



Commission for
Communications Regulation

Report

2014 Programme of Measurement of Non-Ionising Radiation Emissions

Third Interim Report

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An Coimisiún um Rialáil Cumarsáide

Commission for Communications Regulation

Abbey Court Irish Life Centre Lower Abbey Street Dublin 1 Ireland

Telephone +353 1 804 9600 Fax +353 1 804 9680 Email info@comreg.ie Web www.comreg.ie

Contents

| | | |
|-----|--|----|
| 1. | Introduction..... | 3 |
| 2. | Sites Surveyed and Summary of Measurement Results | 4 |
| 2.1 | SITES SURVEYED: JULY - SEPT 2014 | 4 |
| 2.2 | SUMMARY OF MEASUREMENT RESULTS | 4 |
| 2.3 | VIEW INDIVIDUAL SITE SURVEY REPORTS | 4 |
| | Appendix - Explanatory Notes | 5 |
| | NOTE 1: THE ELECTROMAGNETIC SPECTRUM | 5 |
| | NOTE 2: FREQUENCY | 5 |
| | NOTE 3: THE RADIO FREQUENCY SPECTRUM..... | 6 |
| | NOTE 4: WIRELESS TELEGRAPHY LICENCES..... | 8 |
| | NOTE 5: NON-IONISING RADIATION..... | 8 |
| | NOTE 6: INTERNATIONAL COMMISSION ON NON-IONIZING RADIATION PROTECTION (ICNIRP) | 8 |
| | NOTE 7: GENERAL AUTHORISATION | 10 |
| | NOTE 8: AGGREGATE LEVEL OF NON-IONISING RADIATION | 10 |

1. Introduction

The Commission for Communications Regulation (ComReg) is the licensing authority for the use of the *radio frequency spectrum*¹ in Ireland. The radio spectrum is used to support a wide range of applications and electronic communications services such as radio and television broadcasting, mobile telephony, emergency services communications and wireless broadband.

It is a condition of various *Wireless Telegraphy Licences* issued by ComReg that licensees must ensure that *non-ionising radiation* (NIR) emissions from each transmitter operated under the licence must be within the limits set down in the guidelines published by the *International Commission on Non-Ionizing Radiation Protection (ICNIRP)*. Levels of NIR emissions from a licensed transmitter must not exceed the ICNIRP limits in any part of the site or surrounding area to which the general public has access. This is also a condition of a *General Authorisation* for the provision of an electronic communications network and/or service.

In order to assess compliance on the part of licensed and authorised transmitter operators with the ICNIRP Limits, ComReg has put in place a Programme of Measurement of Non-Ionising Radiation Emissions, under which NIR surveys are conducted near a sample number of licensed transmitter sites nationwide each year. Each survey involves measurement of NIR emission levels at the point of highest emissions (in a public area) associated with the transmitter.

This report forms part of an ongoing series of interim reports which outline ComReg's programme of measurements, and summarises the results of the third set of site surveys (20 sites) undertaken during the 2014 programme. The surveys were conducted between July and September 2014 by engineers of Compliance Engineering Ireland Ltd which was contracted by ComReg to assist it with the programme.

¹ See the Appendix for explanatory notes on the items highlighted in Italics.

2. Sites Surveyed and Summary of Measurement Results

2.1 Sites Surveyed: July - Sept 2014

| | County / City | Transmitter Site |
|-----|---------------|---|
| 1. | Cavan | Arva |
| 2. | Cavan | Main Stret, Ballinagh |
| 3. | Donegal | Dunkineely |
| 4. | Donegal | Glenview Business Park, Mountain Top, Letterkenny |
| 5. | Donegal | Heggarty's Auto, Carnamuggagh, Letterkenny |
| 6. | Donegal | RTE, Edenmore, Ballybofey |
| 7. | Galway | An Réalt, Carraroe |
| 8. | Galway | Baile Árd, Spiddal |
| 9. | Galway | Claregalway Hotel |
| 10. | Galway | ESB, Cois na hAbhainn, Tuam |
| 11. | Galway City | Ballybane Shopping Centre, Ballybane Road |
| 12. | Galway City | Whitestrand Avenue, Salthill, Galway |
| 13. | Leitrim | Garda Station, Sligo Road, Manorhamilton |
| 14. | Longford | St. Mary's Street, Drumlish |
| 15. | Mayo | Eircom, Belmullet Industrial Estate |
| 16. | Mayo | ESB, Bunree Road, Ballina |
| 17. | Mayo | Watertower, Tallagh, Belmullet |
| 18. | Monaghan | Ard Gleann, Monaghan Town |
| 19. | Roscommon | The Tap Bar, Ballinlough |
| 20. | Sligo | Former Garda Station, Easkey |

2.2 Summary of Measurement Results

At each of the 20 sites surveyed, the **aggregate level of non-ionising radiation** emissions measured was found to fall below the limits for general public exposure as specified in the ICNIRP Guidelines.

2.3 View Individual Site Survey Reports

Further details of the measurements and of how they were conducted are outlined in separate survey reports for each site. Copies of the reports are available on www.comreg.ie as well as on www.siteviewer.ie, an on-line facility provided by ComReg, which shows the locations of GSM, UMTS (3G) and LTE (4G) mobile phone base stations throughout Ireland on a map.

Appendix - Explanatory Notes

Note 1: The Electromagnetic Spectrum

The electromagnetic spectrum is the range of all possible frequencies of electromagnetic radiation. It extends from radio waves at lower frequencies, through microwaves and visible light (a very small part of the spectrum) all the way to the extremely high frequency gamma rays that are a product of radioactive atoms. The electromagnetic spectrum contains both non-ionising and ionising radiation as shown in *Figure 1*.

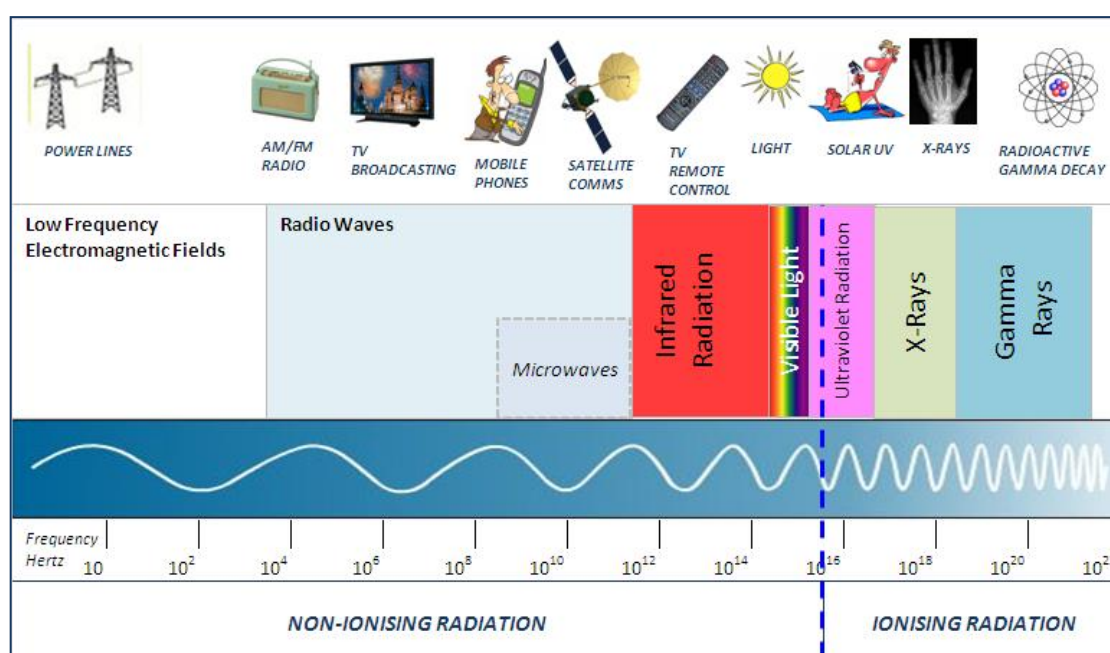


Figure 1: The Electromagnetic Spectrum

Note 2: Frequency

The frequency of an electromagnetic wave is the number of cycles it repeats in one second. It is expressed in Hertz (Hz) or a multiple of Hertz,

e.g.

kHz (kilohertz, 1,000 Hertz)

MHz (MegaHertz, 1,000,000 Hertz)

GHz (GigaHertz, 1,000,000,000 Hertz).

Note 3: The Radio Frequency Spectrum

In physics the radio spectrum is commonly defined as that part of the electromagnetic spectrum at frequencies between 3 kHz and 300 GHz. In the context of radiocommunications, the International Telecommunications Union (ITU) characterises the radio spectrum as that part of the electromagnetic spectrum at frequencies lower than 3 000 GHz².

The radio spectrum is used to support a wide range of applications and electronic communications services such as radio and television broadcasting, mobile telephony, emergency services communications and wireless broadband.

Radio technologies use electromagnetic waves to send information in free space. Many different radio applications can be used at the same time by employing waves of different frequency.

The radio spectrum is divided into "bands", i.e. ranges of frequencies. Different applications use different bands. For example, terrestrial TV broadcasting networks (e.g. Saorview) transmit within the frequency range between 470 and 790 MHz, mobile phones around 900, 1,800 and 2,000 MHz, domestic cordless phones just below 1900 MHz, WiFi in the frequency range 2400 – 2483.5 MHz (and also 5150 – 5350 MHz and 5470 – 5725 MHz), while satellite communications tend to use even higher frequencies. (*See Figure 2 on next page.*)

² No. 1.5 of Article 1 of the Radio Regulations, Edition of 2012, International Telecommunications Union

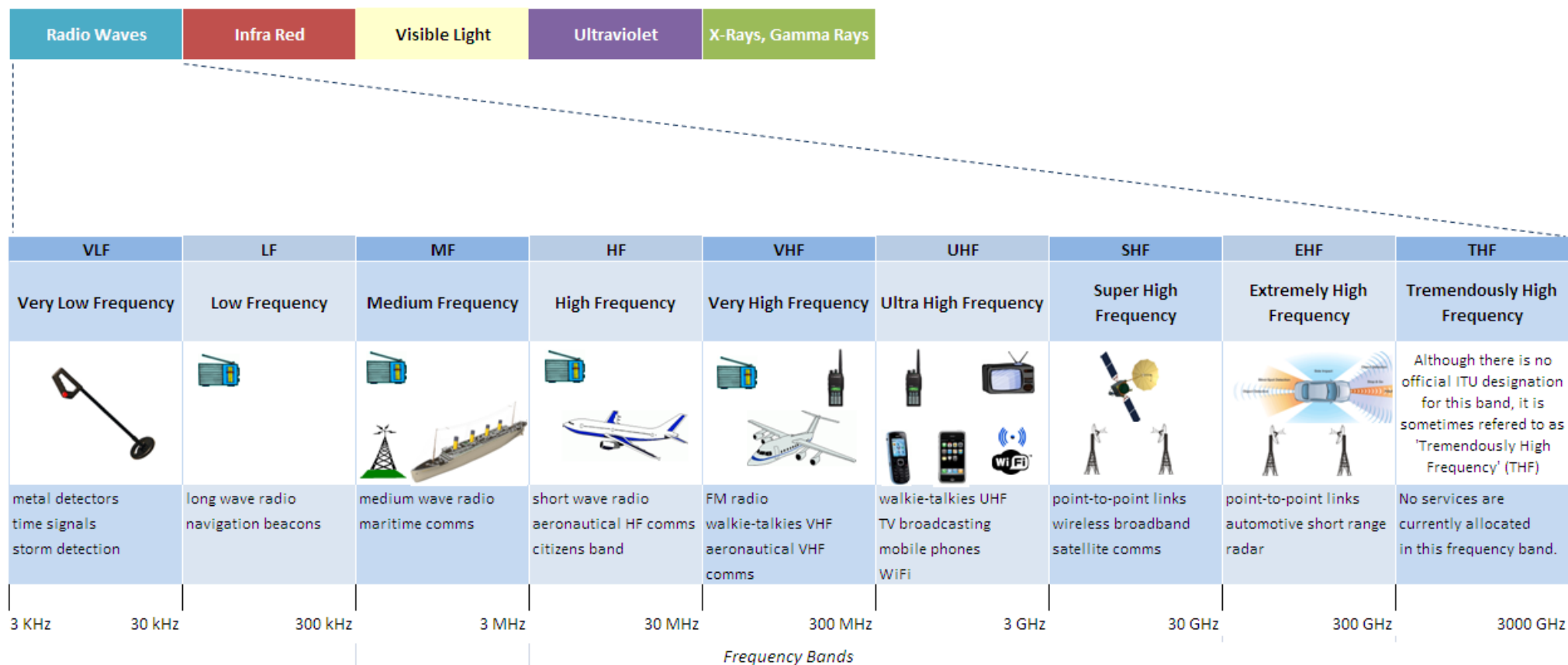


Figure 2: The Radio Frequency Spectrum (not to scale)³

³ Subdivision of radio spectrum as per No. 2.1 of Article 2 of the Radio Regulations, Edition of 2012, International Telecommunications Union (ITU)

Note 4: Wireless Telegraphy Licences

ComReg is the authority charged with the authorisation of radio equipment in Ireland, with the exception of Ships Radio. ComReg has set down specific rules and regulations for the possession and use of many forms of radio equipment. These regulations specify the licensing regime or exempt the radio equipment from licensing.

The possession and use of radio equipment in Ireland is governed by the Wireless Telegraphy Act 1926, (Act No 45 of 1926), (as amended), which stipulates that an appropriate Wireless Telegraphy licence must be held, unless a licence exemption applies. ComReg licenses wireless systems such as mobile phone and wireless broadband networks, emergency services communications, satellite earth stations, point-to-point links and television and radio broadcasting.

Note 5: Non-Ionising Radiation

Radio waves and microwaves used for wireless telecommunications are a form of non-ionising radiation. This radiation is characterized by energy per photon less than approximately 12 eV, wavelengths greater than 100 nm, or frequencies lower than 3×10^{15} Hz.

It includes all radiations and fields of the electromagnetic spectrum that do not normally have sufficient energy to produce ionisation in matter and have sufficient energy only for excitation. As such it does not break bonds that hold molecules in cells together.

According to the International Commission on Non-Ionizing Radiation Protection (ICNIRP), the known biological effects at very high radiation intensity are, depending on frequency, heating, burns, accumulation of charge on body surface and disturbance of nerve responses and muscle stimulation.

Note 6: International Commission on Non-Ionizing Radiation Protection (ICNIRP)

The International Commission on Non-Ionizing Radiation Protection (ICNIRP)⁴ is a non-governmental organisation formally recognised by the World Health Organization. It is an independent body of scientific experts in fields relating to non-ionising radiation such as

⁴ For further information see www.icnirp.org.

medicine, dermatology, ophthalmology, epidemiology, biology, photobiology, physiology, physics, electrical engineering and dosimetry.

ICNIRP provides guidance and recommendations on protection from exposure to non-ionising radiation. ICNIRP's exposure limits 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.

ICNIRP has defined two separate sets of guideline exposure limits for occupational and general public exposure:

(1) Occupational Exposure

The occupationally exposed population consists of adults who are generally exposed under known conditions and are trained to be aware of potential risk and to take appropriate precautions (e.g. telecommunications engineers working on a transmitter).

(2) General Public Exposure

The general public comprises individuals of all ages and of varying health status which might increase the variability of the individual susceptibilities. In many cases, members of the public are unaware of their exposure to electromagnetic fields. Moreover, individual members of the public cannot reasonably be expected to take precautions to minimize or avoid exposure. Therefore, ICNIRP advises more stringent exposure restrictions for the public than for the occupationally exposed population.

The most recent ICNIRP limits are set out in two documents:

“Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz)”, International Commission on Non-Ionizing Radiation Protection, Published in Health Physics 74 (4): 494-522; 1998.

<http://www.icnirp.org/documents/emfgdl.pdf>

and

“Guidelines for Limiting Exposure to Time-Varying Electric and Magnetic Fields (1 Hz - 100 kHz)”, International Commission on Non-Ionizing Radiation Protection, Published in Health Physics 99(6):818-836; 2010.

<http://www.icnirp.org/documents/LFgdl.pdf>

Note 7: General Authorisation

Under European Union law any person intending to provide an electronic communications network or service shall, before doing so, notify the relevant national regulator (ComReg in Ireland) of their intention to provide such a service.

Under the terms of the Authorisation Regulations a person is deemed to be authorised to provide an electronic communications network or service once a completed notification has been received by ComReg. There may also be a requirement to hold a Wireless Telegraphy Licence depending on the service provided. Operations are subject to the conditions set out in a General Authorisation, one of which stipulates that the Authorised Person shall comply with any radiation emission standards adopted and published by the International Commission for Non-Ionising Radiation Protection (ICNIRP).

Note 8: Aggregate Level of Non-Ionising Radiation

At any measurement location it is most likely that numerous signals transmitted on different frequencies will be detectable. For example, the overall electromagnetic field may comprise contributions on many frequencies (e.g. multiple signals from several different mobile operators with antennas on the same mast) from the adjacent transmitter site and also secondary contributions from more distant transmitters (e.g. adjacent cell mobile base stations, TV transmitters serving the area etc.).

ICNIRP has specified a means of assessing the additivity of exposures in such situations of simultaneous exposure to fields of different frequencies. Where applicable, additivity is examined separately for the effects of electrical stimulation effects (relevant up to 10 MHz) and thermal considerations (relevant above 100 kHz). The ICNIRP Guideline documents set out in detail how simultaneous exposure to multiple frequency fields is assessed.