitate market operator’s access to telecommunication infrastructure (ducts, antennas, fibre optics and fixed telephony infrastructure).

Additionally, the “Next Generation Broadband Connectivity for Rural Schools in White Zones” project, planned within the context Western Balkans Investment Framework (WBIF), is in the preparation phase and will benefit from a 72 million EUR loan provided by the European Bank for Reconstruction and Development (EBRD).<sup>8</sup> This project will enable development infrastructure and interconnection of the two existing operators’ networks and schools in rural (white) zones. Schools will obtain fibre connectivity (1 Gbps+), while neighbouring households (private investment part that will follow middle-mile CAPEX investment by the government) will obtain 30+Mbps connectivity.<sup>9</sup>

## 2. Broadband and mobile telecommunication sectors data

ITU data shows that 77.42% of individuals in the Republic of Serbia had access to the Internet in 2019.<sup>10</sup> In 2010, the ITU data for the country was 40.90%.<sup>11</sup> In 2018, the number of fixed-broadband subscriptions per 100 inhabitants was 17.63,<sup>12</sup> being the majority through xDSL (37.8%) or cable access (44.8%)<sup>13</sup>— although the number of users of xDSL users have been slowly decreasing over the years.<sup>14</sup> From the regional perspective, Europe’s average fixed-broadband basket cost was 1.5 percent of the GNI per capita in 2019, while Serbia’s corresponded to 2.9 per cent for unlimited Internet data cap.<sup>15</sup>

<sup>6</sup> See: [https://www.ratel.rs/uploads/documents/pdf\\_documents/documents/Regulativa/Strategije/Serbia\\_bb\\_development\\_strategy.pdf](https://www.ratel.rs/uploads/documents/pdf_documents/documents/Regulativa/Strategije/Serbia_bb_development_strategy.pdf)

<sup>7</sup> See: <https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/20190529-serbia-report.pdf>

<sup>8</sup> See: <https://www.ebrd.com/work-with-us/projects/psd/51835.html>

<sup>9</sup> See: <https://wbif.eu/project/PRJ-SRB-DII-005>

<sup>10</sup> See: ITU World Telecommunication/ICT Indicators Database online (2020): <http://handle.itu.int/11.1002/pub/81550f97-en> (indicator “i99H”)

<sup>11</sup> See: [https://www.itu.int/en/ITU-D/Statistics/Documents/statistics/2019/Individuals\\_Internet\\_2000-2018\\_Dec2019.xls](https://www.itu.int/en/ITU-D/Statistics/Documents/statistics/2019/Individuals_Internet_2000-2018_Dec2019.xls)

<sup>12</sup> See: [https://www.itu.int/en/ITU-D/Statistics/Documents/statistics/2019/Fixed\\_broadband\\_2000-2018\\_Dec2019.xls](https://www.itu.int/en/ITU-D/Statistics/Documents/statistics/2019/Fixed_broadband_2000-2018_Dec2019.xls)

<sup>13</sup> See: [https://www.ratel.rs/uploads/documents/empire\\_plugin/Q1%202020%20ENG%20pdf.pdf](https://www.ratel.rs/uploads/documents/empire_plugin/Q1%202020%20ENG%20pdf.pdf)

<sup>14</sup> See:

[https://www.ratel.rs/uploads/documents/empire\\_plugin/An%20Overview%20of%20The%20Telecom%20And%20Postal%20Services%20Market%20In%20The%20Republic%20of%20Serbia%20In%202018.pdf](https://www.ratel.rs/uploads/documents/empire_plugin/An%20Overview%20of%20The%20Telecom%20And%20Postal%20Services%20Market%20In%20The%20Republic%20of%20Serbia%20In%202018.pdf)

<sup>15</sup> See: [https://www.itu.int/en/ITU-D/Statistics/Documents/publications/prices2019/ITU\\_ICTpriceTrends\\_2019.pdf](https://www.itu.int/en/ITU-D/Statistics/Documents/publications/prices2019/ITU_ICTpriceTrends_2019.pdf)

Serbia's xDSL subscriber structure has changed significantly over the years, with a significant increase of the number of users of VDSL technology that account for 42% of the total number of xDSL users, due to greater demand for packages with bigger throughput.<sup>16</sup> Wireless broadband access, however, has remained stable in the 2013-2018 period,<sup>17</sup> although the average data rates were improved by all operators in 2019.<sup>18</sup> While the north districts of Belgrade and South Bačka have the highest household penetration rates in terms of broadband subscription, the south districts Jablanica and Pčinja have the lowest.<sup>19</sup> ITU data show that 72.9% of households in Serbia had Internet access at home.<sup>20</sup>

In 2018, the number of active mobile-cellular subscriptions per 100 inhabitants was of 95.78,<sup>21</sup> which makes Serbia the country with the highest penetration rates for mobile services in the Balkans.<sup>22</sup> There are three mobile network operators (MNOs)—Telekom Srbija, Telenor and VIP Mobile—that currently have licenses for the use of radio frequency. In 2019, the number of active mobile-broadband subscription per 100 inhabitants was 71.27.<sup>23</sup> In terms of price, the country's mobile-data basket cost corresponded to 1.3 per cent of the GNI per capita in 2019 for a monthly allowance of 5.0 Gb, while the European region's average was 0.8 per cent for the same year.<sup>24</sup> With a relatively equally distributed market share, the total revenue of all MNOs has been constant over the last 3 years, but individual net realized profits are declining at the same time.<sup>25</sup>

For the first quarter of 2020, RATEL reports that the majority of mobile subscribers (around 47%) connected to the Internet benefited from connectivity speed of over 50 Mbps, while around 42% accessed the Internet in between 10 Mbit/s to less than 30 Mbit/s.<sup>26</sup> In comparison to the previous year, data transmission over mobile networks has shown growth, amounting to 101.3 million GB in Q1 2019, meaning that a mobile broadband subscriber used on average 183 MB daily, or almost 5.6 GB a month.<sup>27</sup> In total, mobile-broadband Internet traffic within Serbia in 2019 was equal to 0.3 exabytes.<sup>28</sup>

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<sup>16</sup> See:

[https://www.ratel.rs/uploads/documents/empire\\_plugin/An%20Overview%20of%20The%20Telecom%20And%20Postal%20Services%20Market%20in%20The%20Republic%20of%20Serbia%20in%202018.pdf](https://www.ratel.rs/uploads/documents/empire_plugin/An%20Overview%20of%20The%20Telecom%20And%20Postal%20Services%20Market%20in%20The%20Republic%20of%20Serbia%20in%202018.pdf)

<sup>17</sup> See:

[https://www.ratel.rs/uploads/documents/empire\\_plugin/An%20Overview%20of%20The%20Telecom%20And%20Postal%20Services%20Market%20in%20The%20Republic%20of%20Serbia%20in%202018.pdf](https://www.ratel.rs/uploads/documents/empire_plugin/An%20Overview%20of%20The%20Telecom%20And%20Postal%20Services%20Market%20in%20The%20Republic%20of%20Serbia%20in%202018.pdf)

<sup>18</sup> See: <http://benchmark.ratel.rs/en/trend-analysis-2019>

<sup>19</sup> See:

[https://www.ratel.rs/uploads/documents/empire\\_plugin/An%20Overview%20of%20The%20Telecom%20And%20Postal%20Services%20Market%20in%20The%20Republic%20of%20Serbia%20in%202018.pdf](https://www.ratel.rs/uploads/documents/empire_plugin/An%20Overview%20of%20The%20Telecom%20And%20Postal%20Services%20Market%20in%20The%20Republic%20of%20Serbia%20in%202018.pdf)

<sup>20</sup> See: <https://www.itu.int/en/ITU-D/Statistics/Documents/statistics/2019/CoreHouseholdIndicators.xlsx>

<sup>21</sup> See: [https://www.itu.int/en/ITU-D/Statistics/Documents/statistics/2019/Mobile\\_cellular\\_2000-2018\\_Dec2019.xls](https://www.itu.int/en/ITU-D/Statistics/Documents/statistics/2019/Mobile_cellular_2000-2018_Dec2019.xls)

<sup>22</sup> See: [https://www.itu.int/en/ITU-D/Innovation/Documents/Publications/eBAT\\_Brochure%E2%80%9393DIP%20Serbia\\_432746\\_.pdf](https://www.itu.int/en/ITU-D/Innovation/Documents/Publications/eBAT_Brochure%E2%80%9393DIP%20Serbia_432746_.pdf)

<sup>23</sup> See: ITU World Telecommunication/ICT Indicators Database online (2020): <http://handle.itu.int/11.1002/pub/81550f97-en> (indicator "i911mw")

<sup>24</sup> See: [https://www.itu.int/en/ITU-D/Statistics/Documents/publications/prices2019/ITU\\_ICTpriceTrends\\_2019.pdf](https://www.itu.int/en/ITU-D/Statistics/Documents/publications/prices2019/ITU_ICTpriceTrends_2019.pdf)

<sup>25</sup> See: [https://www.itu.int/en/ITU-D/Regional-](https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2019/Regulatory%20Forum/5.%20RATEL%205G%20in%20Serbia%20-%20challenges%20and%20opportunities.pdf)

[Presence/Europe/Documents/Events/2019/Regulatory%20Forum/5.%20RATEL%205G%20in%20Serbia%20-%20challenges%20and%20opportunities.pdf](https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2019/Regulatory%20Forum/5.%20RATEL%205G%20in%20Serbia%20-%20challenges%20and%20opportunities.pdf)

<sup>26</sup> See: [https://www.ratel.rs/uploads/documents/empire\\_plugin/Q1%202020%20ENG%20pdf.pdf](https://www.ratel.rs/uploads/documents/empire_plugin/Q1%202020%20ENG%20pdf.pdf)

<sup>27</sup> See: [https://www.ratel.rs/uploads/documents/empire\\_plugin/Q1%202020%20ENG%20pdf.pdf](https://www.ratel.rs/uploads/documents/empire_plugin/Q1%202020%20ENG%20pdf.pdf)

<sup>28</sup> See: ITU World Telecommunication/ICT Indicators Database online (2020): <http://handle.itu.int/11.1002/pub/81550f97-en> (indicator "i136mwi")

Furthermore, data from the Republic Agency for Electronic Communications and Postal Services (RATEL) published in the market overview for 2018, all three MNOs have a high 3G and 4G/LTE mobile network coverage, covering between 96% and 97% of the population<sup>29</sup> and between 72% and 78% of the territory of the Republic of Serbia.<sup>30</sup>

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

In line with the strategic framework of the European Union, Serbia's "Strategy for Development of New Generation Networks Until 2023", adopted in 2018, defines measures to ensure infrastructure development of a Single Digital Market in the country.<sup>31</sup> The introduction and expansion of cloud computing, Internet of Things (IoT), as well as the development of mobile systems pertained to the 5G are central points of discussion in this national strategy.<sup>32</sup>

The document acknowledges the need of updating the regulatory framework necessary to support the development of 5G in Serbia. Oriented by the notion that 5G, among future generation networks, is linked to overall increase in gross domestic product and socioeconomic development, the document specifies targets and goals, focusing specifically on:<sup>33</sup>

- Developing of a backbone for broadband network by consolidating the infrastructure that is state-owned;
- Developing of broadband access networks by:
  - Providing conditions for easier construction of broadband infrastructure via the enactment of a broadband law. That will help telecom operators to reduce the cost of building such infrastructure by sharing existing infrastructure and facilitating acquisition of necessary permits;
  - Providing state aid to operators or other legal entities that agree to build their network in areas where there is a little economic viability for the construction of broadband infrastructure;
- Preparing for Spectrum auction for the development of new technologies and 5G in particular.

Other targets and goals that are relevant to 5G to a greater or lesser extent include:

- Strengthening broadband capacities for the needs of state/public institutions;
- Offering a larger set of IP addresses by switching to IPv6;
- Providing state aid incentives for operators that switch to IPv6;
- Promoting the introduction and use of IoT;
- Promoting the introduction and use of smart services in all sectors of the economy;
- Promoting cloud computing and expanding data centres in the country;

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<sup>29</sup> See: ITU World Telecommunication/ICT Indicators Database online (2020): <http://handle.itu.int/11.1002/pub/81550f97-en> (indicators "i271G and i271GA")

<sup>30</sup> See: [https://www.ratel.rs/uploads/documents/empire\\_plugin/Pregled%20trzista%202018.pdf](https://www.ratel.rs/uploads/documents/empire_plugin/Pregled%20trzista%202018.pdf)

<sup>31</sup> See: [https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2018/5G%20Greece/Session%201%20Irini%20Reljin%20-SERBIA%20-%20Serbia\\_5G%20plans\\_Athens\\_2018%20IR.pdf](https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2018/5G%20Greece/Session%201%20Irini%20Reljin%20-SERBIA%20-%20Serbia_5G%20plans_Athens_2018%20IR.pdf)

<sup>32</sup> See: <https://mtt.gov.rs/en/releases-and-announcements/networks-of-new-generations-for-a-single-digital-market/>

<sup>33</sup> See: <https://mtt.gov.rs/en/download/Predlog%20strategije%20razvoja%20mreza%20nove%20generacije%20do%202023.%20godine.pdf>

- Adopting interoperability standards that would ensure exchanging of large amounts of data between different entities with the aim of introducing smart services;
- Developing mechanisms for improving the safety of work on the Internet;
- Improving the conditions for educating the population in the field of ICT at all educational levels.

#### **4. Spectrum assignment for 5G & market development**

Serbia is the one of the few countries that has made both digital dividends free at the moment of its switchover to digital broadcasting. The 800MHz (DD 1) band was sold, and 700MHz (DD2) band was earmarked for use by 5G systems.<sup>1</sup>

The Government of the Republic of Serbia has adopted Allocation Plan of Radio Frequency Spectrum ("Official Gazette of RS", No. 89/20). Due to the decisions of the World Radio Conference 2019 (WRC19) this plan has allocated 700MHz (694-790MHz), 26GHz (24.25-27.5GHz) for IMT-2020 purposes. Thus, besides these two bands, the band 3400-3800MHz has already been allocated for the IMT. Having in mind necessity for testing of the new technologies, 3400-3500MHz band has been reserved for new projects with that goal for the period of next three years. The Allocation Plan has reserved 5+5MHz for smart cities applications in 1800MHz band.

Spectrum assignment plans for 2500MHz-2690MHz and 3400MHz-3800MHz bands are in the process of adoption of the Ministry of Trade, Tourism and Telecommunications. Moreover, the Ministry is preparing the Rulebook on minimum requirements for issuing individual licenses for the use of radio frequencies according to the tendering process, in radio-frequency band 3500-3800MHz. 5G network is expected to be rolled out in 2021.

The Government of the Republic of Serbia has adopted, in 2019, the Bases for Development of Initial Network for Testing of New Technologies Necessary for Inclusion to Digital Single Market. It represents realization of goals defined in the Strategy for Development of New Generation Networks and Services until 2023. Hence, the initial network has been launched for the pre-commercial tests, by license for temporary 5G spectrum usage in 3.4-3.8GHz (100MHz; 3.45-3.55GHz) with LTE anchor in 2.6GHz (2x20MHz; 2.64-2.66GHz DL; 2.52-2.54GHz UL), issued by RATEL.

In accordance with the Strategy for the Development of Next Generation Networks by 2023, the Ministry, in cooperation with the Organisation for Security and Co-operation in Europe, has organized workshops intended for local government representatives on the territory of Serbia, which highlighted the importance of new technologies in broadband access and their impact on the development of industry<sup>34</sup>. Presentations were held at which representatives of the Ministry, RATEL and the academics presented data and challenges related to the setting up of base stations. The data on the limits of exposure levels of electromagnetic radiation produced by mobile systems and the measured results have been presented. Workshops produced positive response and organizers have been asked to expand number of cities

<sup>34</sup> See: <https://mtt.gov.rs/download/informator-o-radu/informator%20o%20radu%20CI-nov.pdf>, p.96

covered by future workshops. Due to the COVID-19 pandemic, the Ministry and OSCE plan to organize virtual workshops from the beginning of the next year.

Having in mind the importance of future 5G network and challenges introduced by this technology, OSCE initiated development of a study that will cover major aspects of its introduction, regulation and exploitation. This study is aimed at, not only experts, but also to give insight to public about main 5G performances as well as obstacles that could slow down the realization of a new network<sup>35</sup>.

OSCE provided funds for realization of the study: Fifth generation of mobile systems 5G – on electromagnetic radiation and its effect on humans and environment, how it is going to be regulated and monitored, how the 5G is functioning and why it is necessary for us. The study will be done by independent experts in the field of mobile communications and is planned for the end of 2020.

Besides that, RATEL has commissioned a feasibility study recommending that spectrum auction for minimum of 15 years should be scheduled for early 2021 on technology neutral basis, according to the Law on Electronic Communications, and with national allocation. It also recommended that the licence fulfilment requirements should be related to the quality of service provided and independent of technology used.

However, due to the regional and local impacts of the COVID-19 pandemic, Serbia's Ministry of Trade, Tourism and Telecommunications have informed the local press in July 2020 that the auction for the 5G spectrum will be postponed and it is likely that will be held in the first quarter of 2021.

## **5. Electromagnetic fields levels and the implementation dynamics**

In the Republic of Serbia, the limits of exposure to electromagnetic fields for the general public are defined in the Rulebook on the limits of exposure to non-ionizing radiation ("Official Gazette of RS," No. 104/2009), and they are approximately two and a half times lower and more stringent than the ICNIRP recommendations on limits of exposure to electromagnetic fields in radio frequency bands 100 kHz-300 GHz.<sup>36</sup>

As part of the *EMF RATEL* project, which is a system for continuous monitoring of electromagnetic field levels, RATEL has been continuously monitoring changes in electromagnetic field levels, as well as exposure of the population to electromagnetic radiation.<sup>37</sup>In this moment, a total of 57 sensors performing continuous measurements are installed nationwide.<sup>38</sup> RATEL also informs that the results obtained through measurements so far have been far below the allowed electromagnetic field level

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<sup>35</sup> The study is in the process of development. For more information contact OSCE or the the Ministry of Trade, Tourism and Telecommunications

<sup>36</sup> See: <https://www.ratel.rs/en/blog/5g-networks-and-public-health-protection>

<sup>37</sup> See: <https://emf.ratel.rs/eng/index>

<sup>38</sup> See: <https://emf.ratel.rs/results/index/eng/2/0>



values. No field levels deviating from the prescribed values and applicable standards were recorded at any time.

## **6. 5G Commercial Launches: Announcements, Trail Cities, and Digital Cross-border Corridors**

During the 2018 Digital Assembly in Sofia, Bulgaria, Greece and Serbia signed a Letter of Intent to work together on the Thessaloniki – Sofia – Belgrade 5G cross-border corridor for connected and automated mobility (e.g. driverless vehicles over hundreds of kilometres of motorways).<sup>39</sup> Represented by Serbia's Ministry of Trade, Tourism and Telecommunications, the letter of Intent propose action in data exchange, common approaches on regulations, and coordinated policy action.

This ratification builds on a number of previous agreements among European countries, and highlights that a pan-European network of 5G corridors is under development.<sup>40</sup> Within the context of the Serbia-Greece-Bulgaria agreement, there are three major guiding goals:<sup>41</sup>

- The corridor will provide a technologically neutral hub for industry, research centres, academia and any other stakeholders for testing and evaluating innovative mobility technologies;
- “Learning by experience approach” and exchange of information will be key points in the use of the corridor;
- Recognition and coordination in specific regulations on automated driving testing will be key aspects in the collaboration.

In June 2019, operator Telenor launched a test service of the first 5G station in Serbia utilizing a temporary license for spectrum in the frequency of 2600MHz and 3500MHz bands, previously assigned by RATEL for 5G tests.<sup>42</sup> Housed in the Science-Technology Park Belgrade, the Telenor's 5G network became available in September 2019 to students at the School of Electrical Engineering, University of Belgrade, who are the first partners of this project.<sup>43</sup>

Relying on the 5G test environment enabled by Telenor, other companies are developing 5G-related products and research. For instance, local start-ups (Novelic and DigitalWorx) performed presentations on development solutions related to smart manufacturing and IoT simulations.<sup>44</sup>

Additionally, a U.S.-based Drone Company Easy Aerial has now a development centre in the Science-Technology Park Belgrade named Startup Aerial d.o.o. Serbia. The start-up is performing research and tests on 5G-enabled drones for advancing reliable video-surveillance and integration with other security-based systems, which may have application for emergency services systems.<sup>45</sup>

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<sup>39</sup> See: <https://ec.europa.eu/digital-single-market/en/news/new-5g-cross-border-corridor-connected-and-automated-mobility-announced-digital-assembly-2018>

<sup>40</sup> See: <https://5gobservatory.eu/info-deployments/pan-eu-5g-corridors/>

<sup>41</sup> See: [https://ec.europa.eu/newsroom/dae/document.cfm?doc\\_id=53070](https://ec.europa.eu/newsroom/dae/document.cfm?doc_id=53070)

<sup>42</sup> See: <https://www.commsupdate.com/articles/2019/06/25/telenor-launches-5g-trial-site/>

<sup>43</sup> See: <https://ntpark.rs/2019/06/21/telenor-pustio-u-rad-prvu-5g-baznu-stanicu-u-ntp-beograd/>

<sup>44</sup> See: <https://www.telenor.rs/en/about-telenor/news/news-and-press-releases/telenor-rolled-out-first-5g-base-station-in-serbia/>

<sup>45</sup> See: <http://www.diplomacyandcommerce.rs/surveillance-drones-for-the-first-time-over-telenor-5g-test-network/>

Within the context of 5G as an enabler of the smart city projects and IoT ecosystem, the Serbian Government signed an agreement between the country and Huawei Technologies, encompassing the country's largest cities: Belgrade, Novi Sad and Nis (which will serve as the pilot-project).<sup>46</sup> This project entails the building of system of transmitters and the development of an information system which should enable an economic implementation of various services (sensors, lights and counters for collecting and analysing data - traffic signalization, parking spaces, water meter control, public lighting, etc.).<sup>47</sup> The special goal of this cooperation is the opening of the Huawei Innovation Centre for Digital Transformation.<sup>48</sup>

In December 2019, the Bechtel-ENKA Joint Venture has been selected by the government of Serbia to build the Morava motorway—Serbia's first 5G-ready digital motorway and flood defence system in the West Morava river valley due to complete by the end of 2023.<sup>49</sup> With construction set to start in 2020, the dual carriage way will cost 783 million EUR. The road will be 112-kilometre long and is set to create 10,000 jobs in central Serbia. Alongside with the road infrastructure, a telecommunication corridor will be built beneath the side of the motorway to allow for future 5G fibre and tower installations, which will allow broadband to impact the economic development zones along the route between Preljina and Pojate.<sup>50</sup> The road will also connect to the north-south motorway running between Hungary and North Macedonia, in addition to linking with trans-European corridors X and XI, which connect Austria with Greece and Italy with Romania.<sup>51</sup>

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<sup>46</sup> See: <http://rs.n1info.com/Biznis/a478184/Plan-saradnje-Srbije-sa-Kinom.html>

<sup>47</sup> See: <https://www.itu.int/en/ITU-D/Regional-Presence/Europe/Documents/Events/2019/Regulatory%20Forum/5.%20RATEL%205G%20in%20Serbia%20-%20challenges%20and%20opportunities.pdf>

<sup>48</sup> See: <https://industryeurope.com/huawei-to-open-innovation-centre-in-serbia/>

<sup>49</sup> See: <https://www.newcivilengineer.com/the-future-of/future-of-roads-multipurpose-morava-motorway-09-03-2020/>

<sup>50</sup> See: <https://industryeurope.com/bechtel-enka-to-build-5g-ready-digital-motorway-in-serbia/>

<sup>51</sup> See: <https://serbia-business.eu/bechtel-and-enka-team-up-to-build-5g-motorway-in-serbia/>