

WIRELESS TELEGRAPHY ACT, 1926

WIRELESS TELEGRAPHY (LIBERALISED AND PREPARATORY LICENCES IN THE 800 MHZ, 900 MHZ AND 1800 MHZ BANDS) REGULATIONS 2012

Amended Liberalised Use Licence for terrestrial systems capable of providing Electronic Communications Services.

Licence under section 5 of the Wireless Telegraphy Act, 1926, to keep and have possession of apparatus for wireless telegraphy for terrestrial systems capable of providing Electronic Communications Services.

The Commission for Communications Regulation, in exercise of the powers conferred on it by section 5 (as substituted by section 182 of the Broadcasting Act 2009 (No. 18 of 2009)) of the Wireless Telegraphy Act, 1926 (No. 45 of 1926), hereby grants to the Licensee specified **Vodafone Ireland Ltd of Mountain View, Central Park, Leopardstown, Dublin 18. :**

Authorisation to keep and have possession of apparatus for wireless telegraphy for terrestrial systems capable of providing Electronic Communications Services as specified in Part 2 to this Licence, subject to such apparatus being installed, maintained, worked and used in accordance with the terms and conditions and restrictions set out in the Wireless Telegraphy (Liberalised Use Licence and Preparatory Licences in the 800 MHz, 900 MHz and 1800 MHz band) Regulations, 2012 (S.I. No. 251 of 2012) ("the Regulations"), including, but not limited to, the following:

- (1) The Licensee shall ensure that it complies with all of the conditions contained within Parts 1 to 4 of this Licence; and
- (2) The Licensee shall ensure that it makes payment of all fees as detailed in the Regulations.

This Licence amends the licence which came into effect 01/02/2013 (the "Licence Commencement Date")

and all amendments thereafter and, subject to revocation, suspension or withdrawal, expires on 12/07/2030 (the "Licence Expiry Date")

Signed: Tara Kagle

For and on behalf of the Commission for Communications Regulation
Date of Issue: 02/05/2013

Part 1
Commencement and Expiry dates per Spectrum Block

| Authorised | Name of Spectrum Block | Uplink / Downlink Frequency Assigned to Spectrum Block | Commencement Date per Spectrum Block | Expiry Date per Spectrum Block |
|------------|------------------------|--|--------------------------------------|--------------------------------|
| 800 MHz | 800/E | 852.0 - 857.0 MHz 811.0 - 816.0 MHz | 1st February 2013 | 12th July 2030 |
| 800 MHz | 800/F | 857.0 - 862.0 MHz 816.0 - 821.0 MHz | 1st February 2013 | 12th July 2030 |
| 900 MHz | 900/E | 900.0 - 905.0 MHz 945.0 - 950.0 MHz | 1st February 2013 | 12th July 2030 |
| 1800 MHz | 1800/D | 1725.0 - 1730.0 MHz 1820.0 - 1825.0 MHz | 13th July 2015 | 12th July 2030 |
| 1800 MHz | 1800/E | 1730.0 - 1735.0 MHz 1825.0 - 1830.0 MHz | 13th July 2015 | 12th July 2030 |
| 1800 MHz | 1800/F | 1735.0 - 1740.0 MHz 1830.0 - 1835.0 MHz | 1st February 2013 | 12th July 2030 |
| 1800 MHz | 1800/G | 1740.0 - 1745.0 MHz 1835.0 - 1840.0 MHz | 1st February 2013 | 12th July 2030 |
| 1800 MHz | 1800/H | 1745.0 - 1750.0 MHz 1840.0 - 1845.0 MHz | 1st February 2013 | 12th July 2030 |
| 900 MHz | 900/F | 905.0 - 910.0 MHz 950.0 - 955.0 MHz | 1st May 2013 | 12th July 2030 |

Part 2

The Apparatus to which this Licence applies

This information is updated annually and a non-confidential version is available separately on the ComReg webpage for “Mobile & WBB-Licensed Apparatus & Sites”.

Part 3

Apparatus Location and Details

This information is updated annually and a non-confidential version is available separately on the ComReg webpage for “Mobile & WBB-Licensed Apparatus & Sites”.

Part 4

Licence Conditions

1. General

(1) The Frequency Bands

- The “800 MHz band” means the 791 to 821 MHz band paired with the 832 to 862 MHz band;
- The “900 MHz band” means the 880 to 915 MHz band paired with the 925 to 960 MHz band;
- The “1800 MHz band” means the 1710 to 1785 MHz band paired with the 1805 to 1880 MHz band.

(2) The Licensed Spectrum Blocks

“Licensed Spectrum Block(s)” means the Spectrum Blocks set out in Part 1 of the Licence.

(3) The Terrestrial Systems and Services

“Terrestrial Systems” means terrestrial systems capable of providing electronic communications services that are in compliance with the technical implementing measures adopted pursuant to Decision No 676/2002/EC of the European Parliament and of the Council of 7 March 2002 on a regulatory framework for radio spectrum policy in the European Community (“Radio Spectrum Decision”) and in conformity with the standards referred to in Sections 1 to 4 of this Schedule.

(4) Provision of Maps and Data

For the purposes of carrying out coverage (see Section 3) and quality of service (see Section 4) compliance checks, the Licensee shall, on request, provide to the Commission the following:

- (a) Maps showing Coverage as defined in Section 3 of this Schedule;
- (b) An up-to-date list of the locations of the ‘Base Station’¹ transmitters;
- (c) An adequate number of test numbers

¹ Repeaters are also included as a Base Station for the purposes of this Licence.

2. Technical Conditions

(1) The 800 MHz band

- (a) The Frequency Division Duplex (FDD) method shall be used. Radio transmitters that use the 791 to 821 MHz frequency space shall transmit in a downlink direction (i.e. ‘Base Station’ transmitters). Radio transmitters that use the 832 to 862 MHz frequency space shall transmit in an uplink direction (i.e. ‘Terminals’ transmitters).
- (b) Terrestrial Systems compatible with Decision 2010/267/EU can be deployed in the 800 MHz band.
- (c) Within a Spectrum Block for which the Licence holder has a Licence, the in-block radiated power from a Base Station transmitter in the downlink direction must not exceed a mean in block power of 59 dBm/5 MHz EIRP.²
- (d) Outside of a Spectrum Block for which the Licence holder has a Licence, the Licensee shall comply with the out-of-block Block Edge Mask (BEM) as specified in Table 1 to Table 4 below

Table 1: Baseline Requirements – Base Station BEM out-of-block EIRP limits

| Frequency Range Of Out-Of-Block Emissions | Maximum Mean Out-Of-Block EIRP | Measurement Bandwidth |
|---|--------------------------------|-----------------------|
| 832 – 862 MHz (Frequencies used for FDD uplink) | -49.5 dBm | 5 MHz |

² EIRP stands for Equivalent Isotropically Radiated Power.

Table 2: Transition Requirements - Base Station BEM out-of-block EIRP limits per antenna over FDD downlink frequencies 791 to 821 MHz

| Frequency Range Of Out-Of-Block Emissions | Maximum Mean Out-Of-Block EIRP | Measurement Bandwidth |
|---|--------------------------------|-----------------------|
| -10 to -5 MHz from lower block edge | 18 dBm | 5 MHz |
| -5 to 0 MHz from lower block edge | 22 dBm | 5 MHz |
| 0 to +5 MHz from lower block edge | 22 dBm | 5 MHz |
| +5 to +10 MHz from lower block edge | 18 dBm | 5 MHz |
| Remaining FDD downlink frequencies | 11 dBm | 1 MHz |

Table 3: Transition Requirements – Base Station BEM out-of-block EIRP limits per antenna (for one to four antennas) over frequencies used as guard bands

| Frequency Range Of Out-Of-Block Emissions | Maximum Mean Out-Of-Block EIRP | Measurement Bandwidth |
|---|--------------------------------|-----------------------|
| Guard band between 790 MHz and 791 MHz | 17.4 dBm | 1 MHz |
| Duplex Gap guard band 821 – 832 MHz | 15 dBm | 1 MHz |

Table 4: Baseline requirements - Base Station out-of-block EIRP limits over frequencies below 790 MHz

| Frequency Range Of Out-Of-Block Emissions | Conditions On Base Station In-Block EIRP, P dBm/10 MHz | Maximum Mean Out-Of-Block EIRP | Measurement Bandwidth |
|---|--|--------------------------------|-----------------------|
| 470 – 790 MHz | $P \geq 59$ | 0 dBm | 8MHz |
| | $36 \leq P < 59$ | (P-59) dBm | 8MHz |
| | $P < 36$ | -23 dBm | 8MHz |

- (e) The Licensee shall comply with all Memoranda of Understanding (“MoU”) agreed from time to time between the Commission and the national regulatory authority

responsible for communications matters in the UK, (“Ofcom”), or its successor, in relation to the 800 MHz band, including ComReg Document 12/47³.

(2) The 900 MHz and 1800 MHz bands

- (a) The Frequency Division Duplex (FDD) method shall be used.
- (b) In the 900 MHz band, radio transmitters that use the 925 to 960 MHz frequency space shall transmit in a downlink direction (i.e. ‘Base Station’ transmitters). Radio transmitters that use the 880 to 915 MHz frequency space shall transmit in an uplink direction (i.e. ‘Terminal’ transmitters).
- (c) In the 1800 MHz band radio transmitters that use the 1805 to 1880 MHz frequency space shall transmit in a downlink direction (i.e. ‘Base Station’ transmitters). Radio transmitters that use the 1710 to 1785 MHz frequency space shall transmit in an uplink direction (i.e. ‘Terminal’ transmitters).
- (d) Terrestrial Systems permitted under Decision 2009/766/EC as amended by Decision 2011/251/EU can be deployed in the 900 MHz band and/or the 1800 MHz band.
- (e) In the absence of bilateral or multilateral agreements between neighbouring Licensees, the Licensee deploying a GSM system⁴ in the 900 MHz and/or 1800 MHz band is required to meet the guard band obligation as set down in Decision 2009/766/EC as amended by Decision 2011/251/EU.
- (f) The Licensee shall comply with all MoU agreed from time to time between the Commission and the Ofcom, or its successor, in relation to the 900 MHz and 1800 MHz band, including ComReg Documents 11/50c, d, e and f.⁵

³ http://www.comreg.ie/_fileupload/publications/ComReg1247.pdf

⁴ As defined in Decision 2009/766/EC as amended by Decision 2011/251/EU.

⁵ http://www.comreg.ie/_fileupload/publications/ComReg1150c.pdf;
http://www.comreg.ie/_fileupload/publications/ComReg1150d.pdf;
http://www.comreg.ie/_fileupload/publications/ComReg1150e.pdf; and
http://www.comreg.ie/_fileupload/publications/ComReg1150f.pdf.

3. Roll-out and Coverage Requirements

(1) Minimum Coverage and Roll-out Requirement

In the case of an existing GSM or 3G licensee⁶, which for the avoidance of doubt excludes Mobile Virtual Network Operators (MVNOs) without GSM or 3G spectrum rights of use, being granted a Liberalised Use Licence:

- The Licensee shall ensure the attainment of, and maintain, a coverage level of at least 70% of the population within 3 years of the Licence Commencement Date as set out in the Licence.

In the case of entity that does not have a GSM or 3G licence, which by definition includes MVNOs which do not have GSM or 3G spectrum rights of use, being granted a Liberalised Use Licence:

- The Licensee shall ensure the attainment of, and maintain, a coverage level of at least 35% of the population within 3 years and 70% of the population within 7 years of the Licence Commencement Date as set out in the Licence.

(2) Definition of Coverage

(a) Terrestrial Systems in the 800 MHz, the 900 MHz or the 1800 MHz bands

(i) Where the Licensee has deployed more than one Terrestrial System in the 800 MHz, the 900 MHz and/or the 1800 MHz band, it is the combined coverage of these Terrestrial Systems that counts towards the minimum coverage and roll-out obligation set out in this Licence.

(ii) Determining whether the Licensee has coverage shall be calculated as follows:

- For measurement purposes, an average pilot signal will be measured outdoors at a height of 1.5m;
- For propagation prediction systems a pilot signal over 95% of the area during 95% of the time is required;

⁶ An existing GSM or 3G licensee is an Existing Mobile Network Operator as defined in the Information Memorandum, ComReg Document 12/52.

- The coverage level specification per frequency band, per bandwidth and per Terrestrial System is set out in Table 5 below.
 - Where both a FS and an Ec/Io or BLER metric are specified in Table 5 for a particular Terrestrial System (i.e. UMTS⁷ and LTE⁸), an area will be deemed to have coverage where the Ec/Io or BLER exceeds the levels as set out in Table 5, even if the FS is less than the value shown in the Table 5.
 - Where a FS metric is the only metric specified in Table 5 for a particular Terrestrial System (i.e. GSM), an area will be deemed to have coverage where the FS in Table 5 below is met.

Table 5: The coverage level specification per frequency band, per bandwidth and per terrestrial system

| Terrestrial Systems ⁹ and Bandwidth | 800MHz FS (dB(μV/m)) | 800MHz Ec/Io or BLER | 900MHz FS (dB(μV/m)) | 900MHz Ec/Io or BLER | 1800MHz FS (dB(μV/m)) | 1800MHz Ec/Io or BLER |
|--|----------------------|----------------------|----------------------|----------------------|-----------------------|-----------------------|
| GSM (0.2MHz) | 45 | N/A | 46 | N/A | 54 | N/A |
| UMTS (5MHz) | 49 | -8 | 50 | -8 | 57 | -8 |
| LTE (5MHz) | 47 | 10 ⁻² | 48 | 10 ⁻² | 55 | 10 ⁻² |
| LTE (10MHz) | 44 | 10 ⁻² | 45 | 10 ⁻² | 52 | 10 ⁻² |
| LTE (15MHz) | 42.5 | 10 ⁻² | 43.5 | 10 ⁻² | 50.5 | 10 ⁻² |
| LTE (20MHz) | 41 | 10 ⁻² | 42.5 | 10 ⁻² | 49.5 | 10 ⁻² |

Where:

FS = Field Strength;

BLER = Block Error Rate; and

Ec/Io = The ratio of the received energy per chip and the interference level.

⁷ As defined in Decision 2009/766/EC as amended by Decision 2011/251/EU.

⁸ As defined in Decision 2011/251/EU.

⁹ As defined in EC Decision 2009/766/EC as amended by Decision 2011/251/EU.

(b) Other Terrestrial Systems in the 800 MHz, the 900 MHz or the 1800 MHz bands

- (i) Insofar as, over the lifetime of this Licence, WiMAX¹⁰ or other terrestrial systems¹¹ may also be deployed in one or more of the 800 MHz, the 900 MHz and the 1800 MHz bands, the Commission will set a measurement standard¹² for these when appropriate.
- (ii) Such measurement standards shall be defined on whatever basis appears appropriate to the Commission having regard to, amongst other things, international standards and recommendations, but for indicative purposes these standards are likely to be based on:
- For measurement purposes – an average pilot signal field strength of “X”¹³ measured outdoors at a height of 1.5m, or a Carrier to Interference (C/I) ratio of –Y dB¹⁴
 - For propagation prediction systems – a pilot signal field strength of “X” over 95% of the area during 95% of the time.

(c) Coverage from terrestrial systems in “other designated frequency bands”

In this paragraph, ‘other designated frequency bands’ means the 2100 MHz band, which is to say, the 1900 to 1980 MHz band and the 2110 to 2170 MHz band.

- (i) Where the Licensee has deployed one or more than one terrestrial system in other designated frequency bands on foot of a licence or licences granted under section 5 of the Act of 1926, which provides or provide a seamless service with Terrestrial Systems in one or more than one of the 800 MHz, 900 MHz and 1800 MHz bands, up to 35% of the population coverage (that is to say, one-half) of the 70% of the population coverage obligation set out in Section 3(1) above may be

¹⁰ As defined in EC Decision 2009/766/EC as amended by Decision 2011/251/EU.

¹¹ Other terrestrial systems” means an electronic communications network not otherwise listed in this Annex that complies with Decision 2010/267/EU (for the 800 MHz band) or Decision 2009/766/EC as amended by Decision 2011/251/EU (for the 900 MHz band and 1800 MHz band), as applicable.

¹² As with the GSM, UMTS and LTE Terrestrial Systems, coverage will be measured using a device matching the appropriate Users Equipment standard for the system in use.

¹³ Corrected for the bandwidth used but based on a harmonised European or International standard which would be confirmed following consultation with stakeholders.

¹⁴ This would be the C/I ratio giving a quasi error free channel, following a standards based approach.

met using coverage provided by the terrestrial systems in these other designated frequency bands.

(3) Reporting of Compliance

- (a) Every twelve months, the Licensee shall measure and submit an annual compliance report to the Commission on coverage.
- (b) The measurements required for this compliance report shall be agreed with the Commission in advance and the compliance report shall have sufficient detail and granularity to allow the Commission to verify the Licensee's measurements.
- (c) Where the Licensee is claiming to have met the minimum coverage and roll-out obligation set out in Section 3(1) above for the first time, the compliance report shall contain drive test measurements¹⁵. These drive test measurements are to be carried out at the Licensee's own expense and to a standard as agreed with the Commission.
- (d) Upon request by the Commission¹⁶, the Licensee shall carry out drive test measurements and submit these results to the Commission. These drive test measurements are to be carried out at the Licensee's own expense and to a standard as agreed with the Commission.
- (e) The Licensee shall submit this compliance report each calendar year within 31 days of the anniversary of the Licence Commencement Date of the Liberalised Use Licence.
- (f) In the compliance report the Licensee shall notify the Commission whether it has either (a) met the relevant coverage and roll-out obligation specified in relation to the Licensee in Section 3 (1) above, or (b) failed to meet the said obligation and reasons for same.
- (g) Failure by the Licensee to so notify the Commission shall be deemed to comprise non-compliance with both this reporting obligation and the relevant coverage and roll-out obligation.

¹⁵ Drive Test Measurements are measurements collected using a motor vehicle.

¹⁶ The Commission does not envisage drive test measurements being required on a frequent basis, but notes that such measurements may be appropriate in circumstances where:

- a Licensee is submitting a compliance report on coverage for the first time;
- the Commission's own verification checks, drive test measurements or other information suggests that there may be discrepancies in the compliance report on coverage or the Licensee may not be meeting its coverage obligation.

4: Quality of Service (QoS) Obligations

(1) The Minimum “Availability of the Network” Standard

"Network unavailability" means the average number of minutes per terminal per six month period for which services on the network are not available due to a network disturbance, failure or scheduled unavailability.

“The network” means any Terrestrial System which uses the Licensed Spectrum Blocks.

- (a) The “availability of the network” shall be measured in terms of “network unavailability” and reported on an annual basis.
- (b) The Licensee shall ensure that network unavailability is less than 35 minutes (based on the weighting factors set out in Table 6 below) per six month period.

Table 6: Weighting Factors for Network Unavailability tracking all periods of network unavailability.

| Network Unavailability, Weighting Factors | | | |
|--|------------------|----------|--------|
| (divide duration of each network event by weighting factor) | | | |
| | Monday to Friday | Saturday | Sunday |
| For periods between 07.00 and 24.00 | 1 | 2 | 4 |
| For periods between 00.00 and 07.00 | 4 | 8 | 16 |

- (c) The Licensee shall maintain this network log in a manner that will demonstrate to the satisfaction of the Commission that such a network log is an adequate means of assessing whether the Licensee is complying with its “availability of the network” obligation under this Licence.
- (d) The network log, or as may be appropriate, part thereof, shall be made available on request to the Commission.

- (e) The Licensee shall calculate the network unavailability for any period specified by the Commission from the information recorded in the network log, and shall, upon request and within such time as may be specified by the Commission, provide the Commission with the results of the calculation

(2) The Minimum “Voice Call” Standard

In this paragraph “voice calls” does not include Voice over Internet Protocol (VoIP) calls.

- (a) Where the Licensee and/or any third party via contractual or other arrangements with the Licensee, provides a “voice call” service on a Terrestrial System which uses the Licensed Spectrum Blocks, the Licensee shall comply with the minimum “voice call” standard as set out in Table 7 below.

Table 7: The minimum “voice call” standard for each 6 month period for annual reporting

| | Average | Worst Case |
|---|---------|------------|
| <p>Maximum Permissible Blocking Rates</p> <p>This refers to the maximum percentage of total call attempts which are unsuccessful during the time consistent busy hour¹⁷.</p> | 2% | 4% |
| <p>Maximum Permissible Dropped Call Rates</p> <p>This refers to the maximum percentage of total originating calls which are prematurely released by the network within 3 minutes of the call being made.</p> | 2% | 4% |
| <p>Transmission quality</p> <p>The Licensee shall ensure that the speech transmission quality is as good as or better than the speech quality associated with the GSM Standard and GSM Technical Specifications of the European Telecommunications Standards Institute (“ETSI”). The Licensee shall ensure that appropriate echo treatment equipment is used and that it is properly configured.</p> | | |

¹⁷ “Time consistent busy hour” means the period of one-hour starting at the same time each day for which the average traffic of the network concerned is greatest over the days under consideration. The time consistent busy hour shall be determined from an analysis of traffic data obtained from the service and be subject to the Commission’s approval.

The ‘Time consistent busy hour’ is determined from the operator’s voice traffic. It is the one-hour period during which there is the highest level of traffic. The blocked call rates are measured for the same one-hour period during each review period (i.e. 6 months). The one-hour period is determined by the operator and is subject to the Commission’s approval.

- (b) Where a “voice call” service is provided by the Licensee and any third party via contractual or other arrangements with the Licensee, the minimum voice call standard shall be calculated by combining the “voice call” measurements of the Licensee with that of the third party.

(3) Reporting of Compliance

- (a) Every twelve months, the Licensee shall measure, and submit an annual compliance report to the Commission on (a) the availability of the network QoS standard and (b) the voice call QoS standard.
- (b) The measurements required for this compliance report shall be agreed with the Commission in advance and the compliance report shall have sufficient detail and granularity to allow the Commission to verify the Licensee’s measurements.
- (c) Upon request by the Commission¹⁸ the Licensee shall carry out drive test measurements¹⁹ and submit these results to the Commission. These drive test measurements are to be carried out at the Licensee’s own expense and to a standard as agreed with the Commission.
- (d) The Licensee shall submit this compliance report each calendar year within 31 days of the anniversary of the Licence Commencement Date of the Liberalised Use Licence.
- (e) In the compliance report the Licensee shall notify the Commission whether the Licensee has either (a) met the relevant QoS obligations as set out in Section 4 (1) and Section 4 (2) above, or (b) failed to meet the said obligations and reasons for same.

¹⁸ The Commission does not envisage drive test measurements being required on a frequent basis, but notes that such measurements may be appropriate in circumstances where:

- a Licensee is submitting a compliance report on QoS for the first time;
- the Commission’s own verification checks, drive test measurements or other information suggests that there may be discrepancies in the compliance report on QoS or the Licensee may not be meeting its QoS obligations.

¹⁹ Drive Test Measurements are measurements collected using a motor vehicle.

- (f) Failure by the Licensee to so notify the Commission shall be deemed to comprise non-compliance with both this reporting obligation and the relevant Quality of Service obligations.