

MATCHING DIFFICULTIES: Belarus is preparing to the 5G networks deployment

A.A.Ivashkin, Director of the Republican unitary enterprise for supervision on telecommunications "BelGIE" of the Republic of Belarus, says

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Today, many countries around the world are actively building fifth generation mobile networks (5G/IMT-2020). The magazine Last Mile asked the director of the Republican unitary enterprise for supervision on telecommunications "BelGIE" of the Republic of Belarus (hereinafter: State Enterprise "BelGIE") A.A. Ivashkin about the situation with the implementation of the 5G network in the Republic of Belarus.

What works on preparation for 5G are being carried out in the Republic of Belarus?

Belarus is a member of two regional organizations in the field of communications, the European Conference of Postal and Telecommunications Administrations (CEPT) and the Regional Commonwealth in the Field of Communications (RCC). Representatives of the Communications Administration of the Republic of Belarus, including specialists from the State Enterprise "BelGIE", actively participate in the work of the RCC Commission on the Regulation of the Use of the Radio Frequency Spectrum and Satellite Orbits and its working groups, which deal with the implementation of 5G, the definition of common tasks for the RCC countries to deploy networks and relevant

strategic elements. In addition to promoting their ideas and interests, decisions and experiences of other countries are taken into account, including information provided by organizations such as the Global System for Mobile Communications (GSA) and the Global Telecommunications Operators Association (GSMA), which analyze practical solutions implementation of 5G.

Today, in terms of introducing 5G, our country is at a preparatory stage, during which such tasks are being solved as improving legislation, determining the amount of fees for the allocation of radio frequency spectrum, determining requirements for the coverage of administrative territories and the quality of 5G services, working out the volume and availability radio

frequency spectrum for creating 5G networks, defining a model for deploying a new generation network, etc. Communication operators are conducting trial operation of 5G networks.

In accordance with the global harmonized spectrum allocation adopted by the International Telecommunication Union and the European Union, taking into account refarming and conversion in the Republic of Belarus, four radio frequency packages in the 700 MHz (30 MHz), 800 MHz (20 MHz) and 3.6 GHz (400 MHz), which allows each of the four potential operators to be offered a set of two radio frequency channels with a width of 10 MHz (700/800 MHz bands) and 100 MHz (3,6 GHz band).

At the same time, during the implementation of measures to



introduce 5G in Belarus, problems were identified that require additional study. They are related to the availability of the radio frequency spectrum, the fulfillment of the requirements for protecting the population from the effects of electromagnetic fields generated by base stations, the calculation of fees for the allocation and use of the radio frequency spectrum for the 5G standard, etc. Specialists of the State Enterprise "BelGIE" are actively involved in the ongoing work to improve the methodology for calculating fees for the allocation and use of the radio frequency spectrum for all types of radio communications, to finalize the quality requirements and methods of monitoring the provision of cellular mobile telecommunications services. In order to improve the quality control system of communication services, hardware and control software are purchased with support for new standards, which will not only allow monitoring the coverage of the fifth generation communication network, but also test the quality of services using mobile terminals.

Specific conditions for the use of the radio frequency spectrum will be developed after the definition of a model for the implementation of fifth generation networks. Considering that the deployment of a 5G network at the initial stage requires significant capital investments, and the prospects for a significant increase in income from the introduction of new technology are not optimistic, several models of network implementation are considered:

a model of sharing of passive infrastructure, which implies the construction of an active infrastructure of 5G networks

(radio equipment) – by each of the operators within the radio frequency spectrum allocated to the operator, and the passive infrastructure (transport network, antenna mast structures) – by a single infrastructure operator;

a competitive model involving the construction of infrastruc-

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ture (passive and active) of 5G networks by each of the operators. At the same time, in order to optimize costs, it is assumed that operators will cooperate in the construction of transport infrastructure (fiber-optic communication lines);

infrastructure model, which involves the construction of a 5G network by a single infrastructure operator.

Sharing of active and passive infrastructure can also be carried out by a consortium of all existing operators, subject to the introduction of appropriate changes in the legislation governing the use of the radio frequency spectrum. The choice of the model will determine the speed of network deployment, the amount of investment, the interest of operators in the development of the network.

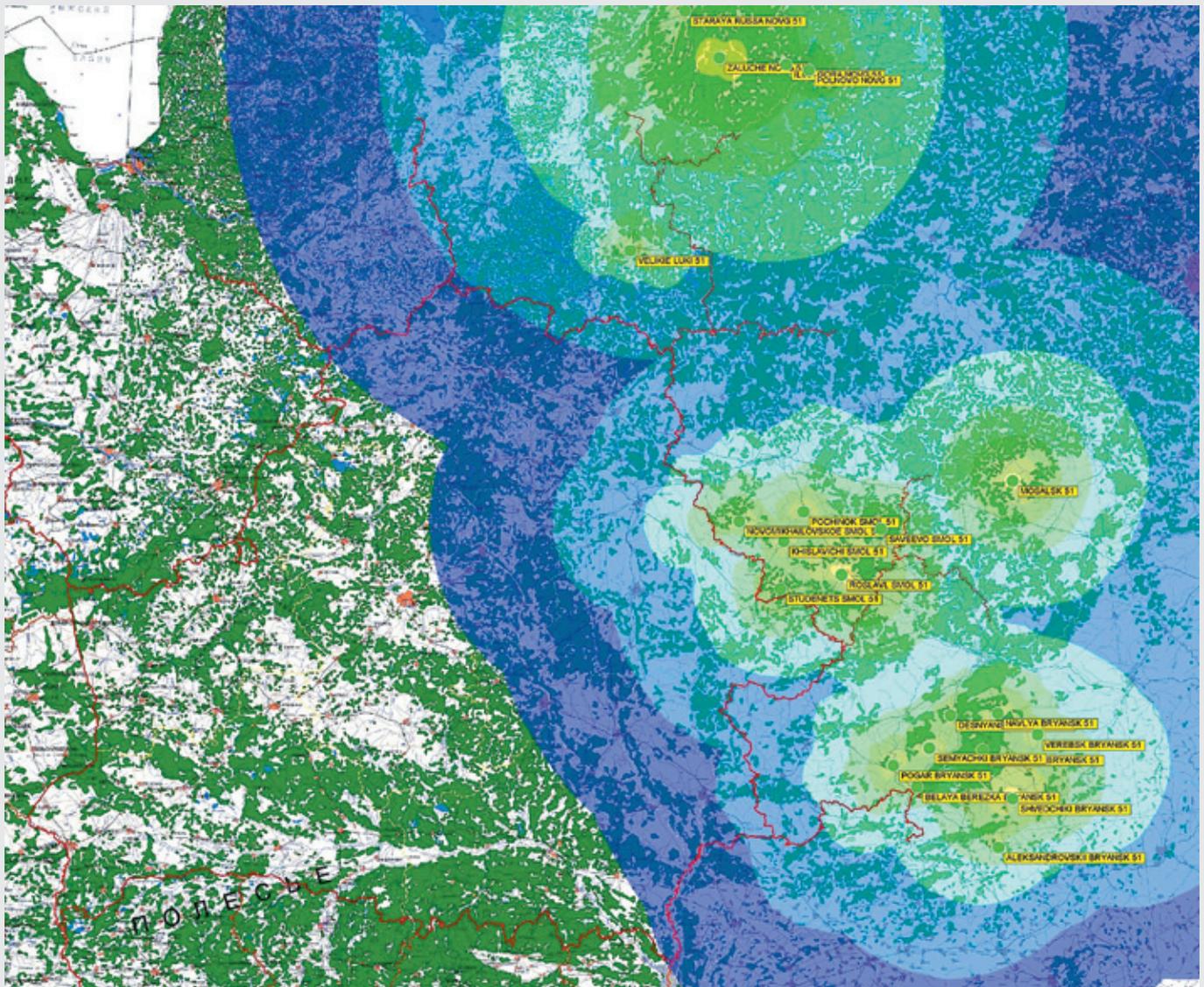
The Republic of Belarus shares border with the countries of the European Union.

Are there any peculiarities in this regard when deploying 5G networks in the country?

Europe has set ambitious targets for a coordinated 5G deployment across all EU member states, as well as pan-European 5G corridors for connected and automated mobility. 5G networks will be multi-service infrastructures

and therefore offer the benefits of co-investment, improving the profitability of each service (sector) sharing the infrastructure. As a flagship use case under the European 5G vertical strategy, connectivity and automatic control is currently being considered for 5G deployment and seamless coverage along European transport routes. The long-term goal is to create holistic ecosystems around vehicles.

In view of the increased bandwidth requirements for networks 5G requires greater than 4G bandwidth, so the most important is the allocation of additional spectrum. In Europe, the 700 MHz and 3,6 GHz bands are considered the most suitable for 5G/IMT-2020 deployment, since they provide both coverage and capacity capabilities. Their use has already been confirmed by equipment manufacturers, standardization bodies, national and international regulators. The 26 GHz



Potential impact of the Russian television transmitters on the planned 5G/IMT-2020 base stations in the eastern regions of the Republic of Belarus in the radio frequency band of 51 TVC

band is planned to be used in places of the greatest concentration of subscribers (dense urban development).

As of summer 2021, the most tested frequency band in Europe was the 3,6 GHz band (69% of tests), with a spectrum allocation percentage of almost 55%, while the EU's 700 MHz band was assigned 46% of the spectrum. The 26 GHz band is still gaining momentum very slowly.

In the Republic of Belarus, it is planned to use the radio frequency

ranges of 700 MHz, 3,6 GHz and 26 GHz agreed for the European region, and the possibility of re-using the spectrum available to cellular operators is being discussed. At the same time, when deploying 5G networks in Belarus, it is necessary to take into account the plans of Russia and Ukraine.

The 26 GHz band (mmWave) is planned to be used to provide innovative services that require ultra-high-speed communication channels with ultra-low signal transmission delays. For

instance, for wireless control of industrial and production processes (robotization), remote surgery, unmanned vehicles, in places with a large concentration of subscribers.

Currently, we do not see much interest in it from operators. There are several reasons for this. Electromagnetic waves in this range have high propagation attenuation and high power losses when penetrating through walls. This leads to a sharp reduction in the radius of



the cell of the base stations (BS) and, consequently, to a significant increase in the cost of network deployment. The extremely small range of the BSs allows the use of mmWave only as an additional to the frequencies of the lower ranges, not allowing to provide continuous coverage of large areas.

What are the problems in the frequency bands considered for 5G?

It is known that in those countries where radio frequency bands are allocated under the terms of exclusive use, such problems do not exist. They reassigned radio frequencies previously allocated to other services and did not provide for their sharing in the radio frequency bands intended for 5G. In our country, there are still such problems, but they are being successfully resolved. In particular, it is planned to release the 694-790 MHz radio frequency band from digital terrestrial TV broadcasting systems, the approximate completion date is 2022.

To free up the 694-790 MHz band for the implementation of advanced land mobile telecommunication systems, a lot of work was done, including within the RCC on the modification of the digital broadcasting service Geneva-2006 plan.

The State Enterprise "BelGIE" held nine coordination meetings with the communications administrations of all border states to find and coordinate additional television channels in the 470-694 MHz radio frequency band in order to compensate for losses associated with the release of the 694-790 MHz band from digital TV broadcasting. Currently, in accordance with the schedule of activities for the conversion of

the 694-960 MHz radio frequency band approved by the Radio Frequencies Commission, work is underway to gradually transfer existing digital TV transmitters from the 694-790 MHz radio frequency band to the 470-694 MHz radio frequency band and free up the band for the implementation of 5G systems.

Federation and Ukraine of the radio frequency band 694-790 MHz for digital terrestrial television broadcasting in accordance with the Geneva-2006 plan. As of today, there is no information on the planned timing of the release of this radio frequency band from the radioelectronic facilities of the broadcast-

In the Republic of Belarus, it is planned to use for 5G the radio frequency ranges of 700 MHz, 3,6 GHz and 26 GHz agreed for the European region

Also, work is underway to analyze the use of this radio frequency band in the territories of neighboring states in order to identify unfavorable conditions that may impose restrictions on the implementation of 5G networks in the territory of the Republic of Belarus.

The situation with this issue in Latvia, Lithuania and Poland is predictable and favorable. These countries, in accordance with the decision of the European Parliament and the Council of Europe No. 2017/899 dated May 17, 2017, are obliged to release the radio frequency band 694-790 MHz from the radioelectronic facilities of the broadcasting service by June 30, 2022 and make it available for the introduction of cellular mobile telecommunications.

The greatest concern is caused by the active use by the Russian

ing service. As an example, the figure shows the possible impact of digital television transmitters of the Russian Federation on the planned 5G/IMT-2020 base stations in the 710-718 MHz radio frequency band (51 TVC).

Further operation of the data of the radioelectronic facilities of the Russian Federation and Ukraine in the 703-733 MHz band (the reception band of 5G IMT-2020 base stations) will restrict the use of 703-733 MHz radio frequency data in the territories of Vitebsk, Mogilev, Brest and Gomel regions of the Republic of Belarus at a distance of up to 200 kilometers from borders. Therefore, it is extremely important that the communications administrations of the Russian Federation and Ukraine intensify their work on the release of this band from the radioelectronic

facilities of the broadcasting service.

The 3,4–3,8 GHz band (often referred to as the "gold band") is now viewed by most experts as offering the best balance between coverage and capacity. Most operators around the world launch networks in this range. The issue of spectrum release in this range is being worked out in Belarus. The key to a successful solution to the problem is in close cooperation with the Ministry of Defense, which uses special-purpose communication systems in this range. It is gratifying to note that mutual understanding has been found on the perspective of this range for the implementation of 5G networks. For a positive solution to the issue, it is necessary to agree on the terms of conversion, ensuring electromagnetic compatibility and a frequency-territorial plan.

At the same time, according to the information available in Russia, it is not yet planned to deploy 5G in the 3,4–3,8 GHz range, since it is already being used by military and space structures. Instead of the "gold band" for Russian fifth-generation networks, it is planned to use the 4,8–4,99 GHz band.

As for the latter band, it was allocated in only a few countries, mainly as a backup or additional band for 3,6 GHz or for specific localized use cases. In this regard, the ecosystem of available equipment for 5G networks may be limited in the 4,8 GHz band.

This band also has higher site density requirements and poorer indoor coverage than the 3,6 GHz band due to the laws of physics. The combination of the above factors does not allow considering this range as a full-fledged replacement for the "gold range".

Taking into account the above, as well as the presence of special-purpose radioelectronic facilities operated in the country, the 4,8 GHz band for 5G in the Republic of Belarus is not considered as promising.

According to international standards, countries wishing to use bands for mobile communications must coordinate with neighboring countries so as not to create unacceptable interference. The use by our countries of different ranges for 5G networks can significantly limit the deployment of such networks in a number of border areas.

That is why already now we are carrying out serious preparatory work to find common ground and develop solutions that take into account mutual interests at the level of communications administrations with the participation of national authorized organizations in the field of regulating the use of the radio frequency spectrum. We have established contact and started interaction with the Ministry of Digital Industry of the Russian Federation. Furthermore, as I noted earlier, the work in the RCC Commission for the Regulation of the Use of the RF Spectrum and Satellite Orbits and its working groups gives us a unique platform for working out and agreeing on many important and complex issues, including those on the above-mentioned problematic ones. Thus, at the 16th meeting of the working group on radio frequency spectrum management, held on April 12–14, 2021, on our initiative, the decision was taken to start the development of documents defining the conditions for the use of 5G-NR/IMT-2020 systems in the radio frequency bands 694–790 MHz, 3400–3800 MHz and

4800–4990 MHz. Both specialists from the Republic of Belarus and the Russian Federation will take part in the development of these documents.

Finally, what do you think is the key to the successful implementation of 5G/IMT-2020?

Spectrum negotiation is a key element in the successful implementation of 5G. Globally harmonized spectrum is a very important priority for the mobile industry. Device and infrastructure development can also be supported when sufficient regional alignment can be achieved to provide economies of scale.

Thus, first of all, it is necessary to take into account the current activities in neighboring countries, which are already undergoing intensive implementation of 5G networks, as well as plans for the future development of such networks, in order to benefit from the harmonization opportunities and timely availability of equipment and infrastructure devices, as well as opportunities roaming. Global and regional alignment creates a unified framework for regulatory requirements and specifications and is essential for the success of next generation networks. Following the global development trends 5G contributes to building an effective digital economy.

I hope that thanks to the close cooperation of our countries, we will be able to resolve all emerging issues as soon as possible, which will allow us to launch 5G networks without external restrictions in the near future.

Thank you for the interesting and frank story.

A.A.Ivashkin was interviewed
by S.A.Popov

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