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# Regulatory Policy

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## Non-Ionizing Radiation Limits For Telecommunication Networks

Version 1.0

Document Date: 21<sup>st</sup> June 2010

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**Regulatory Policy, Non-Ionizing Radiation Limits For Telecommunication Networks, Version 1.0, Issued 21<sup>st</sup> June 2010**

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## 1. Definitions

The terms, words, and phrases used in this Regulatory Policy shall have the same meaning as are ascribed to them in the Telecommunications Law unless this Regulatory Policy expressly provides for otherwise, or the context in which those terms, words and phrases are used in this Regulatory Policy requires otherwise. For the purposes of this Regulatory Policy, the following terms and words shall have the meanings ascribed to them below:

- 1.1 **Compliance Distance** means the minimum distance from the antenna to the point of investigation where the field level is deemed to be compliant to the limits;
- 1.2 **EMF** means the Electro Magnetic Field which is the field of force associated with electric charge in motion. It has both electric and magnetic components and contains a definite amount of electromagnetic energy;
- 1.3 **GSM** means the Global System for Mobile communications which is one of the most popular cellular systems with over two billion subscribers over the globe;
- 1.4 **HRP** means the Horizontal Radiation Pattern;
- 1.5 **ICNIRP Guidelines** has the meaning ascribed to it in Article 5.1;
- 1.6 **ICNIRP** means the International Commission on Non-Ionizing Radiation Protection is a body of independent scientific experts consisting of a main Commission of 14 members, 4 Scientific Standing Committees covering Epidemiology, Biology, Dosimetry and Optical Radiation and a number of consulting experts. This expertise is brought to bear on addressing the important issues of possible adverse effects on human health of exposure to non-ionizing radiation;
- 1.7 **Non-ionizing radiations** refer to any type of electromagnetic radiation that does not have enough energy to completely remove an electron from an atom or molecule. Examples of Non-Ionizing radiation sources are; Mobile/phones, AM & FM Radio, Power line, Microwave;
- 1.8 **Power Density, Plane-Wave Equivalent ( $S_{eq}$ )** means the equivalent plane-wave power density is a commonly used term associated with any electromagnetic wave, equal in magnitude to the power flux-density of a plane wave having the same electric ( $E$ ) or magnetic ( $H$ ) field strength;



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- 1.9 UMTS** means the Universal Mobile Telecommunications System (UMTS) is one of the third-generation (3G) cell phone technologies; and
- 1.10 VRP** means the Vertical Radiation Pattern.

**2. Legal Reference**

- 2.1** Article 13(1) of *Federal Law by Decree No. (3) of 2003 Regarding the Reorganisation of the Telecommunications Sector* (the “**Telecoms Law**”) grants the TRA the authority to exercise its functions and powers to “ensure that the Telecommunication Services provided throughout the State, are sufficient to satisfy the public demands of those who wish to make use of such services”.
- 2.2** Article 14(3) of the Telecoms Law grants the TRA the authority to issue policies with respect to “...*the terms and level of services provided by the Licensees to users, including the standards and quality of service provided, the terms and conditions of supply of such services, the handling and resolution of user complaints and disputes, the provision of information to users, the use of user information and the rendering of bills to users*”.
- 2.3** Article 14.7 of the License provides: “*Environmental Issues, The radiation limits of the radio emission of the Licensee’s radio communication and other Telecommunication Network equipment shall comply with one or more applicable radiation safety standards, as approved by an internationally recognized health and safety standards body. The TRA shall determine the applicable health and safety standards to be applied. The Licensee shall install, manage and operate the radio communications and other equipment in its Telecommunication Network according to the standards determined by the TRA*”.



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**3. Scope**

This Regulatory Policy applies to all Telecommunication Services provided by the Licensees through wireless technologies including but not limited to, mobile services that are provided in the following cellular bands (GSM-900 MHz, GSM-1800 MHz, and UMTS- 2100 MHz).

**4. Purpose**

Non-Ionizing radiations are those radiations that are associated with the electromagnetic fields emitted in the frequency range from 0-300 GHz. Internationally there have been several efforts to set internationally accepted guidelines regarding limits to the maximum EMF (Electro Magnetic Field) exposure having regard to health considerations. This policy is in line with those efforts to control EMF exposure emitted by the networks operated by service providers licensed by the TRA.

## 5. The Policy

5.1 The Licensees shall adhere to the limits specified in the guidelines published by the ICNIRP in 1998 (the “**ICNIRP Guidelines**”, reconfirmed in 2009). By way of example only, the following table (which is extracted from the ITU-T k.52 recommendation) illustrates the levels of exposure for the general public to Non-Ionizing radiations which the ICNRP Guidelines regards as acceptable:

Table 1 : ICNIRP Reference levels

Type of exposure	Frequency range	Electric field strength (V/m)	Magnetic field strength (A/m)	Equivalent plane wave density power $S_{eq}$ (W/m <sup>2</sup> )
General public	Up to 1 Hz	–	$3.2 \times 10^4$	–
	1-8 Hz	10 000	$3.2 \times 10^4/f^2$	–
	8-25 Hz	10 000	$4\ 000/f$	–
	0.025-0.8 kHz	$250/f$	$4/f$	–
	0.8-3 kHz	$250/f$	5	–
	3-150 kHz	87	5	–
	0.15-1 MHz	87	$0.73/f$	–
	1-10 MHz	$87/f^{1/2}$	$0.73/f$	–
	10-400 MHz	28	0.073	2
	400-2000 MHz	$1.375f^{1/2}$	$0.0037f^{1/2}$	$f/200$
2-300 GHz	61	0.16	10	

NOTE 1 –  $f$  is as indicated in the frequency range column.

NOTE 2 – For frequencies between 100 kHz and 10 GHz, the averaging time is 6 minutes.

NOTE 3 – For frequencies up to 100 kHz, the peak values can be obtained by multiplying the rms value by  $\sqrt{2}$  ( $\approx 1.414$ ). For pulses of duration  $t_p$ , the equivalent frequency to apply should be calculated as  $f = 1/(2t_p)$ .

NOTE 4 – Between 100 kHz and 10 MHz, peak values for the field strengths are obtained by interpolation from the 1.5-fold peak at 100 MHz to the 32-fold peak at 10 MHz. For frequencies exceeding 10 MHz, it is suggested that the peak equivalent plane-wave power density, as averaged over the pulse width, does not exceed 1000 times the  $S_{eq}$  limit, or that the field strength does not exceed the field strength exposure levels given in the table.

NOTE 5 – For frequencies exceeding 10 GHz, the averaging time is  $68/f^{1.05}$  minutes ( $f$  in GHz).

Each Licensee must ensure that the general public is not exposed to Non-Ionizing radiations in excess of these limits as a result of the operation of any



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Telecommunications Network or Telecommunications Apparatus by that Licensee.

- 5.2** Within 180 days of this Regulatory Policy coming into force, each Licensee shall submit a formal declaration to the TRA stating that its Telecommunications Network and Telecommunications Apparatus comply with the ICNIRP Guidelines including the levels of exposure for the general public to Non-Ionizing radiations set out in the table in Article 5.1. Any changes to existing base stations or the deployment of new base stations should also adhere to the ICNIRP Guidelines.
- 5.3** In the event that any new version of the ICNIRP Guidelines is released, the Licensees shall adhere to them, unless they contain less onerous standards than the previous version of the ICNIRP Guidelines, in which case the Licensees shall comply with the ICNIRP Guidelines which contain the more onerous standards, unless specified otherwise by the TRA. The Licensees shall update any declarations previously made to the TRA within 90 days of the publication of any new version of the ICNIRP Guidelines.
- 5.4** Within 10 working days of a written request of the TRA, a Licensee shall provide documentation acceptable to the TRA, demonstrating that particular Telecommunications Apparatus or particular site on which Telecommunications Apparatus or part of a Telecommunications Network are located that complies with the ICNIRP Guidelines.
- 5.5** Licensees shall use their best endeavours to avoid establishing any Telecommunications Apparatus used for wireless transmissions (including any cellular or mobile base stations) next to buildings or places visited by the general public or large sections of the public such as schools, hospitals and university campus. Where such Telecommunications Apparatus are established next to such buildings, the relevant Licensee shall use its best endeavours to minimize the radio frequency radiation intensity in these areas.

Mitigation techniques explained in annex D of the k.70 ITU-T recommendation including:

- a decrease in the transmitter power;
- an increase in the antenna height;
- a decrease in the VRP down tilt;
- an increase in the antenna gain;
- changes in the VRP; and





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- changes in the HRP,

shall be used when possible to reduce the amount of radiation exposed in the above mentioned areas.

**5.6** Occupational exposure limits within the ICNIRP Guidelines are more relaxed than the general public exposure limits set out in the ICNIRP Guidelines. Accordingly, Licensees shall ensure that the general public cannot access areas or sites which are subject to Non-ionizing radiations from their activities, if those areas would fall within the limits for occupational exposure set out in the ICNIRP Guidelines.

**5.7** Licensees shall ensure that the general public, cannot access an area surrounding the antennas of transmission stations which area is determined on a case by case basis in accordance with the formulas set out in the ITU-T Recommendation K.70, Annex C. The following table is extracted from ITU-T Recommendation K.70, Annex C:

Table 2, Expressions for the calculation of minimum distances to antennas of transmission stations for compliance with the exposure limits for the population in general.

Radio frequency range	General public exposure	
1 to 10 MHz	$r = 0.10\sqrt{eirp \times f}$	$r = 0.129\sqrt{erp \times f}$
10 to 400 MHz	$r = 0.319\sqrt{eirp}$	$r = 0.409\sqrt{erp}$
400 to 2000 MHz	$r = 6.38\sqrt{eirp / f}$	$r = 8.16\sqrt{erp / f}$
2000 to 300000 MHz	$r = 0.143\sqrt{eirp}$	$r = 0.184\sqrt{erp}$
<p><i>r</i> is the minimum antenna distance, in metres  <i>f</i> is the frequency, in MHz  <i>erp</i> is the effective radiated power in the direction of the largest antenna gain, in Watts  <i>eirp</i> is the equivalent isotropically radiated power in the direction of the largest antenna gain, in Watts</p>		

**6. Violations**

**6.1** Licensees shall comply with the provisions outlined in this Regulatory Policy. Any violation of these provisions will result in penalties imposed in accordance with the Telecommunication Law, the Regulatory Framework and other relevant Laws.



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**6.2** An audit of base stations will be conducted by the TRA from time to time to ensure that the limits of exposure to EMF set by the ICNIRP Guidelines are not exceeded. In addition to the imposition of penalties referred to in Article 6.1 above, if there is any violation of these limits arising from the operation of a base station, the relevant base station will be subject to an immediate deactivation. That base station will not be reactivated until such time as the relevant Licensee can verify to the satisfaction of the TRA that the re-activation of the base station will not cause a breach of the ICNIRP Guidelines or this Regulatory Policy.

**7. Effective Date**

This Regulatory Policy shall be effective on the date of issue.