



THE ANSWER IS IN YOUR HAND

Mobile Phones, Masts and Your Health

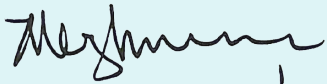
Foreword

CA

I take this opportunity on behalf of the Communications Authority of Kenya (**CA**), to commend Safaricom PLC and all stakeholders in their efforts to educate and sensitize the public on the exposure to Electro-Magnetic Fields (EMF) generated by telecommunications infrastructure and personal communication devices.

The **CA** is guided by the International Commission on Non-Ionizing Radiation Protection (**ICNIRP**) guidelines when monitoring EMF exposure limits of consumer devices (mobile phones) and telecommunications facilities (base stations). Recently **ICNIRP** updated its guidelines to cater for higher frequencies used for 5G technologies. All the telecommunication providers are expected to ensure their operations comply with ICNIRP guidelines, 2020.

As the ICT regulator, we remain fully committed to the health and safety of ICT users in Kenya. We shall therefore maintain continued collaboration with industry stakeholders, including Government Agencies, International Standards Development Organizations, and Licensees to address public concerns about potential hazards from exposure to EMF.



Mrs. Mercy Wanjau, MBS
Ag. Director General

Foreword

NEMA

With the technology rapidly advancing, people living close to the base Trans receiver stations (BTS) have become increasingly concerned over the potential harmful effects that Electro-Magnetic Fields (EMF) may have on their health. There have been concerns about the issue of safety and Electro-magnetic fields.

The National Environment Management Authority (NEMA) is responsible for the general supervision and co-ordination of all matters relating to the environment and is the principal instrument of Government in the implementation of all policies relating to the environment. In this regard, NEMA has a role in risk management and enforcement, risk communication, environmental impact assessment (EIA) and environmental audits (EA), compliance promotion, and implementing the precautionary principle as appropriate.

EMCA 1999 and the Environmental impact assessment and environmental audit (EIA &EA) regulations require that all telecommunications companies undertake Environmental impact assessment (EIA) for their Base Trans receiver stations for considerations by the Authority before commencement of the project and environmental audits (EA) after one year the project commences operations. This provision is in line with the EMF guidelines published by the International Commission on Non-Ionizing Radiation Protection Board (ICNIRP) in 1998. We urge all telecommunication companies to comply with both provisions in EMCA 1999 and (ICNIRP).

Over 50 years of scientific research has already been conducted into the possible health effects

from mobile phones, Base Trans receiver stations and other wireless services. Many experts review groups have analysed the data from this research and indicated that there is no evidence to convince experts that exposure below the guidelines set by the ICNIRP carries any health risks, for adults or children. However, there is need to compare the research and risk assessment undertaken by WHO, International Agency for Research on Cancer (IARC) with ICNIRP.

The Authority supports the development and use of this EMF booklet, as it will go a long way towards creating awareness on the effects of electromagnetic fields from the Base Trans receiver stations on public health.



MAMOB.MAMO
DIRECTOR GENERAL
NATIONAL ENVIRONMENT MANAGEMENT AUTHORITY

Foreword

SAFARICOM

Commitment To Care

As part of our vision to becoming a purpose-led technology company, we are committed to building a resilient and world class network infrastructure that will support the country's economic development. This has been demonstrated by the sustained capex investment in our network over the years, targeting expansion and transmission enhancements. At the centre of this expansion lies the Base Transceiver Stations which are the building blocks of the robust mobile network ecosystem and internet connectivity that we enjoy today.

We are aware of the fears from the public about the perceived effects of not only these essential connectors but also the use of mobile phones in general. These concerns relate to the emissions of Electromagnetic Fields (EMF) from the phones and base stations that receive and transmit the signals.

Extensive studies by various independent bodies including the World Health Organisation (WHO) show no evidence of human health risks associated with use of mobile technology. However, there is still a gap when it comes to this information reaching the public. This misunderstanding and misinformation have the potential of slowing down the growth and positive impact that the industry has observed over the years. International and local regulators as well as policy-makers have put in place measures to ensure that all Base Stations undergo Baseline EMF measurement, Environmental Impact Assessments, Type Approval of all network elements by the Communications Authority of Kenya as well as annual statutory Environmental Audits and EMF measurements.

As part of our commitment to ensuring that our activities pose no risks to the health and safety of the communities in which we operate and our own employees, we not only adhere to all the regulations but also remain conscious of our customers' and indeed the general public's questions and concerns. To address this, we have put in place a robust EMF policy that outlines all the measures and strategies aimed at protecting health and safety of communities and employees. In addition, we developed this booklet in partnership with The National Environment Management Authority (NEMA), the Global System for Mobile Communication (GSMA), Strathmore University, Kenya Alliance of Residents Association, and Communications Authority of Kenya (KARA). This booklet provides answers to frequently asked questions on mobile phones, masts and health in an honest, transparent and simple language.

As an industry we have a responsibility to remain conscious of our customers and indeed, the general public's questions and concerns. We however cannot do it alone. I therefore call upon our peers in this sector to join in these efforts to demystify the myths surrounding EMF to allow the continued growth of the sector. I also urge the regulators to continue playing their role in holding us accountable and to step up efforts on EMF awareness creation.

Let us all work together to ensure a safe and healthy environment for all Kenyans.




Peter Ndegwa
Chief Executive Officer, Safaricom PLC

Our Partners





CONTENTS



1.0	Electro-Magnetic Fields (EMF)	10
2.0	Guidelines for exposure	16
3.0	Base stations and health	18
4.0	Mobile phones and health	24
5.0	5G Technology	28
	Misinformation & Disinformation	30
	Frequently Asked Questions and facts	31
	Expert opinion	33
	Glossary	35
	Reference materials	37



1.0

Electromagnetic Fields

*What are Electromagnetic
Fields (EMF)?*

Electromagnetic Fields (EMF) which is also called electromagnetic radiation (EMR) is a combination of invisible electric and magnetic fields of force. They are generated by natural phenomena like the Earth's magnetic field but also by human activities, mainly through the use of electricity. Mobile phones, power lines and computer screens are examples of equipment that generates electromagnetic fields.

Most man-made electromagnetic fields reverse their direction at regular intervals of time, ranging from high **radio frequencies** (mobile phones) through **intermediate** frequencies (computer screens) to **extremely low frequencies** (power lines).

Typical sources of Electromagnetic Fields

Frequency range	Frequencies	Some examples of exposure sources
Static	0 Hz	video display units; MRI (medical imaging) and other diagnostic or scientific instrumentation; industrial electrolysis; welding devices
ELF (Extremely Low Frequencies)	0-300 Hz	power lines; domestic distribution lines; domestic appliances; electric engines in cars, trains and tramways; welding devices
IF (Intermediate Frequencies)	300 Hz - 100 kHz	video display units; anti-theft devices in shops; hands-free access control systems, card readers and metal detectors; MRI; welding devices
RF (Radio Frequencies)	100 kHz - 300 GHz	mobile telephones; broadcasting and TV; microwave ovens; radar and radio transceivers; portable radios; MRI



Types of Electromagnetic Fields/ Radiation

Electromagnetic Fields, which we have said is also called Electromagnetic Radiation, has two types of radiation. These are ionizing and non-ionizing radiation



Ionizing radiation:

Ionising radiation is the energy produced from natural or artificial sources. It has more energy than non-ionising radiation, enough to cause chemical changes by breaking chemical bonds. This effect can cause damage to living tissue. This includes x-ray machines in hospitals, radon gas and nuclear materials.



Non-ionizing radiation:

This type of electromagnetic fields does not have enough energy to cause ionization in the media it interacts with. These include radiations from mobile phones, base station antennas, TVs and TV broadcasting stations, FM radio stations, microwaves, the sun, and power lines among others. This is the primary focus for this booklet.

The Electromagnetic Spectrum

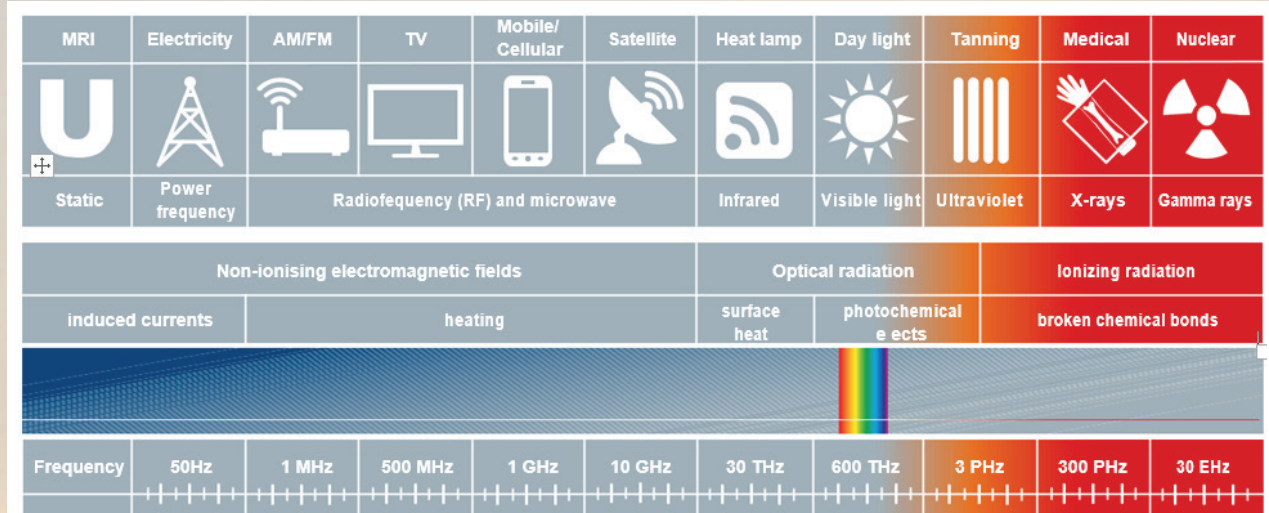


Fig. Electromagnetic spectrum: ionizing and non-ionizing radiation sections and typical sources of electromagnetic fields/radiations.



2.0

Guidelines for EMF Exposure

*Who monitors and reviews
the research and sets
international guidelines on
EMF?*



The World Health Organization (WHO) works with a special advisory group of independent expert scientists called the International Commission on Non-ionizing Radiation Protection (ICNIRP) who monitor and review the research and set international guidelines.

The International Commission on Non-ionizing Radiation Protection (ICNIRP) was formed in 1992 and works with the World Health Organization (WHO) to assess health effects of Non Ionizing Radiations and to develop international guidelines on limits to exposure and protection measures, which are science based and independent.

The **ICNIRP** guidelines were first published in 1998 and recently updated in 2020. The ICNIRP Guidelines 2020 on Limiting Exposure to Electromagnetic Fields are for the protection of humans exposed to radiofrequency electromagnetic fields (RF) in the range 100 kHz to 300 GHz. The guidelines cover many applications such as 5G technologies, WiFi, Bluetooth, mobile phones, and base stations.

These guidelines form the basis of the **WHO** and International Telecommunications Union (ITU) recommendations to governments and have been widely adopted around the world. Many countries use the ICNIRP guidelines to set national standards or guidelines for exposure to mobile phone technology.

Here is a map of all the countries that have adopted the guidelines:

<https://www.gsma.com/publicpolicy/emf-and-health/emf-policy>.



3.0

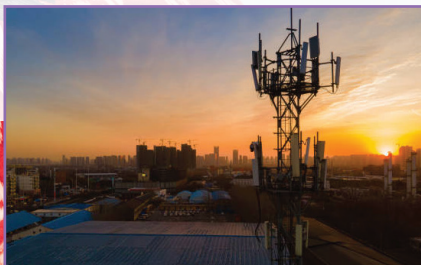
Base Stations and Health

*What is a base station and
why do we need them?*

Base stations are the building blocks of a mobile phone network and provide voice, messaging and data. Connect one to another and you have a network for making calls, sending messages, and accessing the internet from anywhere.

Whenever you make or receive a call, message, or access the internet, your phone uses low power radio frequency waves to communicate with a network of radio transmitters and receivers called base stations or cell sites.

Base transceiver stations need to be located close to mobile phone users to provide good quality reception and faster & stable internet connectivity.



How do mobile network operators decide where to build base stations?

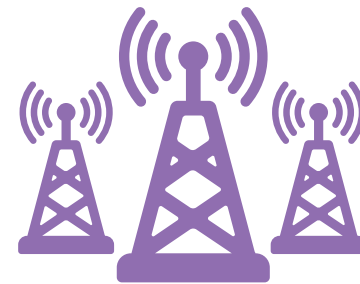
To provide a good quality mobile service, base stations need to be located where people use their mobile phones. A mobile network is typically designed on a “cell grid” basis covering a geographic area. The number of base stations required for a given area will depend on the terrain and number of people using mobile phones.

The radio signals that base station antennas transmit are primarily transmitted from the centre of the antenna outwards. This means that the antennas need to be placed in locations where there are no obstructions, such as building rooftops and masts.

In built-up and mountainous areas with many buildings, trees and obstructions, it is likely that more base stations will be required to provide service to the local community. In rural areas with fewer obstructions, less base stations will be required.

How many base stations are required in a given area?

Mobile networks have a finite capacity, which means the ability to cater for simultaneous phone calls. The more people using mobile phones, the more capacity is required and this usually means more base stations closer together. Mobile networks must be designed according to the local population and number of people using the network



Should base stations be located near homes and schools?



Today's society relies on mobile phones working everywhere including at home, at school and at work. When base stations are located close to users, the transmitter power required by the mobile phone and the base station to communicate is relatively low. The further away a base station is from a customer, the more power and therefore Electromagnetic Fields it will emit.

Therefore to provide good reception and minimise EMF, base stations need to be located close to users and where we live.

Is it safe for me to live near a base station?

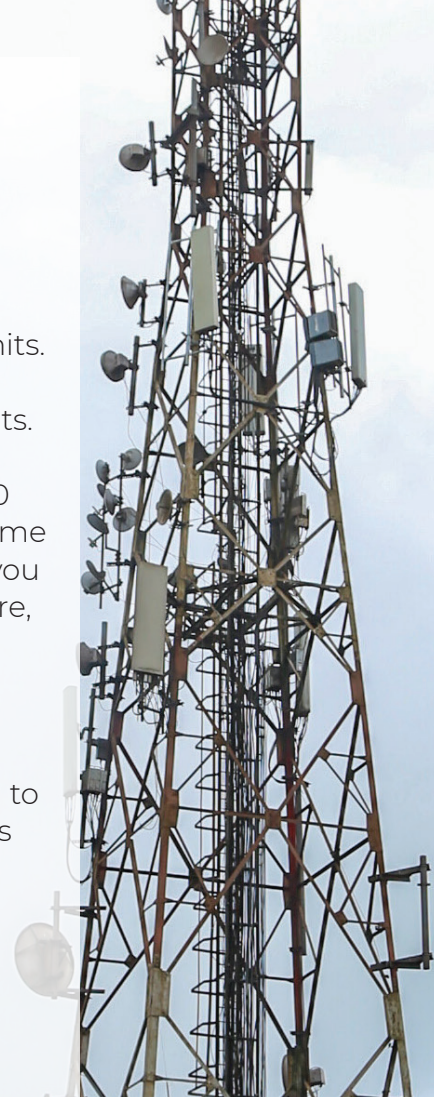
Base stations are designed to send signals outward like a lighthouse sends out light. Radio wave exposure levels at the foot of a base station are hundreds, even thousands of times lower than the set guideline limits. Base stations are sited with great care to ensure nobody living near or passing by them is exposed to radio waves above ICNIRP guideline limits.

Radio waves have been used as a means of communication for over 100 years now. Each base station covers a specific area or cell, hence the name 'cellular phone'. The power output of a base station is quite small. Did you know that a TV transmitter may have an output of 100,000 watts or more, while a typical base station's output is less than 150 watts?

In relation to base stations and health, the **WHO** fact sheet on electromagnetic fields and public health has concluded that: '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.'

Further Reading:

<https://www.who.int/peh-emf/publications/facts/fs304/en/>




How are specific populations, such as children, pregnant women, sick and elderly people, protected in the RF-EMF guidelines?

The **ICNIRP** limits for human exposure to RF energy protect all age groups, including children, on a continuous (24 hours a day/seven days a week) basis.

The position of **WHO** is that there is no established scientific evidence of any adverse health effects from electromagnetic fields below the guidelines specified by ICNIRP.





4.0

Mobile Phones and Health

*Does the use of mobile
phones have any health
effects on users?*

WHO states that:

“A large number of studies have been performed over the last two decades to assess whether mobile phones pose a potential health risk. To date, no adverse health effects have been established for mobile phone use.”

ICNIRP guidelines (2020) have established that there is NO evidence that non-ionizing radiation causes:

- Cancer
- Electrohypersensitivity
- Infertility
- Other health effects



Is it safe to use a mobile phone while driving?

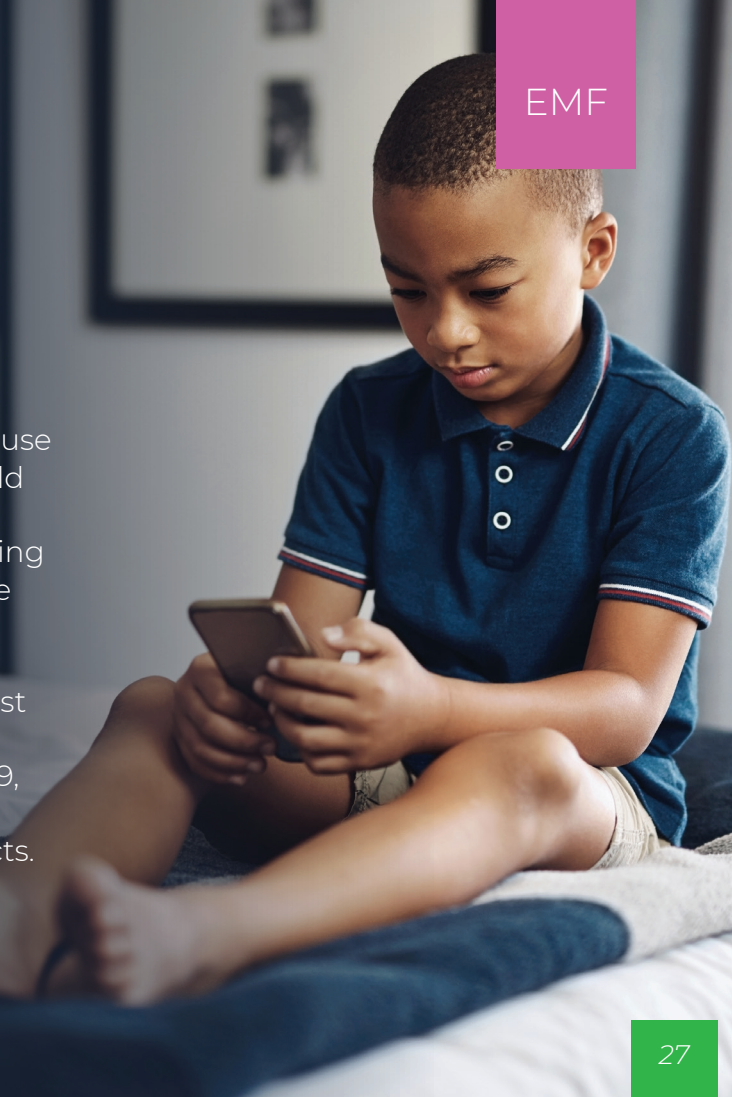
Driving is a complex and challenging activity. The use of mobile phones while driving causes distraction. Research shows that using a hand-held or hands-free mobile phone while driving may increase your chance of an accident by as much as four times. The current traffic law also prohibits the use of mobile phones while driving.

It is safe to have phones switched off or put on silent mode while driving and only used while the vehicle is legally parked in a safe location.

Is it safe for our children to use mobile phones?

WHO says, “Present scientific information does not indicate the need for any special precautions for the use of mobile phones.” If you are still concerned, you could work with your children to vary their mobile phone usage, for example, by limiting their calls or by teaching them to use a ‘hands-free’ kit which keeps the phone away from the body.

Even though the weight of evidence does not suggest there are any adverse effects, Safaricom, through Vodafone, supports independent research. Since 1999, Vodafone has globally committed more than Kshs 900,000,000 to an 8-year program of research projects.





5.0

5G Network Connectivity

What is 5G?

5G is the next generation of mobile technology that will transform the role of mobile connectivity in society. We have been running on 2G, 3G & 4G which are now approaching their shelf life with technological advancements.

5G is designed to offer improved data rates (up to 100 times faster than current mobile networks), supporting virtually instant access to services and applications. This includes everything from connected cars, smart city & Internet of things (IoT) technology.

Features associated with 5G include:

1. Faster download speeds i.e. Gb/s speed faster than the current Mb/s speed
2. Low latency i.e. Minimal buffering or faster response
3. Greater capacity i.e. Ability to support greater data demands from the customer

The **WHO** (2020) says that when 5G is deployed provided that the overall exposure remains below international guidelines, no consequences for public health are anticipated.

<https://www.who.int/news-room/q-a-detail/radiation-5g-mobile-networks-and-health>

Misinformation and Disinformation

What is Misinformation & Disinformation?

Misinformation is Information that is false but not created with the intention of causing harm

Disinformation is Information that is false and deliberately created to harm a person, social group, organisation, or country.

A Fast tool to help you categorize and validate the information you and your colleagues come across, especially on social media and websites:

Stakeholder	Validation
Regulators	<ul style="list-style-type: none">• Have you engaged the relevant ministry on this? ICT Ministry, Health Ministry• Have you engaged with the Enforcement Authorities? NEMA, Communication Authority of Kenya (CA)?• Have the Telco regulators spoken up? NEMA, CA• Have you engaged with the Health Authorities? WHO
Associations	<ul style="list-style-type: none">• Have you engaged with leading associations/groups? ICNIRP• Have you provided the groups and associations with scientific materials and use cases?

FAQs & Facts

a. Will I be constantly exposed to RF waves if I carry my phone in my handbag or pocket?

Not always. Phones transmit RF waves when on a call or when transmitting data like photos (MMS). At all other times, RF waves are transmitted by the handset only intermittently to maintain contact with the nearest base station.

The new technologies we love to use - like text messaging, picture messaging, the internet and e-mail - reduce our exposure to RF, as they encourage us to hold the phone away from our bodies.

b. Does your ear sometimes feel warm when you're on the phone?

It can...but the warmth you may feel does not come from the small amount of RF Waves from a compliant handset. The warmth comes from the batteries, which warm up when in use and is also the result of restricted airflow around the ear when on an extended call.

c. Why are there so many restrictions on using mobile phones in hospitals?

At short range, the radio signal from a mobile phone may cause interference with electronic medical devices. It may also cause a distraction to the medical personnel and patients. It is possible for mobile phones to be used in designated areas of hospitals.

d. Why can't I use my mobile phone when I fly?

Aircraft contain vast arrays of complex electronic equipment and sophisticated communication systems that may be interfered with by the use of mobile phones.

e. Why do some petrol stations ask me to turn off my mobile phone?

It's distracting. Mobile phones will not cause a fire or explosion but can be distracting when filling a vehicle with highly flammable petrol. This is why some petrol stations have signs asking customers not to use their mobile phones.

f. Is 5G Carcinogenic (Causes Cancer)?

In February 2020, the US Food and Drug Administration in a review of animal and epidemiological studies of radio signals and cancer concluded that:

“To date, there is no consistent or credible evidence of health problems caused by the exposure to radiofrequency energy emitted by cell phones”.

The International Agency for Research on Cancer (IARC), which reviews evidence for cancer hazards, classifies radio frequency signals in the same group as eating pickled vegetables (i.e. that there was limited evidence that they could cause cancer in humans). Eating processed meat falls in a higher classification than radio signals (i.e. there is stronger evidence that they might cause cancer in humans).

g. Is ICNIRP a credible source

Yes. **ICNIRP** is an independent body, formally recognized by the World Health Organization (WHO), offering science-based advice and guidance on the health and environmental effects of electromagnetic fields including radio signals, such as those used for mobile communications. ICNIRP published guidance for radio signals in 1998 and periodically reviews their guidance.

h. Will 5G increase my exposure to EMF

No. With 5G, exposure will remain very low relative to the international exposure limits. This is because with advancement mobile equipment's are being designed to use minimal power to reduce systems interference.

i. Do Base Stations reduce property value

No. This is based on the fact that internet connectivity strength and communication quality which are essential services depend on base stations and how close to the users they are situated among other factors such as obstructions etc.

j. Do 5G spread Covid 19?

No. The WHO states that there is no link between 5G and COVID-19, confirming that viruses cannot travel on radio waves and/or mobile networks. The **WHO** maintains that COVID-19 is spread through respiratory droplets when an infected person coughs, sneezes or speaks.

Expert Opinion

Global System for Mobile Association (GSMA), 2020

'5G is the next generation of mobile technology that will transform the role of mobile connectivity in society, enabling changes in the way we live and do business. The radio signals used for 5G are similar to those used by current technologies and are covered by the same international safety guidelines that protect all members of the public and the environment.'

International Commission on Non-Ionizing Radiation Protection (ICNIRP), 2020

"As RF-EMF has not been shown to cause cancer (in rodents or humans), specific restrictions were not needed in the guidelines to protect against cancer initiation or promotion. However, by protecting against the adverse health effects that occur with the lowest exposure levels, if any additional adverse health effects were found at higher exposure levels (such as those used in the NTP studies), then the new ICNIRP guidelines would also protect against those hypothetical effects."

"ICNIRP adopts a conservative approach to each of these steps in order to ensure that its limits would remain protective even if exceeded by a substantial margin...The degree of protection in the exposure levels is thus greater than may be suggested..."

The Institution of Engineering and Technology, 2020

"In the future, the greatest contribution in reducing radio wave exposure to smartphone users will be more base stations as shorter ranges require much less power."

Expert Opinion

World Health Organization (WHO), 2020

“...To date, and after much research performed, no adverse health effect has been causally linked with exposure to wireless technologies. Health-related conclusions are drawn from studies performed across the entire radio spectrum but, so far, only a few studies have been carried out at the frequencies to be used by 5G’

SSMs Independent Expert Group on Electromagnetic Fields (Sweden), 2013

“...Recent research on exposure from transmitters has mainly focused on cancer and symptoms, using improved study designs. These new data do not indicate health risks for the general public related to exposure to radiofrequency electromagnetic fields from base stations for the mobile telephony, radio and TV transmitters, or wireless local data networks at home or in schools.”

Health Council of the Netherlands, 2012

“...No evidence has been found that exposure to radiofrequency electromagnetic fields has a negative influence on the development and functioning of children’s brains, not even if this exposure is frequent.”

Glossary

5G

5G, which is the 5th generation of mobile technologies, is an evolution from the previous generations of mobile technology of 2G, 3G and 4G. It supports applications such as smart homes and buildings, smarter and cleaner cities, self-driving cars and road safety, other intelligent transport systems, 3D video, work and play in the cloud , remote medical services , virtual and augmented reality and massive machine to machine communications for industry automation and manufacturing

Base Station

Consists of antennas fixed to a mast, building, or structure and connected to radio transmission equipment, stored in a secure cabinet. Allows your mobile phone to communicate.

Mast/tower

The most visible part of the base station, for example, a pole or tower. Safaricom ensures it locates/sites its masts to blend with the landscape.

WHO (The World Health Organization)

A United Nations agency that coordinates international health activities and helps governments improve health practices.

EMF (Electromagnetic Fields)

These electric and magnetic fields are produced by equipment like televisions, radios, microwave ovens, fridges, computers, electricity, mobile phones, and base station antennas.

Glossary

Radio waves (RF Electromagnetic Fields)

Waves of electrical and magnetic energy moving together through space. When an RF current is connected to an antenna, an electromagnetic field (EMF) is created and can travel through space as radio waves.

ICNIRP

It is an international commission specialized in non-ionizing radiation protection. The organization's activities include determining exposure limits for electromagnetic fields used by devices such as cellular phones.

Non-ionizing Radiation

Radiation that does not have enough energy to break chemical bonds (ionization). It is used in devices such as radios, microwaves, and the infrared lamps used to keep food warm in restaurants. It includes the visible light spectrum.

Radio Frequency

Refers to any of the electromagnetic wave frequencies that lie in the range extending from below 3 kilohertz to about 300 gigahertz and that include the frequencies used for communications signals (as for radio and television broadcasting and cell-phone and satellite transmissions) or radar signals

CA is the Communications Authority of Kenya. It is the regulatory Authority for the ICT industry in Kenya with responsibilities in telecommunications, e-commerce, broadcasting and postal/courier services

NEMA is the National Environment Management Authority and responsible for the management of the environment, and environmental policy in Kenya.

Key reference materials about RF/EMF and Human Health

The World Health Organization: www.who.int/emf

The ICNIRP Guidelines:

<https://www.icnirp.org/cms/upload/publications/ICNIRPrfgdl2020.pdf>

Mobile phones, your Health and regulations of Radiofrequency Electromagnetic Energy'. Available on the ACMA website: www.acma.gov.au

Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields available from Federal Communications Commission (Bulletin No.65): www.fcc.gov/oet/rfsafety

International Telecommunication Union: www.itu.int/en/ITU-T/emf/

European Commission: <https://ec.europa.eu/digital-single-market/en/faq/5g-faq>

<https://www.theiet.org/impact-society/factfiles/engineering-safety-factfiles/allaying-health-concerns-regarding-5g-and-exposure-to-radio-waves/>

<https://www.who.int/news-room/q-a-detail/radiation-5g-mobile-networks-and-health>

<https://www.gsma.com/publicpolicy/resources/safety-of-5g-mobile-networks>



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