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International legal and foreign advanced experience in the legal regulation of agricultural machinery using ultrafast mobile communications (5G) for Kazakhstan

Abstract. Ultra-fast mobile technologies are rapidly entering our lives. Fifth-generation mobile communication is a key factor in the further development of these technologies. The proposed article is about international best practices in the development of 5G technologies in agricultural engineering and its legal regulation. The author of the article notes the importance of international cooperation for the benefit of 5G development not only in the Republic of Kazakhstan but also around the world. The article also discusses the existing legal problems of the 5G industry and a certain attempt was made to predict the emergence of future legal challenges. The main method of research was the method of comparative legal analysis of foreign best practices in the development of 5G communications. The central task of this article is to familiarize the circle of experts and specialists of the legislative body with the global trends taking place in the world of telecommunications technologies and their impact on certain sectors of the economy.

Keywords: agricultural engineering, 5G, legal regulation of digitalization, robotization, communication, Internet of things, data transmission.

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Introduction

With the development of wireless technologies and the advent of mobile devices with the ability to transfer large amounts of data, the scope of application of ultrafast 5G mobile communications has significantly expanded. Commercial telecommunications networks of the fifth-generation standard have been successfully tested and launched in major cities of the United States of America (USA), China, Finland, South Korea, Switzerland, Great Britain, Germany, Italy and Spain. Nevertheless, the 5G network is still expensive, requiring a developed infrastructure base, and is mainly used in industry and large businesses. In the vast expanses of the former Soviet Union, intentions to launch a full-scale ultrafast mobile communication were announced in the Baltic countries, Russia and Kazakhstan.

A new generation of mobile communications may shortly cause tectonic shifts in the industry, agriculture, entertainment, healthcare, logistics, and other industries. One of the promising and most important areas of active development of this technology is the branch of mechanical engineering, including agricultural engineering. Recently, the popularity of the so-called "smart farming", the concept of farming with the practical application of the latest information and communication technologies, which can include 5G mobile communication, has been increasing in the world. Thanks to the ultrafast network, new opportunities are opening up for farmers related to the development of precision farming, drone spraying, monitoring of

weeds and crops, tracking the movement of insects, and livestock in real-time.

Plants and factories producing agricultural machinery also strive to use the Internet of Things technology in production, which uses a fifth-generation network. To this end, scientists from all over the world are constantly looking for innovative approaches to the application of 5G technology in the industry. For example, a group of Malaysian scientists recently proposed a completely advanced method for improving the algorithm of functioning of industrial robots using 5G communication, which will increase their efficiency by 68% [1]. At such a pace of development, it becomes obvious that the 5G mobile network will bring big changes in the manufacturing industry in the near future, and domestic specialists will face issues related to its legal regulation.

Methodology

Government measures to support the development of 5G technology in the manufacturing industry, including agricultural engineering, are being implemented in many advanced countries of the world. The study of their experience becomes the main task for domestic telecommunications providers and legal specialists. In the Kazakh scientific community, such scientists as M.A. Sarsembayev, M.N. Imankulov, R.K. Sarpekov, and T. Talgatbekuly study this issue to one degree or another. This topic arouses increased interest among foreign professionals, most of whom represent developing countries in Europe and Asia. Among them are the works of M.K. Khavari,

G. Atharvan [2], J. Harmatos [3], and D. Murtzis [4]. The main method of research was the method of studying and analyzing scientific, theoretical and legal materials from different countries concerning the development of high telecommunications technologies in the industry. The author used this method of analysis when proposing new Kazakh laws on the further development of 5G technologies in agricultural engineering. Based on the experience of foreign countries and multinational corporations, the author offers his own views on the development of 5G technologies in the Republic of Kazakhstan.

Discussion

The development and spread of 5G technology in the world is uneven and is often accompanied by a broad public discussion. Margarita Robles-Carrillo, a professor from the University of Granada, Spain, identifies some areas of the existing controversy on 5G technologies: a technical direction where one side of the disputants claims the technological advantage of 5G, and the other focuses on serious technological risks associated with network instability, the problem of data leakage; socio-economic and political directions of the issue have become, in her opinion, tools in the debate among politicians and economists; strategic direction and national security issues, according to her article, are the most obvious and common cause of disputes on this topic [5].

Indeed, in recent years we have seen a developing discussion around the issue of the widespread introduction of the latest

generation of mobile communications by the technological giants of the telecommunications industry. Some governments openly express dissatisfaction with the activities of multinational corporations such as Huawei for the construction of 5G infrastructure in various countries of the world. Nevertheless, most countries and manufacturing enterprises, realizing the importance of 5G technology in the modern world, are still actively working on its development. For Kazakhstan, the development of fifth-generation mobile communications, in our opinion, cannot threaten national security in any way, but on the contrary, the technological lag of domestic enterprises can lead to a loss of competitiveness of the national economy.

In order to develop 5G mobile communications, many developed countries are developing so-called acts of "soft law", that is, norms of behavior that are advisory in nature. Such documents include concepts, strategies and plans for the development of a certain area. In addition to the pioneering countries in the development of 5G technology such as China, the USA, South Korea, Finland, a number of other countries with progressive economies have developed national plans and programs for the development of 5G. For example, the Austrian government approved in April 2018 a document with the simple title "5G Strategy for Austria". It was planned to implement it in three stages, upon completion of which the 5G mobile network should be available almost throughout the country by the end of 2023. Poland has a similar strategy, according to which the Polish government launched 5G in some cities by the end of 2020 with a

frequency of 700 MHz, and transport routes are planned to be covered by 2025. Also, the Ministry of Digital Affairs of this European country seeks to simplify the issuance of permits for the installation of network equipment and ease restrictions on electromagnetic radiation [6]. The adoption of such strategies made it possible for these countries to clearly formulate a list of measures necessary to achieve the ultimate goal of covering the entire territory with a broadband network of the latest generation. The countries have successfully tested the 5G network in some cities and have already started building infrastructure facilities to achieve maximum results.

In order to cover a vast territory with a fifth-generation mobile network, we should, taking into account the experience of developed countries, develop and approve our own soft law document. Such a document could be called "The concept of development of 5G technology in agricultural engineering of the Republic of Kazakhstan". The adoption of such a document will allow Kazakhstan, as it was in European countries, to accurately determine the range of planned activities in order to ultimately contribute to the development of a high-tech and competitive agricultural industry in the country.

The United States is an indispensable leader in the deployment of 5G infrastructure around the perimeter of its territory. There, 5G services are provided by three major and some major regional mobile operators. Since 2019, an active phase of 5G communication development has begun in the country. This became possible thanks to the state's lifting of serious barriers to licensed providers

providing 5G services. The US Federal Communications Commission has consistently eased the requirements for providers, including reforming the rules for deploying 5G antennas and providing a spectrum of frequency bands. The US Federal Communications Commission conducts several public frequency auctions throughout the year for anyone who wants to purchase a frequency license for their business. It is noteworthy that the state provides a small credit benefit for small businesses and companies operating in agricultural areas. Licenses issued to frequency holders are granted by the State for 10 and 15 years.

As we can see from the American and European experience, one of the most effective solutions in the development of 5G communications was the simplifying of requirements for local providers. In Kazakhstan, such requirements are contained in the Order of the Acting Minister for Investment and Development of the Republic of Kazakhstan dated January 21, 2015 No. 34 "On approval of the Rules for assigning frequency bands, radio frequencies (radio frequency channels), operation of radio-electronic means and high-frequency devices, as well as calculation of electromagnetic compatibility of radio-electronic means for civil purposes". For example, art. 60 of the Rules establishes requirements for bidders intending to receive a radio frequency. Two requirements, namely the requirement to have an extensive telecommunications backbone network covering at least six regions and cities of republican significance and the capital, as well as experience in the field of communications for at least five years, in our opinion, can significantly reduce

the number of operators with the potential to introduce 5G communications in the agricultural engineering industry. At the initial stage of the introduction of 5G mobile communications in Kazakhstan, in our opinion, it would be possible to think about softening these and other requirements imposed on mobile operators.

The experience of Germany is interesting, where, in addition to operators providing 5G communications at the national level, the authorities have provided separate frequencies for local industrial enterprises. In November 2020, the German government allocated separate mobile communication frequencies to more than fifty representatives of large businesses, among which there are machine-building enterprises. The frequencies allocated by the Federal Communications Agency in the range from 3.8 to 3.9 GHz allowed these enterprises to organize their local ecosystems of high-speed mobile communications. The frequencies were provided by the state through public auctions, the participants of which had to meet certain criteria. Currently, the communications agency is discussing the issue of providing additional frequencies for local purposes and is developing a draft of new compliance criteria for obtaining these frequencies [7]. Large Kazakhstani machine-building enterprises with strategic importance and opportunities to engage in R&D should also have access to private corporate networks of the fifth generation. To this end, it is necessary for Kazakhstan to develop a regulatory act "On the allocation of separate 5G mobile communication frequencies for industrial and scientific and innovative enterprises" through the

Government. This will allow them to use Industry 4.0 technologies more in production.

The experience of Germany is one of the most attractive models of 5G development for Kazakhstan. There are several reasons for this statement. Firstly, in Germany, as in Kazakhstan, there is a Romano-German legal system. Unlike the Anglo-Saxon legal system based on case law, the Romano-Germanic legal system allows for effective amendments to existing legislation in the conditions of Kazakhstan. Secondly, Germany is a leading country both in terms of the level of development of agricultural machinery and in terms of its automation, which is achieved, among other things, through the development of 5G mobile communications. In addition, German manufacturers of agricultural machinery and our country have already reached agreements on the deployment of factories on the territory of Kazakhstan. In particular, the German manufacturer of tractors and other agricultural equipment CLAAS has already started assembling its products in the northern agricultural part of the Republic of Kazakhstan. Taking into account these qualities, it can be assumed that the measures taken there are quite possible to translate into reality in our country.

Foreign private investors and businessmen are also interested in the development of 5G technology and invest a lot of money in this industry. So, for example, the agrotechnological startup company Small Robot Company (SRC) has entered into a partnership in the 5G Rural Dorset project, within which a 5G connection scheme optimized for rural areas is being developed and tested with a ready-made 5G agrobot for

arable farms. The £7 million project is partially funded by the UK Department of Digital Technology, Media, Culture and Sport as part of its 5G Testing Program [8]. The same usage examples exist in other countries. So, a few years ago, an American manufacturer of agricultural machinery, one of the world's sales leaders John Deere, bought out a small startup company from Silicon Valley, which was engaged in the development of artificial intelligence. Thus, John Deere is trying to establish the production of agricultural equipment capable of interacting with other machines in the field by streaming data from the vehicle to the cloud and back to machine operators in the shortest possible time. It would be desirable for domestic agricultural machinery enterprises to study the experience of their foreign counterparts and invest more in breakthrough projects related to the 5G mobile network.

Of the post-Soviet states, the Baltic countries have developed their own plans. Russia is also trying to support the development of a fifth-generation network. In 2019, the GSM Association, the Analytical Center under the Government of the Russian Federation and the Union of Mobile Operators LTE jointly prepared a detailed report on the development of 5G in Russia and in the world, where they revealed in detail the main advantages and challenges associated with this technology. Among others, the authors noted the need for legislative transformation in terms of sanitary and epidemiological norms, and the transfer of personal data and IoT data [9]. The issue of allocating individual frequencies was also not left aside.

Issues regarding sanitary and epidemiological standards, the transfer of personal data and security in cyberspace are also relevant for the Republic of Kazakhstan. Unfortunately, in our country, the legal side of the issue is studied by a critically small number of specialists. Basically, domestic scientists and specialists focus on technical provisions and largely limit themselves to listing the advantages of digital technologies based on a 5G network. In domestic legal science, we have not yet observed a full-scale research work that would cover various aspects of the introduction of 5G mobile technologies into the manufacturing industry. Nevertheless, individual scientific articles and analytical materials deserve the attention of all those interested in this issue. For example, an associate professor of the Kazakh Agrotechnical University named after S. Seifullin, Ph.D., M.N. Imankulov in his article entitled "Network infrastructure for digital transformation" calls the positive aspects and vulnerabilities of high-speed network technologies. In the article, he comes to the conclusion that it is necessary to form a systematic approach to simplifying and accelerating infrastructure changes, thereby supporting in absentia the method used in the USA and Germany, where governments have maximally simplified the requirements for infrastructure facilities that ensure the operation of the 5G network [10]. Here our position converges with the position of the author with a small remark – such concessions in the requirements should be only at the initial stages of the development of 5G communications. In the future, the requirements can be returned to the "proper" level, since the country in pursuit of

technology should not lose network sovereignty.

From the point of view of the law, the issue of the development of 5G mobile communications in agricultural engineering has been repeatedly discussed in the articles of M.A. Sarsembayev, Doctor of Law, Professor of the Department of International Law of the L.N. Gumilev Eurasian National University. In order to stimulate the development of 5G technology in the industry, he proposes to adopt such laws in the country as "On the introduction of digitalization, artificial intelligence devices, automation in the production processes of transport and agrotechnical engineering", "On the launch of mass production of electric and unmanned vehicles and agrotechnical means with diverse potential, with a gradual transition from industrial assembly to autonomous production" [11]. On the one hand, the adoption of such laws would encourage the development of the machine-building industry in a digital way, on the other - is it justified to adopt special laws in order to make the introduction of digital technologies in agricultural engineering possible? Of course, innovative development, including the use of 5G in the company's activities, requires a certain push from the state. But at the same time, companies themselves can and should "implement" and "launch" digital technologies, and the state should remain an independent arbiter and provide a legislative framework for their stable operation. In this aspect, the role of a regulator that distributes frequencies, sets requirements for technical means of communication and encourages the use of digital technologies in enterprises should be

shifted to the state. Yes, it stimulates and encourages, but does not interfere with corporate governance processes. It seems that the adoption of the law "On measures to stimulate the use of digital technologies in the manufacturing industry in the Republic of Kazakhstan" would be a more correct decision in a market economy.

The Director of the Institute of Legislation and Legal Information of the Republic of Kazakhstan R.K. Sarpekov also speaks about the need to digitalize the legal space. In particular, his article "Digitalization of the legal space" largely touches on those provisions that could contribute to the successful development of digital 5G technologies in the country [12]. In fact, the development of 5G cannot be carried out effectively in isolation from the digital modernization of the entire legal space, because fifth-generation communication can open up completely new forms of interaction between economic entities. Accordingly, his views can be supported in the context of the fact that the digital development of the legal industry will somehow contribute to the development of technologies such as the 5G mobile network.

In practical terms, the introduction of 5G communications in the Republic of Kazakhstan will be carried out in several stages. It is planned, first of all, to cover the cities of republican significance with superfast mobile communications. To date, a new generation of communication has already been successfully tested on the territory of the city of Almaty. In September 2021, the Ministry of Digital Development, Innovation and Aerospace Industry of the Republic of Kazakhstan reported that the

commercial launch of mobile communications of the 5G standard is not yet possible and that the relevant bill is under consideration in the Parliament of the Republic of Kazakhstan [13]. Today, when the Ministry is already an authorized body with the right to conduct auctions, we can talk about the next stages of development. Recall that according to the national project "Technological breakthrough through digitalization, science and innovation", the 5G mobile network should cover cities of republican significance and all regional centers. As the number of devices capable of connecting to the Internet in machine-building and other enterprises increases, the market for 5G technology communication services will increase. The Ericsson report states that "the expected addressable market in 2026 will amount to \$113 billion" [14]. If Kazakhstan does not make attempts to move to the next level now, there is a risk of falling behind global progress.

Unfortunately, it is still too early to talk about international regulation of the 5G mobile network, since unified rules for the implementation and operation of the fifth-generation network have not yet been developed. For the widespread adoption of 5G technology, the international community must overcome some obstacles. First of all, the international community needs to take care of the issues of harmonization of international standards for 5G. The issues of allocation of operating frequencies are discussed within the framework of the World Radiocommunication Conference organized by the International Telecommunication Union (ITU). In addition, international standards development organizations such as

3GPP, the Institute of Electrical and Electronics Engineers and ITU itself are already working hard to standardize 5G technology. However, trade wars between Chinese tech giants such as Huawei and the US government may lead to a war of standards in the world of 5G technologies, as it was before the formation of the 3rd Generation Partnership Project (3GPP). Obviously, in relation to such advanced technologies, the world should move towards openness and solidarity. An example of successful cooperation is the Agreement signed this year between the European Union (EU) and China on cooperation in the development of the 5G network. The same agreements were signed between the EU and South Korea, the EU and Japan.

Cooperation in the field of digital technology development can be carried out both within one organization and between an organization and individual countries, as in the above examples. Within the framework of the Eurasian Economic Union (EAEU), there are some attempts to unify norms in the field of data turnover, which may later contribute to the adoption of unified documentation for 5G communications. So, currently, the EAEU members are actively discussing a draft agreement on data turnover. However, each EAEU member country has its own views on the development of the 5G network.

In order to develop 5G communications in agriculture, the Food and Agriculture Organization of the United Nations (FAO) in 2019 concluded an agreement with Korea Telecom on joint efforts in promoting digital agricultural innovations. Realizing that it will be extremely difficult for Kazakhstan to develop

a 5G network alone, and analyzing the examples given, we can conclude that we will also need to choose a partner from a limited number of companies to conclude an agreement, whether in a bilateral format or within the EAEU. Potential partners include such companies as Cisco, Nokia, Huawei, Juniper.

"Smart" agricultural engineering generates various legal issues, which, unfortunately, partially remain unanswered. In this article, we have tried to outline the range of the main legal problems. First of all, you should pay attention to the contracts concluded for the provision of 5G services. The problem of data protection used for intelligent agriculture is important for the development of successful projects in the field of digital agriculture and mechanical engineering. In addition, future users of agricultural technology tools need to determine in advance who will be responsible if data processing leads to incorrect decisions affecting the chain of production of final products. In this case, strict provisions of the rules on compensation and limitation of liability can help, since suppliers of agricultural machinery should also be able to guarantee their reliability with the help of appropriate certificates and audits.

Results

Having analyzed the works of domestic and foreign authors on this topic, and having studied foreign experience in the development of 5G technology, we came to the conclusion that the topic under consideration, at least in terms of legal

regulation, has been studied at a low level. In this regard, the domestic legislator is recommended to pay attention to the experience of some foreign countries that have already managed to put 5G technologies into practice and feel its advantages. It was characteristic of all successful cases that the governments of these countries developed and approved a comprehensive plan for the development of 5G infrastructure in their territories, created favorable legal conditions for the deployment of the necessary infrastructure for its scaling, allocated separate frequencies for representatives of local businesses, provided concessions in the installation of antennas or other devices. In addition, the legislator needs to anticipate in advance future legal problems related to personal data protection, cybersecurity, copyright and other issues. Domestic specialists also need to explore the possibility of joint use of infrastructure facilities by several operators on the territory of our country. The author proposes, in addition to the proposals listed in the discussion part of the article, to develop a general draft law "On amendments and additions to some legislative acts of the Republic of Kazakhstan on the development of 5G mobile communications in the manufacturing industry", with the help of which it will be possible to significantly improve domestic legislation in the field of telecommunications services.

Conclusion

The factories of tomorrow will rely heavily on wireless technology. 5G's high bandwidth, wireless flexibility and low

latency performance make it an ideal choice for manufacturers. Agricultural machinery manufacturing countries and major manufacturers and suppliers themselves are well aware of the importance of this technology and are developing their national plans and strategies for the development of 5G technology. Kazakhstan also needs to develop its strategy for the introduction of 5G in various spheres of life. On the way to the development of new technologies, various previously unknown difficulties and problems in the legal regulation of 5G will appear. Kazakhstan already needs to take care of these issues and prepare a favorable legal ground for the full-scale implementation of 5G. This should be done based on the experience of advanced countries and companies. We are going to improve our laws on communications,

personal data, intellectual property, and others. The development of 5G standards and bringing them into line with international standards should be the main guideline. It is necessary to take into account the recommendations of leading researchers in this area for developing countries. Kazakhstan, unfortunately, does not yet have its own developments, but it is possible to achieve positive results in development on a national scale in partnership with foreign companies. The experience of such countries as Finland, Germany, the USA, and Australia has shown that the development of 5G mobile communications in agricultural engineering has a positive effect on the overall level of the economy. Kazakhstan has every chance to be on the same list with these states.

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Қазақстан үшін аса жылдам байланысты (5G) пайдалана отырып, ауыл шаруашылығы машина құрастыруды құқықтық реттеудің халықаралық-құқықтық және шетелдік озық тәжірибесі

Аңдатпа. Өте жылдам жұмыс жасайтын мобильді технологиялар біздің өмірімізге тез еніп келеді. Бесінші буын 5G ұялы байланысы осы технологияларды одан әрі дамытудың негізгі факторы болып табылады. Ұсынылып отырған мақалада ауылшаруашылық машина жасаудағы 5G технологиясын дамытудың халықаралық озық тәжірибесі және оны реттеудің құқықтық мәселелері туралы айтылады. Мақала авторы 5G Қазақстан Республикасында ғана емес, бүкіл әлемде дамуы үшін халықаралық іскерлік қатынастың маңыздылығын атап өтеді. Мақалада сондай-ақ 5G саласының қолданыстағы құқықтық мәселелері талқыланады және құқықтық сипаттағы болашақ сын-тегеуріндердің пайда болуын болжауға әрекет жасалды. Зерттеудің негізгі әдісі 5G байланысын дамыту бойынша шетелдік озық тәжірибені салыстырмалы-құқықтық талдау әдісі болды. Аталмыш мақаланың басты міндеті – сарапшылар мен заң шығарушы орган мамандар шеңберін телекоммуникациялық технологиялар әлемінде болып жатқан жаһандық тенденциялармен және олардың экономиканың салаларына әсерімен таныстыру болып табылады.

Түйін сөздер: ауыл шаруашылығы машиналарын жасау, 5G, цифрландыруды құқықтық реттеу, роботтандыру, байланыс, Заттар интернеті, деректер беру.

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Международно-правовой и зарубежный продвинутой опыт правового регулирования сельскохозяйственного машиностроения с использованием сверхбыстрой мобильной связи (5G) для Казахстана

Аннотация. Сверхбыстрые мобильные технологии стремительно входят в нашу жизнь. Мобильная связь пятого поколения 5G является ключевым фактором дальнейшего развития этих технологий. В предлагаемой статье говорится о международном передовом опыте развития 5G технологий в сельскохозяйственном машиностроении и его правовом регулировании. Автор в статье отмечает важность

международной кооперации во благо развития 5G не только в Республике Казахстан, но и во всем мире. В статье также обсуждаются существующие юридические проблемы 5G отрасли и была предпринята определенная попытка предсказать появление будущих вызовов правового характера. Основным методом исследования стал метод сравнительно-правового анализа зарубежного передового опыта по развитию 5G связи. Центральной задачей данной статьи является ознакомление круга экспертов и специалистов законодательного органа с мировыми тенденциями, происходящими в мире телекоммуникационных технологий и их влиянием на определенные отрасли экономики.

Ключевые слова: сельскохозяйственное машиностроение, 5G, правовое регулирование цифровизации, роботизация, связь, интернет вещей, передача данных.

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