

# EXPLORATION OF 5G TECHNOLOGY PERIOD: BOON OR BANE

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## Abstract

The Fifth Generation of mobile networking is the descendant of the world's wireless standards succeeding 1G, 2G, 3G and 4G networks. 5G is the advent of all the previous mobile networks based on CDMA. It establishes a secure connection for the users. It promises more than faster and secure network, from high-speed mobile network to smart cities, 5G is a life-changing technology. The potential applications of 5G are achieved by producing electro-magnetic radiations which uses high frequencies around 3.5 -6.00 GHz, making it faster and efficient. While, cancer is not only one problem, however exposure to these radio frequencies can also result in heating of organic tissue, reproductive problems, autism and boom in body temperature. This paper presents a general review on the new cellular technology and it also lists environmental and health issues related to 5G technology and scientist's opinion about it.

**Keywords:** 5G, Health Hazards, Electromagnetic Radiation

## 1. INTRODUCTION

5G network is based on OFDM for all its intents and purposes (Orthogonal frequency division multiplexing). OFDM is a method of modulating a digital signal. OFDM is an excellent waveform choice as it operates well with high data rate stream and works on 3 bands-LOW, MIDDLE and HIGH Frequency spectrum.



Figure 1 Applications of 5G

It has been designed to enable next generation user experiences such as virtual reality appliances, telemedicine, remote surveillance, e-cars, including strengthening e-health as shown in Fig 1. These potential applications of 5G are achieved by producing electromagnetic radiations- which uses high frequencies around 300-600 GHz, making it faster and efficient. At these higher frequencies, 5G will use greater number of

base stations and beamforming antennas, which sends data directly to devices, thus increasing mandatory exposure. [1][2] The widespread adoption of 5G applications will result in a significant rise in total, long-term RF-EMF exposure.

As energy has grown and technology has advanced, exposure to electromagnetic fields has continuously increased. The harm produced by these radiations extends beyond the human race, with increasing evidence of adverse impacts on both plants and animals, which is rather substantial.

## 2. LITERATURE SURVEY

In [3] author reviewed the concept of 5G technology and how it works. It also explained the how 5G network would impact modern technologies such as AI (Artificial Intelligence), IoT (Internet of Things). In work [4] author presented a set of question & answers. And answered the most frequently asked questions about radiations and electromagnetic fields. In [2] the authors Rainer Nyberg, Lennart Hardell and 250 prominent scientists recommended a moratorium on the rollout of 5G. In work [5] authors studied the implementation and health concerns related to the fifth generation of mobile network(5G).

## 3. CASE STUDY

Considering the health hazards caused by EMF, a group of 250 prominent scientists from 40 different countries have recommended a temporary halt on the use of fifth generation of mobile network until the health hazards related to 5G have been fully investigated. These scientists

have expressed "severe concern" about 5G radiation's exposure to EMF, which is, for all intents and purposes, significant. EMF damages live creatures at levels below most international recommendations, according to a number of recent scientific articles. These scientists also encouraged the EU to adopt wired rather than wireless communications.

According to the EUROPA EM-EMF Guideline 2016, there is strong evidence that long-term exposure to specific EMFs increases the risk of diseases such as cancers, Alzheimer's disease, and male infertility, fairly common EHS (electromagnetic hypersensitivity) signs consist of headaches, awareness difficulties, sleep problems, depression, loss of energy, fatigue, and flu-like signs. After describing in detail how 5G could be harmful, the appeal urges the government to appoint an EU taskforce of independent and impartial scientists to re-examine the health risks, determine about maximum exposure standards of wireless communication and to create policies to keep away from exposure to exceeding the "maximum exposure standards" in order to guard EU citizens. [2]

5G is gradually rolling out with its use in China, South Korea and America. These top countries have most cities with 5G. South Korea is the first city with the deployment of 5G with over 85 cities with 5G availability. In article [6], it has been claimed that more than 30% of the world countries now have 5G availability. While many global companies are working together for the success of 5G in India. The department of telecommunications has recently allotted 5G trial spectrum to Reliance Jio, Vodafone and Bharti Airtel. As per Ericsson Mobility Report, by 2026 around 26-27% of the mobile subscription would be 5G [7].

#### 4. DISCUSSION ON 5G EFFECTS

Exposure to electromagnetic fields has been regularly growing as increasing electricity and ever-advancing technologies. The harm caused by these radiations goes past the human race, as there is growing proof of dangerous consequences to both plants and animals.

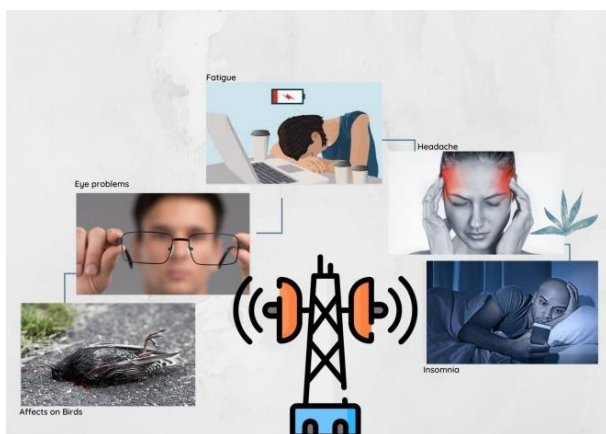


Figure 2 Impacts of 5G

##### Health Issues in Humans

Electromagnetic fields above a certain level can trigger biological effects that has been discussed below.

- These frequencies cause tissue heating and also different kind of illness that are caused without

heating ("non-thermal effect"), according to WHO [4]. Heating occurs when your skin absorbs electromagnetic energy which causes slight rise in body temperature.

- The health of the exposed individual or his or her progeny is harmed as a result of the adverse health effect. Low-level exposure to the fields, according to WHO and other agencies, raises the chance of negative consequences such as abortion and low birth weight. Occasional reports of association between health problems and EMFs have not been regarded by the scientists.
- In article [1], it has been stated that some members of public have reported symptoms like headache, anxiety, nausea, fatigue on exposure to low level electromagnetic fields as shown in Fig 2. In addition, employees exposed to high amounts of these radiations have been found to develop eye irritation and cataracts.
- The latest cellular technology uses millimeter waves that are in most cases absorbed inside few millimeters of human skin pores and cornea.
- Also, there's some research involving EMFs, where researchers examined how using mobile phones affects cognitive function and reduces attention.
- Studies on EMFs have showed negative effects of these radiations which include the risk of developing cancer on exposure to RF-EMF via cell phones. The working group classified EMF as "possibly carcinogenic to humans (Group 2B)". However, in accordance with [1] despite the fact that electromagnetic fields have an impact on cancer the feasible risk will be very small.

#### 5. RF-EMF EFFECTS ON ENVIRONMENT

RF broadcasts kills everything that lives not only some form of microorganisms. Insects and birds are already being killed by RF transmissions. The world's largest study, the National Toxicology Program (NTP), has revealed a significant rise in the incidence of brain and heart tumors in animals exposed to EMF below ICNIRP standards. The result of the study is supported by numerous scientific Departments. Animals with lower ability to change body temperature are found to be more vulnerable to high frequency EMF. It has been seen that animals exposed to RF radiation partially or whole body may have various changes in the blood-forming and immune 4 systems. Stimulatory or suppressive changes have been observed depending on the exposure conditions and biological parameters.

However, some studies have conflicting evidence. Opinions and research outcomes on 5G diverge across the community, government and organization [5]. Therefore, more studies are needed to determine if 5G have been potentially associated with any of the health risks related to electromagnetic frequencies. Considering the issues related to the latest technology, scientists across the globe demand a moratorium on this technology until its safety

has been established by WHO which is conducting a health risk assessment from exposure to radiofrequencies covering the effects of 5G technology which is to be published by 2022.

## 6. CONCLUSION

5G is a promising technology as it will allow many new applications such as telemedicine, e-health, e-cars to thrive. It is said to provide secured network with high speed and low latency rate, the put off among sending and receiving information. Yet, it has negative impacts as it increases the wave radiation in our environment which uses high frequencies around 300-600 GHz, making it faster and efficient. At these higher frequencies, 5G uses greater number of base stations and beamforming antennas, which sends data directly to devices, thus increasing mandatory exposure. The damage induced by these radiations extends beyond humans, with mounting evidence of negative impacts on all plant and animal life. Raising the concern related to health hazards caused by 5G radiations many prominent scientists have signed an appeal which demands a halt on the use of 5G technology. Until, the health hazards related to 5G have been fully investigated. Therefore, studies and research should be set up for the deployment of 5G and the roll out of 5G should be halted until the safety of the technology has been tested and proven.

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