# Chapter 3
# The Environmental Impact of 5G Technology on Humans and Animals

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## ABSTRACT

*5G has the potential to become the future communication technology as it has the capability to provide faster download speeds, extremely low latency, and higher capacity. The deployment of 5G will be as a wi-fi that will cover the entire globe. It will serve an elevated number of devices than the previous technology; therefore, the distribution of radiofrequency electromagnetic fields (RF-EMF) will grow rapidly. Although no direct adverse effect has been reported by the service providers, the real health impact of this advanced technology is still under investigation. It is expected that the mm-wave frequency range (30-300 GHz) is ideal for 5G technology, and the devices, in this operating range, will work at very low power due to which small penetration is supposed to occur, but it will require a high density of small cells. It will increase the chances of human exposure to RF-EMF. In this chapter, a theoretical framework is used to describe the effect of 5G technology on humans and animals and also the rumors related to the adaptation of 5G technology.*

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## INTRODUCTION

International Telecom Union (ITU) is an UN-based agency whose responsibility is to define the generation of wireless networks and allocation of spectrum to all other nations. Before defining the wireless generation, its expert member examines the requirement which mainly emphasizes three matrices (i) Spectral Efficiency Peak, (ii) User's Experience and Data Rate, and (iii) Spectrum Efficiency Average. The generation of wireless communication has some fixed set of metrics values which is given by the ITU (Chauhan et al., 2016). The requirement of ITU is satisfied by different companies like 3GPP, once the requirement is fulfilled the expert and the independent team of ITU have considered it very harshly for future implementations. If any of the technologies has satisfied the matrix value that technology came under the umbrella of that particular generation of communication. The ITU defines the generation of wireless technology into five different parts which are discussed below:

1. The first generation '1G' is a voice-based system that uses technology like TACS, NMT, and AMPS. In this, the spectrum is divided into frequencies and transmitted in the range of 824 MHz to 894 MHz. The major disadvantage of this generation is that it is analog technology and having a poor speed of 2.4 kbps and security is also very less (Kesari et al., 2011).
2. The second-generation '2G' of wireless mobile communication is the first-time digital communication system that came into the picture. This technology is called GSM (S. Kumari et al., 2017). Here, the quality of voice is the main concern the other problem is speed which is up to 64 Kbps. The second generation of mobile communication is a tool for most of the developing nations in recent days and it provides a little bit more data rate as per the demand of the subscribers. The '2.5G' also comes into the picture and it supports the speed up to 144 kbps. Web browsing and email start by using this technology. The first handset and modem were introduced at that time. The first iPhone was introduced which is also based on GSM technology (Oyewopo et al., 2017).
3. The '3G' cellular system was introduced around 2020. There are two main technologies WCDMA and HSPA in 3G. Later on, China introduced TD-SCDMA which is a footprint. This generation provides tremendous improvement over the 2G system and the global roaming facility across the globe has been started. In India, the speed of streaming is up to 2 Mbps for mobile devices. A modified version of the iPhone came into the existence, with the introduction of the iPhone the consumption of data rate has also increased. There are several applications like YouTube, Facebook, and other data-hungry applications slowly came into the picture and subscribers started browsing them on their cell phones (Sinha et al., 2021). The situation arises where the saturation of '3G' is reached and the requirement of a new generation of mobile communication is felt.
4. Again after 10 years, the 4G was deployed with Coma LTE and WIMAX AKTU technology. The speed of the data streaming is 10 Mbps to 20 Mbps. It is truly a data system whose main purpose is to fulfill the growing demand of customers. The applications like Netflix and other online games are also introduced during these periods. Now the users required more and more data to fulfill their desires and it can be available on their mobile devices and they also want to control all the online applications through their mobile set. The use of '4G' is a good solution for growing demand but there is no solution for Internet of Things (IoT) technology, and it is not sufficient to cope up with the existing demands and advancement of science in the modern era (Sinha & Paul, 2018). The level of radiofrequency electromagnetic fields (RF-EMF) in the ordinary climate is also increased, with most radiating gadgets working in the recurrence range of over 100 kHz to some GHz (Kazemi