Belarusian State University
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Technology for analyzing and predicting the level of electromagnetic environmental pollution by 2G/3G/4G/5G mobile communication systems

Type of collaboration

Commercial agreement with technical support

Key words

5G, mobile, network, electromagnetic, safety

State of IPR

Copyright

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University offers

- Methodology and algorithms for system analysis of electromagnetic ecology of areas and electromagnetic safety of the population based on the analysis of integrated system characteristics of mobile communication networks and services to ensure high standards of electromagnetic ecology of the environment and electromagnetic safety of the population.
- Development of the specialized expert system for collecting and processing information and computer analysis of electromagnetic pollution of territories in 30 MHz – 300 GHz frequency band, with the development of versions in the languages of customers, including software, installation of stationary and mobile tools for monitoring of electromagnetic pollution of the environment.

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Potential partners

- Operators of mobile communications which are interested in creation and operation of safe and environmentally friendly cellular radio networks, in safe wireless information service for the population.
- Research centers and enterprises that develop and deliver the software and specialized expert systems for collecting and processing information and computer analysis of electromagnetic pollution of the environment and electromagnetic safety of population in the context of intensive development of 4G/5G mobile communication systems and services.
- Local authorities, research centers monitoring the environment, assessing the electromagnetic ecology of territories and electromagnetic safety of the population.

Advantages of the technology

Unlike all analogs, this technology does not require calculations of the levels of electromagnetic fields created at the observation point near the Earth's surface by the entire set of surrounding cellular base and subscriber stations, the accuracy of which is usually low due to the extremely large and uncertain number of these stations and the lack of information (randomness) of their radiation characteristics.

The technology provides a worst-case estimate of the average levels of the electromagnetic background. The estimation error is determined by the accuracy of the initial data and, depending on their quality, is 1-6 dB.

Due to the simplicity of the analysis and the availability of the initial data, the implementation of the technology ensures effective control and management of the processes of electromagnetic pollution of the environment by regulators and supervisory authorities under the conditions of extremely intensive development of 4G/5G systems and services and high standards of electromagnetic ecology of the area and electromagnetic safety of the population.

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Technology description

The proposed technology solves the problem of system analysis and prediction of the level of electromagnetic background created by modern and future systems of mobile communications near the Earth's surface at the human height in areas with different population density (urban, suburban, rural area). This makes it possible to assess electromagnetic ecology of the environment and electromagnetic safety of the population in the context of intensive development of 4G/5G networks and services.

The technology, unlike its analogues, does not require calculations of the levels of electromagnetic fields created at the observation point near the Earth's surface by the entire set of mobile communication's base and mobile subscriber's stations at its radio visibility vicinity, which are usually impossible due to the excessive number of stations and the lack of information about their radiation characteristics.

The technology is based on the analysis of the available integral system characteristics of the radio-information component of the technosphere:

- the average electromagnetic loading on area created by the radiations of base and subscriber stations in the allocated frequency bands,
- the average area traffic capacity of the wireless information services for the population and the average dimension of service areas of base stations at each hierarchical level of the 2G/3G/4G/5G network infrastructure.

These integrated system characteristics of radio networks can be determined indirectly on the basis of estimates of the terrestrial density and technical characteristics of base and subscriber's stations; specific traffic intensity, number and volumes of mobile communication services.

The technology can be implemented by creating a specialized system for analyzing the electromagnetic ecology of urban and suburban areas and electromagnetic safety of population under the intensive development of 4G/5G wireless systems and information services.