

Radio waves and health: 6G



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150 years



Introduction

Founded in 1876, Ericsson has been in the forefront of communication technologies for 150 years. Today, we are providing hardware, software, and services to enable the full value of connectivity.

By combining creativity, expertise and technology, we open new possibilities in communication for you. At the same time, we consider your safety a key priority when using these technologies.

6G is the name for the sixth generation of mobile communication networks, expected to be ready for commercial markets by the early 2030s.

Delivering extraordinary performance and a multi-purpose network platform, 6G will unleash new possibilities across telecom, technology sectors, wider industry and society. Its capabilities will extend beyond previous generations, but it will be based on similar radio technologies.

6G devices will be designed and tested to comply with established radio wave exposure limits, and 6G base stations will be installed and operated so that the radio wave exposure in homes and public areas remain below the limits.

6G represents the next generation in mobile communications

6G will introduce new mobile network functionalities that will enable many new use cases and services. These will also extend beyond communication and will help tackle societal challenges and promote innovation. Expected 6G use cases include immersive extended reality (XR), autonomous vehicles, high-precision positioning, and advanced remote healthcare.

6G will be an evolution of 5G

6G will build on 5G, evolving from today's networks towards the needs of 2030 and beyond. The radio technology will be like what is used in 4G and 5G. Initially, 6G will further advance technologies and use cases already introduced in 5G, delivering essential support for enhanced mobile broadband (eMBB), fixed wireless access (FWA), and the Internet of Things (IoT). By increasing the data speed and improving the performance, value will be added in many sectors.

Radio waves are used for communication in 6G

Like in previous generations of mobile networks, the connected 6G devices will communicate with base stations by transmitting and receiving radio waves, or radio frequency (RF) electromagnetic fields (EMF). The radio waves are fundamentally no different from those that have been used in various types of wireless communication for more than 100 years.

6G will use both existing and new frequency bands

6G will use current frequency bands available for mobile communications as well as new spectrum that will be allocated to support the expected capacity and coverage demands. The most important new frequency bands are expected in the frequency range from 6425 to 8400 MHz, which is close to frequency bands used for 5G.

6G will use advanced antennas

To address the demands for increased performance, and to make the most efficient use of new spectrum, the advanced antennas that were widely introduced for 5G will be further developed and used in 6G base stations. Arrays of up to about a thousand small antennas will be used to direct the transmission of radio waves to maximize the quality of the signals received by connected devices. This technology, called beamforming or massive MIMO, enables significant performance improvements with transmitted power and radio wave exposure at similar levels to those of previous networks.

Exposure limits are set by independent scientific organizations

Independent expert organizations, such as the International Commission on Non-Ionizing Radiation Protection (ICNIRP), have established technology-neutral exposure guidelines for radio waves based on available science. The recommended limits include safety margins, apply to 6G, and cover the frequency bands used in mobile communications. Most countries have adopted these guidelines in standards and regulations, and they are endorsed by the World Health Organization (WHO). 6G equipment, whether it be mobile devices or base stations, will meet the same safety standards as equipment used in previous mobile communications networks.

Exposure levels will be below international safety limits

The power levels of the radio signals transmitted by 6G radio equipment will be of similar magnitude as those used in previous 4G and 5G networks. 6G devices will be designed and tested to comply with established radio wave exposure limits. 6G base stations will be positioned so that the exposure in homes and public areas will stay below the limits.

Public access will be restricted where needed

6G base station antennas will be installed in such a way that unauthorized people do not have access to areas where the exposure limits may be reached, which vary in size from a few centimeters for small indoor antennas up to 10-30 meters for antennas mounted on masts or on rooftops. The intensity of the radio waves from an antenna drops quickly when moving away, and the exposure levels are normally well below the limits in places where people reside.

No adverse health effects from mobile communications

The World Health Organization (WHO) states: "From all evidence accumulated so far, no adverse short- or long-term health effects have been shown to occur from the RF signals produced by base stations" and "Considering the very low exposure levels and research results collected to date, there is no convincing scientific evidence that the weak RF signals from base stations and wireless networks cause adverse health effects." (WHO backgrounder on base stations and wireless technologies)

For more information on radio waves and health, visit:
www.ericsson.com/health