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## **ANALYSIS OF SCIENTIFIC RESEARCH AND TECHNICAL SOLUTIONS TO PROTECT SECURITY OF COMMUNICATION USERS**

*The analysis of the normative legal framework on information security issues showed that today there are formal requirements formalized by a document that obligates communication operators to ensure the security of their information resources, as well as those of users who trust them. However, not all issues related to the organization of data protection in mobile communication systems are adequately regulated. The analysis of the normative legal framework on information security issues has shown that today there are requirements formalized by a document that imposes obligations on communication operators to ensure the security of their information resources, as well as those of users who trust them. However, not all issues related to the organization of data protection in mobile communication systems are adequately regulated.*

*Key words: Information, security, operator, radiation, system, mobile networks, radio signals, frequency, human factor.*

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## **АНАЛИЗ НАУЧНЫХ ИССЛЕДОВАНИЙ И ТЕХНИЧЕСКИХ РЕШЕНИЙ ДЛЯ ЗАЩИТЫ БЕЗОПАСНОСТИ ПОЛЬЗОВАТЕЛЕЙ СВЯЗИ**

*Анализ нормативно-правовой базы по вопросам информационной безопасности показал, что на сегодняшний день существуют формальные требования, оформленные документом, который обязывает операторов связи обеспечивать безопасность своих информационных ресурсов, а также тех пользователей, которые им доверяют. Однако не все вопросы, связанные с организацией защиты данных в системах мобильной связи, должным образом урегулированы. Анализ нормативно-правовой базы по вопросам информационной безопасности показал, что на сегодняшний день существуют требования, формализованные документом, который налагает обязательства на операторов связи по обеспечению безопасности своих информационных ресурсов, а также тех пользователей, которые им доверяют. Однако не все вопросы, связанные с организацией защиты данных в системах мобильной связи, должным образом урегулированы.*

*Ключевые слова: информация, безопасность, оператор, излучение, система, мобильные сети, радиосигналы, частота, человеческий фактор.*

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## **БАЙЛАНЫШ КОЛДОНУУЧУЛАРДЫН КООПСУЗДУГУН КОРГОО ҮЧҮН ИЛИМИЙ ИЗИЛДӨӨЛӨРДҮ ЖАНА ТЕХНИКАЛЫК ЧЕЧИМДЕРДИ ТАЛДОО**

*Маалыматтык коопсуздук маселелери боюнча ченемдик-укуктук базаны талдоо көрсөткөндөй, бүгүнкү күндө байланыш операторлорун өздөрүнүн маалыматтык ресурстарынын, ошондой эле аларга ишенген пайдалануучулардын коопсуздугун камсыз кылууга милдеттендирген документ менен таризделген формалдуу талаптар бар. Бирок, мобилдик байланыш системаларында маалыматтарды коргоону уюштурууга байланыштуу бардык маселелер тийиштүү түрдө жөнгө салынган эмес. Маалыматтык коопсуздук маселелери боюнча ченемдик-укуктук базаны талдоо көрсөткөндөй, бүгүнкү күндө документ менен формалдаштырылган талаптар бар, ал байланыш операторлоруна өздөрүнүн маалыматтык ресурстарынын, ошондой эле аларга ишенген пайдалануучулардын коопсуздугун камсыз кылуу боюнча милдеттенмелерди жүктөйт. Бирок, мобилдик байланыш системаларында маалыматтарды коргоону уюштурууга байланыштуу бардык маселелер тийиштүү түрдө жөнгө салынган эмес.*

*Ачкыч сөздөр: маалымат, коопсуздук, оператор, радиация, система, мобилдик тармактар, радио сигналдар, жыштык, адам фактору.*

**Introduction** Currently, the Internet of Things covers many areas of human activity, from industry and agriculture to services and healthcare. At the same time, one detail almost always remains the same for any application of the Internet of Things: data flows from objects connected to a communication network can improve the quality of existing services, create new services, add can reduce costs, and solve security problems.

With its emergence and rapid development, the Internet of Things not only significantly changed the idea of the role of telecommunications in modern science and technology, but also laid the foundation for many other promising applications. These are more self-organizing networks of motor vehicles and road infrastructure [4,5].

Today, there are many different definitions for such a complex and complex concept as e-health [6]. Electronic health care is a unified information field for solving large-scale health care problems, designed to ensure continuous exchange of medical information, as well as cooperation between doctors and patients based on ICT technologies. is quickly emphasized.

Mobile networks are divided into geographical areas, each of which is served by a base station. Communication between a mobile phone and a base station is provided by the exchange of radio signals. A user connects to a base station via a cell phone, and the system connects when the user moves from system to system.

**Literature review** An activated mobile phone responds to special control signals from the nearest base stations. When a suitable base station is found, the phone establishes a network connection. When there is no outgoing call or call from the other party, except for periodic updates, the phone is in a passive state.

Since 1990, more than 100 reports from various expert groups and government organizations have been devoted to the study of scientific data, all of which have shown that radio signals are below the level set by the International Commission on Non-Ionizing Radiation Protection shows (ICNIRP) 1998 guidelines are not harmful to health. WHO recommends the use of ICNIRP guidelines for exposure control?

In May 2011, radio frequency (RF) electromagnetic fields were classified as "potentially carcinogenic" (Group 2B) to humans. This category is used in cases where causal relationships between events are acceptable, but the influence of chance, error or interference of other factors cannot be completely ruled out. WHO has outlined the direction of further research needed to assess future health threats? Many research programs are based on WHO guidelines for research, and WHO estimates that more than US\$200 million has been allocated to these programs since 1997. [3,1,2].

International Telecommunication Union (ITU) and European Commission and widely used in Africa, Asia, Europe, Middle East and Latin America. Similar radio exposure limits exist in North America. Some countries apply stricter standards in response to differences in scientific interpretation or public concerns.

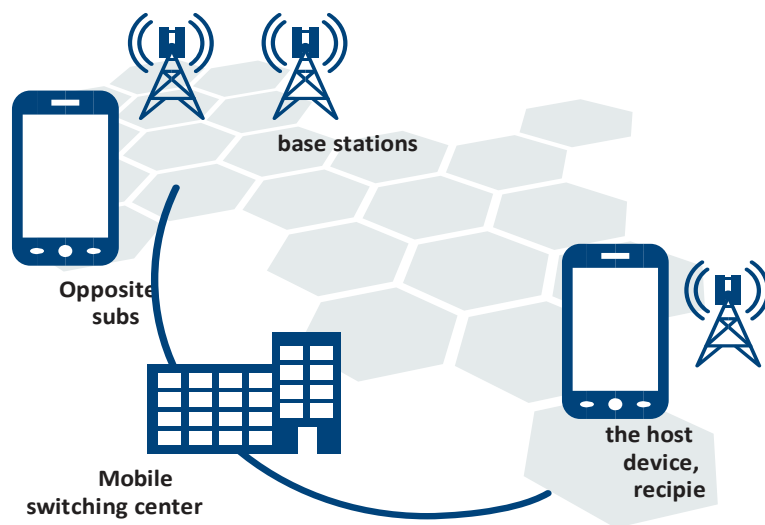


Figure 1. Mobile stations

The compatibility of a mobile phone is determined by measuring the specific absorption rate (SAR), which is a measure of the absorption of radio signal energy by the human body. SPL is determined at the highest power level verified under laboratory conditions, but the actual SPL of a working telephone may be much lower than this value.

Mobile phones use adaptive power management to minimize transmitted power while maintaining high call quality. These increases talk time and reduce noise. For example, the average power of a phone during a voice call can vary from 0.001 W to a maximum of less than 1 W.

There is no evidence that the radio signals emitted by mobile phones are harmful. Some studies have shown that long-term cell phone use increases the risk of brain cancer, but these studies are limited and health statistics do not support an increased risk of cancer. Given this uncertainty, WHO recommends further research?

**Results and discussions** The general scientific view is that living near a base station is not harmful to health. Cellular base stations use low-power radio transmitters to reduce their impact on nearby homes and properties. Recent studies have shown that exposure to radio signals from base stations is between 0.002% and 2% of the international recommended level. The specific level depends on a number of factors, such as proximity to the antenna and the specific environment. This level is lower than or comparable to the RF exposure of radio or television transmitters. Recommended limits can only be exceeded in areas near antennas, so network operators limit access to these areas by placing antennas on tall poles or roofs.

In May 2011, the International Agency for Research on Cancer, a part of the World Health Organization, concluded that there is a potential risk of cancer from exposure to radio waves, based on limited human and animal data. Health authorities are recommending more research and reminding mobile phone users of practical ways to reduce exposure, such as using a wireless headset. At close range, a mobile phone's radio signal can interfere with electronic medical equipment, and at a distance of more than 1-2m, there is a possibility of interference significantly reduced. Cell phones can be used in designated areas in hospitals.

**Conclusions and suggestions** The mobile phone safety study used well-designed and rigorous research methods using validated models to assess health risks. Many research

institutions and guidelines where research is conducted are overseen by governments and independent organizations around the world. Research results are constantly reviewed at the international level by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) and other organizations.

No scientific research has addressed the connection between cell phone or base station radio signals and gas station fires. A 2005 report by the Australian Transport Safety Bureau concluded that not one in 243 accidents worldwide involved telecommunications equipment. In fact, many fires are caused by electrostatic discharge from the human body.

The development of safety standards is based on many scientific studies. Expert groups have not identified any side effects associated with specific radio signals, and therefore scientific organizations want to ensure that existing safety standards are reliable enough for new technologies and protect against all identified health risks

A mobile phone does not have enough power to create such an effect. The maximum average power of a mobile phone is about 0.25 W, which is not comparable to the power of a microwave oven of 900 W. Accepting electronic health as the current level of integration of telecommunication technologies and computer technologies into medical practice is probably the most correct solution.

The beginning of such integration can be considered as the first experiments on the transmission of medical statistics data by telegraph and telephone. Currently, electronic health is one of the most high-tech, demanding and therefore rapidly developing areas of human knowledge [18]. Electronic health includes the transmission of medical information over the Internet, the provision of electronic consultation or reference services to the public, remote diagnosis of the health status of patients, remote control of medical robots and probes, etc.

A number of influential organizations in the world, including the World Health Organization (WHO), the International Commission on Non-Ionizing Radiation Protection (ICNIRP), the Institute of Electrical and Electronics Engineers (Institute of Electrical and Electronics Engineers – IEEE) and others have been studying the effects of electromagnetic waves on human health since the 1960s. Based on the results of these studies, recommendations on limit indicators of electromagnetic radiation were developed for use in the development of national and industrial standards and norms. A mobile phone and a base station in a person's hand automatically increase or decrease their radiation power depending on the distance between them and obstacles. That is, the further away the base station is, the higher the radiation power of the phone in your hand. That is, not the power of the mobile base station, but the effect of the radiation of the phone in your hand is higher.

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