



**MEMORANDUM OF UNDERSTANDING ON  
FREQUENCY COORDINATION BETWEEN  
IRELAND AND THE UNITED KINGDOM OF GREAT BRITAIN AND  
NORTHERN IRELAND  
CONCERNING THE SPECTRUM COORDINATION  
OF  
MOBILE/FIXED COMMUNICATIONS NETWORKS  
IN THE FREQUENCY RANGE 703 MHz to 3800 MHz**

## 1 INTRODUCTION

The representatives of the Administrations of Ireland and the United Kingdom of Great Britain and Northern Ireland (UK), taking into account the recommendations of the International Telecommunication Union, have concluded this present MoU, under Article 6 of the Radio Regulations, on the coordination of frequencies used by mobile/fixed communications networks in the spectrum ranges within Table 1. This MoU covers the territories of the United Kingdom of Great Britain and Northern Ireland (UK), the Isle of Man, and Ireland.

For the purposes of this MoU, all references to the UK include the IoM.

This MoU covers frequency coordination for mobile/fixed communications systems including **GSM**<sup>1</sup>, **UMTS**<sup>2</sup>, **LTE**<sup>3</sup> and **NR**<sup>4</sup> systems in the spectrum bands listed in Table 1, below:

**Table 1: Frequency Bands**

<b>Frequency Band</b>	<b>Base receive</b>	<b>Base transmit</b>
FDD 700 MHz	703-733 MHz	758-788 MHz
SDL 700 MHz	-	738-758 MHz
FDD 800 MHz	832-862 MHz	791-821 MHz
FDD 900 MHz	880-915 MHz	925-960 MHz
SDL 1400 MHz	-	1452-1492 MHz
FDD 1800 MHz	1710-1785 MHz	1805-1880 MHz
FDD 2100 MHz	1920-1980 MHz	2110-2170 MHz
FDD 2600 MHz	2500-2570 MHz	2620-2690 MHz
TDD 2100 MHz	1900-1920 MHz	1900-1920 MHz
TDD 2600 MHz	2570-2620 MHz	2570-2620 MHz
TDD 3600 MHz	3400 – 3800 MHz	3400 – 3800 MHz

This MoU abrogates the previous MoU<sup>5</sup> covering the frequency bands extending from 703 – 2690 MHz listed in table 1 above, between Ireland and the UK, and also the previous MoU<sup>6</sup> covering the frequency band 3400 to 3800 MHz:

The provisions of this MoU add to the mandatory requirements of the ITU Constitution and the ITU Radio Regulations, which have both the status of an International Treaty, and in particular:

- Article°**15.2** of the ITU Radio Regulations: “*Transmitting stations shall radiate only as much power as is necessary to ensure a satisfactory service*”

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<sup>1</sup> Global System for Mobile Communications – encompassing GSM, EC-GSM-IoT (Extended Coverage GSM IoT) and stand-alone (SA) NB-IoT (Narrowband IoT).

<sup>2</sup> The Universal Mobile Telecommunications System

<sup>3</sup> Long-Term Evolution – encompassing LTE, LTE-MTC (LTE Machine Type Communication), LTE-eMTC (evolved MTC), LTE inband NB-IoT, LTE guard-band (GB) NB-IoT

<sup>4</sup> New Radio, which supports the new capabilities of IMT-2020, such as Enhanced Mobile Broadband, Massive Machine Type Communications, and Ultra-reliable, Low Latency Communications

<sup>5</sup> Concerning the spectrum coordination of land mobile radiocommunication networks in the frequency range 703 – 2690 MHz which entered into force on the 1<sup>st</sup> May 2020.

<sup>6</sup> For wireless access services in the frequency band 3400 to 3800 MHz which entered into force on 1<sup>st</sup> April 2008

- Articles°15.3, 15.4 & 15.5 of the ITU Radio Regulations: *“In order to avoid interference [...]: a) locations of transmitting stations and, where the nature of the service permits, locations of receiving stations shall be selected with particular care; b) radiation in and reception from unnecessary directions shall be minimized by taking the maximum practical advantage of the properties of directional antennas whenever the nature of the service permits”*

This MoU has been established with a view to:

- reducing the potential for harmful interference<sup>7</sup> between land mobile radio communication systems operating in neighbouring countries; and
- optimising the use of spectrum resources in the border areas.

In particular, this MoU has been established with a view to finding a balanced solution between:

- minimising harmful emissions coming from the neighbouring territories. These harmful emissions may cause harmful interference, harmful coverage (international roaming issues) or may prevent an Administration from utilising / allocating portions of its national spectrum; and
- defining satisfactory frequency-usage conditions for land mobile operators to operate their networks while maintaining a good quality of service and good coverage throughout the national territory.

The Administrations have therefore agreed upon an acceptable level of interference (as defined in Article°1.168 of the ITU Radio Regulations<sup>8</sup>), and/or a specified level of coverage overspill from neighbouring countries, details of which are as set out in this MoU.

The coordination procedure is based on the principle of equitable access to the spectrum resource.

### **Commitment of Administrations**

The Administrations of Ireland and the UK are committed to ensuring that the radio-communications stations, operating in the bands listed above, respect the limits for the establishment of base stations without coordination as outlined in this MoU, unless the stations are specifically exempt from the coordination procedure in accordance with Section 5 of this document.

## **2 SPECTRUM COORDINATION FOR GSM 900 AND GSM 1800 SYSTEMS**

The coordination procedure shall be based on the concept of preferential frequencies in line with ECC Recommendation (05)08. The GSM 900 and GSM 1800 frequency bands shall be split into groups of frequencies which shall be assigned between the two countries in an equitable manner as "preferential frequencies".

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<sup>7</sup> Article°1.169 of the ITU Radio Regulations

<sup>8</sup> Accepted interference: Interference at a higher level than that defined as permissible interference, and which has been agreed upon between two or more administrations without prejudice to other administrations.

## 2.1 Preferential / Non-preferential division

The allocation of preferential frequencies, listed as absolute radio-frequency channel numbers (ARFCN), for GSM900 and GM1800 shall be as follows:

**Table 2: EGSM 900**

<b>EGSM 900 CHANNELS (ARFCN)</b>	<b>COUNTRY</b>
975-982	IRELAND
983-990	UK
991-994	IRELAND
995-998	UK
999-1002	IRELAND
1003-1006	UK
1007-1014	IRELAND
1015-1022	UK
1023-0	IRELAND and UK

**Table 3: GSM 900**

<b>GSM 900 CHANNELS (ARFCN)</b>	<b>COUNTRY</b>
1-12	UK
13-36	IRELAND
37 - 55	UK
56-74	IRELAND
75-93	UK
94-111	IRELAND
112-124	UK

**Table 4: GSM 1800**

<b>GSM 1800 CHANNELS (ARFCN)</b>	<b>COUNTRY</b>
512-525	IRELAND
526-547	UK
548-561	IRELAND
562-593	UK
594-618	IRELAND
619-624	UK
625-639	IRELAND
640-668	UK
669-693	IRELAND
694-699	UK
700-711	IRELAND
712-744	UK
745-768	IRELAND
769-774	UK
775-788	IRELAND
789-817	UK
818-843	IRELAND
844-849	UK
850-861	IRELAND
862-874	UK
875-877	IRELAND
878-882	UK
883-885	IRELAND

## 2.2 Technical and operational requirements applicable to the use of preferential / non-preferential frequencies

A base station may be established without prior coordination if the predicted field strength does not exceed the trigger values at the specified points in the following table:

**Table 5: Narrowband (E-GSM/GSM) Trigger Values**

Frequency Band	Coordination threshold predicted at a height of 3m above ground at the border or coastline of the neighbouring country	Coordination threshold predicted at a height of 3m above ground at the specified distance inside the neighbouring country
E-GSM/GSM 900 preferential frequencies*	-	19dB $\mu$ V/m/200 kHz at all points 15 km inside
E-GSM/GSM 900 non-preferential frequencies*	19dB $\mu$ V/m/200 kHz.	-
GSM 1800 preferential frequencies*	-	25dB $\mu$ V/m/200 kHz at all points 15km inside
GSM 1800 non-preferential frequencies*	25dB $\mu$ V/m/200 kHz	-
Propagation prediction assumptions: <ul style="list-style-type: none"> <li>• 50% of the time</li> </ul>		

\* from ECC Recommendation (05)08

To establish the predicted field strength produced by a station, the methodology as set out in Section 4 shall be employed.

Radio-communication stations for which the predicted field strength exceeds the values given in the table above must be coordinated in accordance with the coordination procedure as outlined in Section 7, except where an arrangement exists between operators as outlined in Section 5.

### 3 SPECTRUM COORDINATION FOR UMTS/LTE/NR SYSTEMS IN THE 700MHz, 800 MHz, 900 MHz, 1400 MHz, 1800 MHz, 2100 MHz, 2600 MHz, 3600 MHz FREQUENCY BANDS

Base stations may be operated without coordination if the predicted mean field strength of each carrier produced by the base station does not exceed the following values at a height of 3 m above ground at a specified distance (x km) inside the border or coastline of the neighbouring country.

**Table 6: Wideband (UMTS/LTE/NR) Trigger Values**

Frequency Band	Coordination threshold for the use of preferential codes <sup>9</sup>	Coordination threshold for the use of non-preferential codes	ECC/ERC Recommendation for reference
FDD 700 MHz	59 dB $\mu$ V/m/5 MHz at 0 km 41 dB $\mu$ V/m/5 MHz at 6 km	41 dB $\mu$ V/m/5 MHz at 0 km	ECC Rec(15)01
SDL 700 MHz	59 dB $\mu$ V/m/5 MHz at 0 km 41 dB $\mu$ V/m/5 MHz at 6km	41 dB $\mu$ V/m/5 MHz at 0km	ECC Rec (15)01
FDD 800 MHz	59 dB $\mu$ V/m/5 MHz at 0 km 41 dB $\mu$ V/m/5 MHz at 6 km	41 dB $\mu$ V/m/5 MHz at 0km	ECC Rec (11)04
FDD 900 MHz	59 dB $\mu$ V/m/5 MHz at 0 km 41 dB $\mu$ V/m/5 MHz at 6 km	41 dB $\mu$ V/m/5 MHz at 0 km	ECC Rec (08)02
SDL 1400 MHz	65 dB $\mu$ V/m/5 MHz at 0 km 47 dB $\mu$ V/m/5 MHz at 6km	47 dB $\mu$ V/m/5 MHz at 0km	ECC Rec (15)01
FDD 1800 MHz	65 dB $\mu$ V/m/5 MHz at 0 km 47 dB $\mu$ V/m/5 MHz at 6 km	47 dB $\mu$ V/m/5 MHz at 0 km	ECC Rec (08)02
FDD 2100 MHz	65 dB $\mu$ V/m/5 MHz at 0 km 37 dB $\mu$ V/m/5 MHz at 6 km	37 dB $\mu$ V/m/5 MHz at 0 km	ERC Rec (01)01
TDD 2100 MHz	37 dB $\mu$ V/m/5 MHz at 0 km	21 dB $\mu$ V/m/5 MHz at 0 km	No ECC Recommendation for TDD 2100. These values are unchanged from previous version of the MoU
FDD 2600 MHz	65 dB $\mu$ V/m/5 MHz at 0 km 49 dB $\mu$ V/m/5 MHz at 6 km	49 dB $\mu$ V/m/5 MHz at 0km	ECC Rec (11)05
TDD 2600 MHz (Synchronised, as defined below)	65 dB $\mu$ V/m/5 MHz at 0 km 49 dB $\mu$ V/m/5 MHz at 6 km	49 dB $\mu$ V/m/5 MHz at 0km	ECC Rec (11)05
TDD 2600 MHz (Unsynchronised)	30 dB $\mu$ V/m/5 MHz at 0 km		ECC Rec (11)05
TDD 3600 MHz (Synchronised, as defined below)	79 dB $\mu$ V/m/5 MHz at 0 km 61 dB $\mu$ V/m/5 MHz at 6 km	61 dB $\mu$ V/m/5 MHz at 0 km	ECC Rec (15)01
TDD 3600 MHz (Unsynchronised)	31 dB $\mu$ V/m/5 MHz at 0 km		ECC Rec (15)01
Propagation prediction assumptions:			
<ul style="list-style-type: none"> <li>10% of the time</li> </ul>			

<sup>9</sup> See Tables 7-10, below, on the preferential codes.

The above values are based on a block size of 5 MHz. In cases of other frequency block sizes,  $10 \cdot \text{Log}_{10} \left( \frac{\text{Channel Bandwidth [MHz]}}{5 \text{ [MHz]}} \right)$  should be added to these field strength values.

To establish the predicted field strength produced by a station, the methodology as set out in section 4 shall be employed.

Radio-communication stations for which the predicted field strength exceeds the values given in the table above, must be coordinated in accordance with the coordination procedure as outlined in Section 7, except where an arrangement exists between operators as outlined in section 5.

Both administrations recognize that Base stations already installed before the date of entry into force of this MoU, and have adhered with previously agreed MoU's at the time of their deployment, are considered as already coordinated.

### **TDD Synchronisation in the 2600 MHz and 3600 MHz frequency bands**

TDD 2600 and TDD 3600 NR/LTE base stations on both sides of the border should conform to the following parameters to be deemed as being Synchronised with one another:

- 1) The time reference (t0) of base stations deployed in the frequency bands 2570 – 2620 MHz and 3400-3800 MHz, is defined according to Coordinated Universal Time (UTC) +/-1.5 µs.
- 2) The frame structure reference is the LTE frame n° 2 DSUDD (periodicity 5ms, with a sub-carrier spacing (SCS) of 15 kHz).

The special subframe is: SS n° 6, 9:3:2 (number of symbols, DL: GP: UL)

- 3) NR should be only used if the corresponding NR frame structure is compatible with the LTE frame structure defined above.

### **Coordination of scrambling code groups for UMTS, physical-layer cell-identity groups for LTE/NR and other radio parameters**

In order to ensure the optimum network performance for systems deployed in the border areas, the administrations shall encourage operators to coordinate the use of scrambling code groups for UMTS, physical-layer cell-identity groups for LTE/NR and other radio parameters, as described in ECC Recommendations (01)01, (08)02, (11)04, (11)05 and (15)01.

#### **UMTS:**

For the FDD mode; 3GPP TS 25.213 defines 64 “scrambling code groups” in § 5.2.2, numbered {0 to 63}

**Table 7: UMTS-FDD Scrambling Code Groups**

<b>SCRAMBLING CODE GROUPS</b>	<b>21 - 52</b>	<b>0-20 + 53-63</b>
<b>UK</b>	<b>PREFERENTIAL</b>	<b>NON-PREFERENTIAL</b>
<b>IRELAND</b>	<b>NON-PREFERENTIAL</b>	<b>PREFERENTIAL</b>

For the TDD mode, 3GPP TS 25.223 defines 32 “scrambling code groups” in § 7.2, numbered {0 to 31}.

**Table 8: UMTS-TDD Scrambling Code Groups**

<b>SCRAMBLING CODE GROUPS</b>	11 - 26	0-10 + 27-31
<b>UK</b>	PREFERENTIAL	NON-PREFERENTIAL
<b>IRELAND</b>	NON-PREFERENTIAL	PREFERENTIAL

**LTE:**

3GPP TS 36.211 defines 168 “unique physical-layer cell-identity groups” in § 6.11, numbered 0...167, hereafter called “PCI groups”. Within each PCI group there are three separate PCIs giving 504 PCIs in total.

**Table 9: LTE PCI Groups**

<b>PCI GROUPS</b>	168 - 419	0-167 + 420-503
<b>UK</b>	PREFERENTIAL	NON-PREFERENTIAL
<b>IRELAND</b>	NON-PREFERENTIAL	PREFERENTIAL

**NR:**

**Table 10: NR PCI Groups**

3GPP TS 38 211 defines NR Physical channels and modulation, in NR 2-step identification using PSS/SSS detection of the Physical Cell ID (same as LTE), the number of different cell IDs has been increased from 504 in LTE to 1008 for NR.

<b>PCI GROUPS</b>	168 – 419 + 672 – 923	0-167 + 420-503 + 504 – 671 + 924 – 1007
<b>UK</b>	PREFERENTIAL	NON-PREFERENTIAL
<b>IRELAND</b>	NON-PREFERENTIAL	PREFERENTIAL

**4 PREDICTION OF PROPAGATION**

The field strength prediction method shall be according to the latest version of ITU-R Recommendation P. 452 and taking account of:

- Terrain profile for the base station in all main directions
- Type of terrain (e.g. land, sea, mixed path)
- Effective radiated field strength
- Antenna tilt and azimuth

Including model components:

- Mixed land/sea paths
- Receiving/mobile antenna height



- Terrain clearance angle

And standard values:

$\Delta N = 40$  (N0m-N1000m)

## **5 ARRANGEMENT FOR PLANNING AT AN OPERATIONAL LEVEL**

A “Framework” MoU between the administrations of Ireland and the UK, which enables planning arrangements between mobile operators, subject to agreement of the Administrations, was signed on 1<sup>st</sup> May 2005<sup>10</sup>.

Licensees holding rights, in each of the neighbouring countries, to use the frequencies of operation of a radio communication station may mutually agree conditions in which that station can exceed the predicted field strengths as set out in sections 2 and 3.

Where licensees have reached such a mutual agreement, coordination of the corresponding station in accordance with Section 7 is not required, subject to the terms of the agreement between the licensees and subject to the agreement being lawful.

- It is the responsibility of the licensees to ensure that the agreement is lawful.
- It is also the responsibility of the licensees to ensure that an appropriate agreement is reached with all licensees in the neighbouring country authorised to use frequencies at which the predicted field strength may exceed the thresholds as set out in sections 2 and 3.

The administrations of Ireland and the UK agree to extend the applicability of this MoU to all operators of systems in the frequency bands that are the subject of the present MoU.

To facilitate reasonable and timely development of their systems, licensees are encouraged to develop Arrangements in accordance with the Framework MoU of 1<sup>st</sup> May 2005.

Operators may only negotiate Arrangements concerning the common part of those frequency bands for which they have been licensed by the National Administration. The provisions in the Arrangements shall not result in an impairment of the authorised use of radio frequencies by third parties not involved in the Arrangements.

In order to facilitate Arrangements between operators, each Administration will provide names and point of contact information for the relevant licensees, subject to the agreement of the licensees.

## **6 HARMFUL INTERFERENCE**

If an operator suffers from harmful interference and/or notices a degradation of the quality of service on its network - due to the rise of the field strength coming from a neighbouring Administration for example - it should immediately inform its Administration, which will contact its counterparts. A list of contact points for each Administration, including the operators shall be exchanged regularly.

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<sup>10</sup> Agreement between the administrations of the United Kingdom and Ireland concerning the approval of planning arrangements between operators of mobile radio communications network 1<sup>st</sup> May 2005

## 7 COORDINATION PROCEDURE

Exchanges of information for coordination/notification purposes shall be in the format set out in the HCM agreement Annex 2A<sup>11</sup>

A coordination request must be sent by the licensee through the Administration responsible for its authorisation.

The coordination procedure shall follow the one described in the HCM Agreement.

In the event of interference between authorised users of the bands listed in Ireland and the UK, the affected users shall exchange information between themselves with a view to resolving the interference by mutual agreement. A report of the interference and the details of the information exchanged shall be sent to both Administrations who can, if requested, advise on resolution. The Administrations of Ireland and the UK agree to facilitate the exchange of information between authorised users of the band.

## 8 REVIEW AND FOLLOW UP OF THE MOU

Either signatory Administration may request a review of this MoU. Any part of this MoU may be revised in the light of future developments, i.e. introduction of new technologies and experience in the operation of the networks covered by the MoU.

## 9 TERMINATION OF THE MOU

Either signatory Administration may withdraw from this MoU subject to 6 months' notice.

## 10 Date of entry into force

This MoU will enter into force on the 29 April 2024

For the Administration of  
The United Kingdom and  
Northern Ireland



*David Willis*

For the Administration of  
Ireland



*Dr Samuel Ritchie*

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<sup>11</sup> Agreement between the administrations of ... on the Coordination of frequencies between 29.7 MHz and 43.5 GHz for the fixed service and land mobile service (HCM Agreement), Berlin , 2022.