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TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

K.83

Amendment 1
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SERIES K: PROTECTION AGAINST INTERFERENCE

Monitoring of electromagnetic field levels

**Amendment 1: Updates to the introduction and
Appendix I of ITU-T K.83**

Recommendation ITU-T K.83 (2011) – Amendment 1

ITU-T

Recommendation ITU-T K.83

Monitoring of electromagnetic field levels

Amendment 1

Updates to the introduction and Appendix I of ITU-T K.83

- 1) *Modify the Summary, Introduction and Appendix I to read as follows (the full text of the Recommendation is included for easy reference):*

Summary

Recommendation ITU-T K.83 gives guidance on how to make long-term measurements for the monitoring of electromagnetic fields (EMF) in the selected areas that are under public concern, in order to show that EMFs are under control and under the limits. The purpose of this Recommendation is to provide for the general public clear and easily available data concerning electromagnetic field levels in the form of results of continuous measurement. Amendment 1 introduces references to ITU-T K.52, ITU-T K.61 and ITU-T K.70, which provide guidance on measurements methods that can be used to achieve compliance assessments. It also updates the list of links contained in Appendix I.

History

Edition	Recommendation	Approval	Study Group	Unique ID*
1.0	ITU-T K.83	2011-03-09	5	11.1002/1000/11037
1.1	ITU-T K.83 (2011) Amd.1	2014-07-29	5	11.1002/1000/12224

* To access the Recommendation, type the URL <http://handle.itu.int/> in the address field of your web browser, followed by the Recommendation's unique ID. For example, <http://handle.itu.int/11.1002/1000/11830-en>.

FOREWORD

The International Telecommunication Union (ITU) is the United Nations specialized agency in the field of telecommunications, information and communication technologies (ICTs). The ITU Telecommunication Standardization Sector (ITU-T) is a permanent organ of ITU. ITU-T is responsible for studying technical, operating and tariff questions and issuing Recommendations on them with a view to standardizing telecommunications on a worldwide basis.

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.

NOTE

In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

Compliance with this Recommendation is voluntary. However, the Recommendation may contain certain mandatory provisions (to ensure, e.g., interoperability or applicability) and compliance with the Recommendation is achieved when all of these mandatory provisions are met. The words "shall" or some other obligatory language such as "must" and the negative equivalents are used to express requirements. The use of such words does not suggest that compliance with the Recommendation is required of any party.

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As of the date of approval of this Recommendation, ITU had not received notice of intellectual property, protected by patents, which may be required to implement this Recommendation. However, implementers are cautioned that this may not represent the latest information and are therefore strongly urged to consult the TSB patent database at <http://www.itu.int/ITU-T/ipr/>.

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Introduction

Electromagnetic fields are imperceptible and unknown for the general public. This unawareness and imperceptibility distrust and rejection among the population, which can result in social conflicts and lead to delays in the deployment of new wireless technologies.

One solution to these problems can be the control of the electromagnetic emissions by taking measurements and having a proper communication. Measurements turn emissions into something objective and, when presented to the public in an understandable format, help diminish the unawareness and helplessness of the public.

The measurements of electromagnetic fields described in this Recommendation meet three requirements: must be objective, reliable, and continuous. The objectivity of the measurements is achieved whenever a public and/or independent body carries out the taking of the measurements and manages their publication. Reliability derives from compliance with international norms and standards regarding the measurement of electromagnetic fields and by an accredited calibration of the measuring equipment. The continuous taking of objective and reliable measurements (24/365) provides permanent monitoring of emissions and a maximum transparency.

For years, in various parts of the world, broadband systems have been used for the continuous measurement of electromagnetic fields with satisfactory results, increasing citizens' confidence in governments, and reducing their fear and ignorance regarding electromagnetic emissions. An alternative are the frequency selective measurement systems which should be applied to meet particular requirements. Other Recommendations, such as ITU-T K.52, ITU-T K.61 and ITU-T K.70 provide guidance on measurements methods that can be used to achieve compliance assessments. These are also effective approaches to reduce concern undertaken by some countries.

This Recommendation presents the basis for the implementation of continuous measurement systems for electromagnetic emissions, in order to constitute a common practice at the international level for this type of measurements.

Recommendation ITU-T K.83

Monitoring of electromagnetic field levels

Amendment 1

Updates to the introduction and Appendix I of ITU-T K.83

1 Scope

This Recommendation specifies the methods and characteristics of the monitoring system to be used for the continuous monitoring of electromagnetic fields emitted by radio transmitters, both in the broadband and in the frequency selective measurement systems, in order to assess the long-term exposure of people to electromagnetic fields in the band of 9 kHz-300 GHz.

2 References

The following ITU-T Recommendations and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published. The reference to a document within this Recommendation does not give it, as a stand-alone document, the status of a Recommendation.

- [EN 50383] EN 50383 (2010), *Basic standard for the calculation and measurement of electromagnetic field strength and SAR related to human exposure from radio base stations and fixed terminal stations for wireless telecommunication systems (110 MHz-40 GHz)*.
- [EN 50400] EN 50400 (2005), *Basic standard to demonstrate the compliance of fixed equipment for radio transmission (110 MHz-40 GHz) intended for use in wireless telecommunication networks with the basic restrictions or the reference levels related to general public exposure to radio frequency electromagnetic fields, when put into service*.
- [EN 50413] EN 50413 (2008), *Basic standard on measurement and calculation procedures for human exposure to electric, magnetic and electromagnetic fields (0 Hz-300 GHz)*.
- [EN 50492] EN 50492 (2008), *Basic standard for in-situ measurement of electromagnetic field strength related to human exposure in the vicinity of base stations*.
- [ICNIRP] ICNIRP (1998), *Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic and Electromagnetic Fields (up to 300 GHz)*.
- [IEC 62311] IEC 62311 (2007), *Assessment of electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (0 Hz-300 GHz)*.
- [IEEE C95.3] IEEE Std C95.3-2002, *IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields With Respect to Human Exposure to Such Fields, 100 kHz-300 GHz*.
- [ISO/IEC Guide] ISO/IEC Guide to the Expression of Uncertainty in Measurement, 1995.

3 Definitions

This Recommendation defines the following terms:

3.1 averaging time (tavg): Appropriate time over which exposure is averaged for purposes of determining compliance with the limits.

3.2 electric field strength (E): Magnitude of a field vector at a point that represents the force (F) on a small test charge (q) divided by the charge:

$$E = \frac{F}{q}$$

The electric field strength is expressed in units of volt per metre (V/m).

3.3 exposure: Exposure occurs whenever a person is exposed to electric, magnetic or electromagnetic fields.

3.4 exposure ratio: The assessed exposure parameter at a specified location for each operating frequency of a radio source, expressed as the fraction of the related limit.

For assessments against reference levels:

Between 9 kHz and 10 MHz:

$$ER = \text{MAX} \left[\left(\frac{E}{EL} \right), \left(\frac{H}{HL} \right) \right]$$

Between 100 kHz and 300 GHz:

$$ER = \text{MAX} \left[\left(\frac{E}{EL} \right)^2, \left(\frac{H}{HL} \right)^2 \right]$$

or between 10 MHz and 300 GHz:

$$ER = \left(\frac{S}{SL} \right)$$

where:

ER is the exposure ratio at each operating frequency for the source

EL is the investigation E-field limit at frequency f

HL is the investigation H-field limit at frequency f

SL is the equivalent plane-wave power density limit at frequency f

E is the assessed E-field at frequency f for the source

H is the assessed H-field at frequency f for the source

S is the assessed equivalent plane-wave power density at frequency f for the source

f is each operating frequency of the source

ER is applicable to limits based on national regulations, or if they are not defined then in ICNIRP principles.

3.5 far-field region: Region of the field of an antenna where the radial field distribution is essentially dependent inversely on the distance from the antenna. In this region, the field has a predominantly plane-wave character, i.e., locally uniform distribution of electric field and magnetic field in planes transverse to the direction of propagation.