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SERIES K: PROTECTION AGAINST INTERFERENCE

ITU-T K.91 – Guide on electromagnetic fields and health

ITU-T K-series Recommendations – Supplement 1

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Supplement 1 to ITU-T K-series Recommendations

ITU-T K.91 – Guide on electromagnetic fields and health

Summary

The objective of Supplement 1 to the ITU-T K-series Recommendations, Guide on electromagnetic fields and health, is to answer questions commonly posed by the public on EMF and to address related concerns.

This *Guide on electromagnetic fields and health* aims to:

- Provide electromagnetic field (EMF) information and education resources suitable for all communities, stakeholders and governments.
- Support clarification of the science by referencing the WHO and other stakeholders (see Note) that provide information that is particularly useful in helping to clarify scientific uncertainties e.g., in the areas of radio frequency (RF) technology, infrastructure implementation, usage and consequential EMF exposure.

NOTE – The primary reference on EMF and health is the World Health Organization (WHO). The primary reference on EMF assessment methods is the International Telecommunication Union (ITU) and the International Electrotechnical Commission (IEC).

History

Edition	Recommendation	Approval	Study Group	Unique ID*
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FOREWORD

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The World Telecommunication Standardization Assembly (WTSA), which meets every four years, establishes the topics for study by the ITU-T study groups which, in turn, produce Recommendations on these topics.

The approval of ITU-T Recommendations is covered by the procedure laid down in WTSA Resolution 1.

In some areas of information technology which fall within ITU-T's purview, the necessary standards are prepared on a collaborative basis with ISO and IEC.

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Table of Contents

		Page
1	Introduction to EMF	1
1.1	The electromagnetic spectrum.....	1
1.2	What is an electromagnetic field (EMF)?	1
1.3	What is a radio frequency (RF) electromagnetic field?.....	1
1.4	What is ionizing radiation?	2
1.5	What is non-ionizing radiation?	2
2	Overview of EMF and health	2
2.1	International EMF Project	2
2.2	Information on mobile phones and health	3
2.3	Information on base stations and health	3
2.4	Information on human exposure guidelines	3
2.5	Research on EMF and health.....	4
2.6	Effects of EMF	4
2.7	International Agency for Research on Cancer.....	4
3	Mobile phones and base stations	6
3.1	How mobiles and wireless devices work.....	6
3.2	Towers and antennas	7
3.3	Does the power of a base station vary?	7
3.4	Mobile phone power transmitters	7
4	Mobile phones and SAR.....	8
4.1	What is SAR?	8
4.2	How SAR varies	8
4.3	How important is the SAR value?	9
4.4	How SAR is measured for devices	10
4.5	Example of SAR test results.....	10
4.6	Does SAR vary between mobile phones?	11
4.7	Are low SAR mobile phones safer?	11
4.8	Finding the SAR for your mobile	11
5	Relevant EMF guidelines and standards.....	11
5.1	Human EMF exposure guidelines	11
5.2	Safety factors	12
5.3	ITU standards and guidelines	12
5.4	IEC standards.....	13
5.5	IEEE standards	13
6	Mobile phones and EMF FAQ	14
6.1	What are the health risks associated with mobile phones and their base stations?	14
6.2	Do mobile phones emit radiation?.....	15



Documents

Document Sharing Hub

K series – Supplement 1 (07/2014)

iii

6.3	How much power does a mobile phone transmit?.....	15
6.4	How does adaptive power control work?	15
6.5	Does the EMF from my mobile vary?	15
6.6	What are exposure levels from mobile phones?.....	15
6.7	What is the typical power of a mobile phone?	16
6.8	How can I reduce exposure from my mobile?.....	16
6.9	Do mobile phone shields reduce exposure?	17
6.10	Do mobiles radiate less EMF when close to a base station?	17
6.11	Do mobiles have less EMF when the signal display has full bars?.....	17
6.12	Does texting have lower exposure compared to calls?	17
6.13	Are we at a high risk of EMF exposure when using mobile phones inside high speed transportation?	17
6.14	Is using a mobile phone in the car or at home safer because these constitute a barrier to radiation?	18
6.15	Are children more vulnerable to the EMF from mobile phones than adults?	18
7	Base stations and EMF FAQ	19
7.1	What are the EMF levels around base stations?	19
7.2	Is it safe to live near a base station, or to locate base stations near schools?	19
7.3	Do more base stations reduce EMF?	20
7.4	Is it safe to locate base stations on hospitals?.....	20
7.5	Are there restricted areas in front of base station antennas?	20
8	EMF standards FAQ	20
8.1	Who sets the EMF human exposure standards?	20
8.2	Is there a safety margin built into the standards?	20
8.3	Are children and pregnant women protected by the safety standard?	21
8.4	Are people with electronic implants protected by the safety standard?	21
9	EMF myths FAQ	21
9.1	Is it possible to cook an egg or grains of corn using a mobile phone?	21
9.2	Is the power output of a mobile phone enough to make the brain boil?	22
9.3	Does use of a mobile phone attract lightning?	22
9.4	Can a mobile phone cause a gas station to catch fire?	22
10	ITU EMF resources	22
11	Additional EMF resources	22
11.1	WHO resources	22
11.2	ICNIRP resources	22
11.3	National government resources	23
11.4	Non-government organizations	23
12	About this Guide on electromagnetic fields and health.....	23

	Page
13 Bibliography	23

Supplement 1 to ITU-T K-series Recommendations

ITU-T K.91 – Guide on electromagnetic fields and health

1 Introduction to EMF

1.1 The electromagnetic spectrum

Electromagnetic fields have existed in different forms since the birth of the universe. Electromagnetic fields differ from each other in relation to frequency, and visible light is their most familiar form.

Electric and magnetic fields are part of the electromagnetic spectrum which extends from static electric and magnetic fields, through radio frequency (RF), infrared radiation and visible light to X and gamma-rays, see Figure 1.

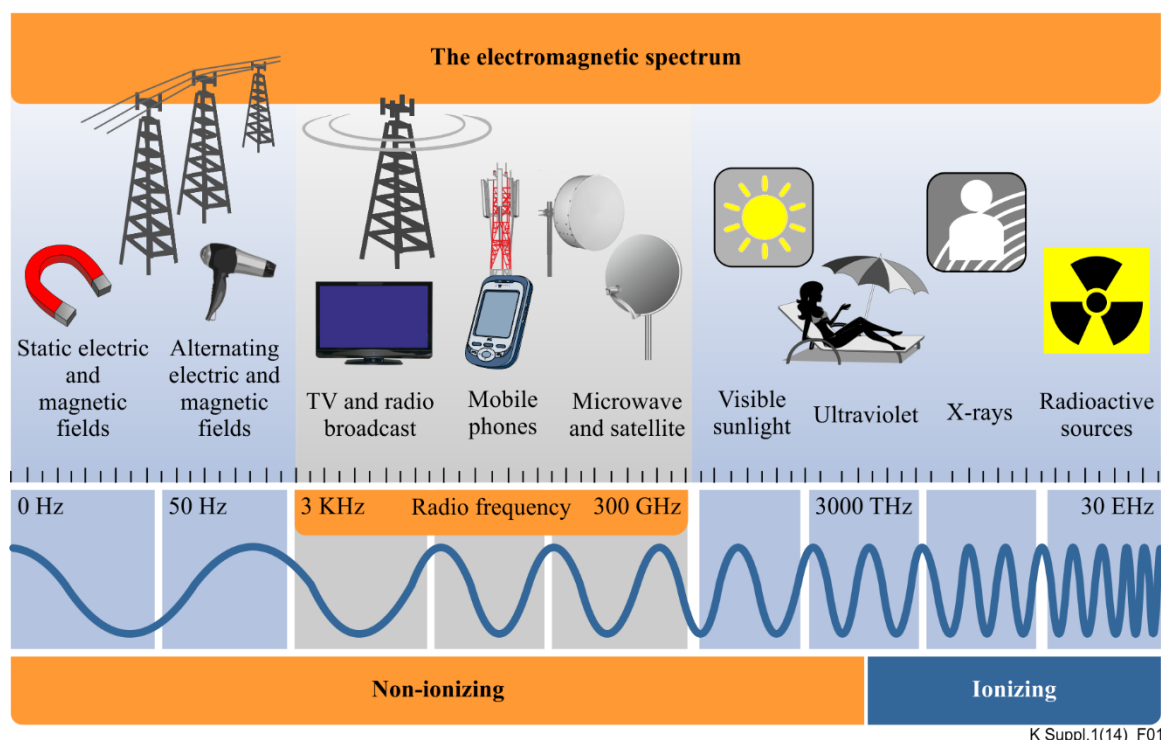


Figure 1 – The electromagnetic spectrum

1.2 What is an electromagnetic field (EMF)?

An electromagnetic field consists of waves of electric and magnetic energy moving together through space. Often the term "electromagnetic field" or EMF is used to indicate the presence of electromagnetic radiation.

1.3 What is a radio frequency (RF) electromagnetic field?

A part of the electromagnetic spectrum extending from the 3 kHz frequency to 300 GHz is referred to as radio frequency (RF). Television and radio transmitters (including base stations) as well as microwaves, mobile telephones and radars produce radio frequency fields. These fields are used to transmit information and form the basis of telecommunications as well as radio and television broadcasting all over the world. Many home devices such as cordless phones, baby monitors and radio-controlled toys also transmit EMF at radio frequencies.

1.4 What is ionizing radiation?

Electromagnetic radiation at frequencies above the UV band are classified as "ionizing radiation", because they have enough energy to effect changes in atoms by liberating electrons (ionizing) and thus altering their chemical bonds. X-rays and gamma rays are common forms of ionizing radiation.

Ionizing radiation occurs at frequencies above 2900 THz (2900×10^{12} Hz). This corresponds to a wavelength of about 103.4 nm, which lies near the lower wavelength-edge of the ultraviolet (UV) spectrum.

1.5 What is non-ionizing radiation?

Electromagnetic radiation at frequencies below the UV band are classified as "non-ionizing radiation" because they lack the energy to liberate electrons i.e., to ionize or effect changes in atomic structure. Radio frequency fields are non-ionizing radiations.

2 Overview of EMF and health

2.1 International EMF Project

Wireless communication technology has become an indispensable part of modern society. Mobile phones, tablets and wireless devices have become basic communication tools of everyday life for billions of people around the world and are also common in medical applications. Base stations and telecommunications towers are continuously being erected to provide good quality wireless communications.

Together with the introduction of wireless communication technologies, there has been some degree of public concern about the potential health risks associated with wireless communications including the use of mobile phones and living near base stations.



Figure 2 – Wireless devices in everyday use

Electromagnetic fields (EMFs) of all frequencies represent one of the most common and fastest growing environmental influences. As part of its charter to protect public health and in response to public concern, the WHO established the International EMF Project in 1996. The purpose of the International EMF Project is to assess the scientific evidence of possible health effects of EMF in the frequency range from 0 to 300 GHz.

Further information on the WHO International EMF Project is available at www.who.int/peh-emf/about/en/

In terms of EMF and health the WHO notes:

"All reviews conducted so far have indicated that exposures below the limits recommended in the ICNIRP (1998) EMF guidelines, covering the full frequency range from 0-300 GHz, do not produce any known adverse health effect. However, there are gaps in knowledge still needing to be filled before better health risk assessments can be made."

Source: WHO EMF Research – <http://www.who.int/peh-emf/research/en/> and WHO Summary of Health Effects www.who.int/peh-emf/about/WhatisEMF/en/index1.html

2.2 Information on mobile phones and health

The WHO notes:

"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 as being caused by mobile phone use."

"While an increased risk of brain tumours from the use of mobile phones is not established, the increasing use of mobile phones and the lack of data for mobile phone use over time periods longer than 15 years warrant further research of mobile phone use and brain cancer risk. In particular, with the recent popularity of mobile phone use among younger people, and therefore a potentially longer lifetime of exposure, WHO has promoted further research on this group and is currently assessing the health impact of RF fields on all studied endpoints."

Source: WHO Fact Sheet 193 June 2011 – <http://www.who.int/mediacentre/factsheets/fs193/en/>
WHO Online Q&A September 2013 <http://www.who.int/features/qa/30/en/>

2.3 Information on base stations and health

The WHO notes:

"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."

"Studies to date provide no indication that environmental exposure to RF fields, such as from base stations, increases the risk of cancer or any other disease."

Source: WHO Backgrounder 2006 www.who.int/peh-emf/publications/facts/fs304/en/
WHO Online Q&A September 2013 <http://www.who.int/features/qa/30/en/>

2.4 Information on human exposure guidelines

The WHO notes:

"A number of national and international organizations have formulated guidelines establishing limits for occupational and residential EMF exposure. The exposure limits for EMF fields developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) - a non-governmental organization formally recognised by WHO, were developed following reviews of all the peer-reviewed scientific literature, including thermal and non-thermal effects. The standards are based on evaluations of biological effects that have been established to have health consequences."

Source: WHO EMF Standards and Guidelines – <http://www.who.int/peh-emf/standards/en/>