



Commission for
Communications Regulation

Memorandum of Understanding

Agreed MoU with the UK in the Frequency Range 790 MHz to 2690 MHz

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**MEMORANDUM OF UNDERSTANDING ON
FREQUENCY COORDINATION BETWEEN
THE REPUBLIC OF IRELAND AND THE UNITED KINGDOM
CONCERNING THE SPECTRUM COORDINATION
OF
LAND MOBILE RADIOCOMMUNICATION NETWORKS
IN THE FREQUENCY RANGE 790 MHz to 2690 MHz TO BE APPLIED
IN THE AREA INCLUDING THE REPUBLIC OF IRELAND,
THE UNITED KINGDOM AND THE ISLE OF MAN**

1 INTRODUCTION

The representatives of the Administrations of United Kingdom (UK) and the Republic of Ireland (RoI), 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 land mobile radio communication networks in the spectrum range 790 MHz to 2690 MHz.

This MoU covers frequency coordination for **GSM/UMTS/LTE** systems following the spectrum arrangements below:

Table 1: Frequency Bands

Frequency Band	Base receive	Base transmit
FDD 800 MHz	832-862 MHz	791-821 MHz
FDD 900 MHz	880-915 MHz	925-960 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

This MoU abrogates the previous MoU's concluded in the frequency bands in table 1 above, between Republic Of Ireland and United Kingdom, and listed hereafter:

- Technology Neutral 790-862 MHz (Dublin, 28th Feb 2012 and London, 29th Feb 2012)
- UMTS 900 MHz, 1800 MHz (5th April 2011)
- Technology Neutral 2500-2690 MHz (30th January 2008)
- EGSM 900 MHz (London, 4th November 2005)
- UMTS 2100 MHz London, 9th December 2002)
- GSM 900 MHz (Dublin, 19th Dec 2000 and London, 22nd Nov 2000)
- GSM 1800 MHz (1st September 1999)

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”*
- 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 antennae whenever the nature of the service permits”*

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The present frequency coordination MoU has been established with a view to:

- reducing problems of harmful interference¹ between land mobile radio communication systems operating in neighbouring countries;
- 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:

- On the one hand, 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.
- On the other hand, defining satisfactory frequency-usage conditions for land mobile operators to operate their networks while maintaining a good quality of service and good coverage upon the national territory.

This leads Administrations to accept and agree upon a certain level of interference (as defined in Article°1.168 of the ITU Radio Regulations²) and/or a certain level of coverage from neighbouring countries.

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

Commitment of Administrations

The Administrations of the RoI 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 6 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".

¹ Article°1.169 of the ITU Radio Regulations

² 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

EGSM 900 CHANNELS (ARFCN)	COUNTRY
975-982	REPUBLIC OF IRELAND
983-990	UNITED KINGDOM
991 - 994	REPUBLIC OF IRELAND
995 - 998	UNITED KINGDOM
999-1002	REPUBLIC OF IRELAND
1003-1006	UNITED KINGDOM
1007-1014	REPUBLIC OF IRELAND
1015 - 1022	UNITED KINGDOM
1023-0	REPUBLIC OF IRELAND and UNITED KINGDOM

Table 3: GSM 900

GSM 900 CHANNELS (ARFCN)	COUNTRY
1-12	UNITED KINGDOM
13-36	REPUBLIC OF IRELAND
37 - 55	UNITED KINGDOM
56-74	REPUBLIC OF IRELAND
75-93	UNITED KINGDOM
94 - 111	REPUBLIC OF IRELAND
112 - 124	UNITED KINGDOM

Table 4: GSM 1800

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

Frequency Band	Coordination threshold at 3m above ground at the border or coastline of the neighbouring country	Coordination threshold at 3m above ground at the specified distance inside the neighbouring country
E-GSM/GSM 900 preferential frequencies*	-	19dB μ V/m at all points 15 km inside
E-GSM/GSM 900 non-preferential frequencies*	19dB μ V/m. Note: No base station may be established within 10km of the border in the non-preferred band without coordination since the method of propagation prediction does not apply at distances of less than 10km	-
GSM 1800 preferential frequencies*	-	25dB μ V/m at all points 15km inside
GSM 1800 non-preferential frequencies*	25dB μ V/m	-
Propagation prediction assumptions: <ul style="list-style-type: none"> • 50% of the time • 50% of locations 		

* 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 8, except where stations are listed in section 5 or an arrangement exists between operators as outlined in Section 6.

3 SPECTRUM COORDINATION FOR UMTS/LTE SYSTEMS IN THE 800 MHz, 900 MHz, 1800 MHz, 2100 MHz and 2600 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 trigger values at the specified points in the following table.

Table 6: UMTS/LTE Trigger Values

Frequency Band	Coordination threshold at 3 m above ground at the border or coastline of the neighbouring country	Coordination threshold at 3 m above ground at the specified distance inside the neighbouring country
FDD 800 MHz ^{*1}	59 dB μ V/m/5 MHz 62.0 dB μ V/m/10 MHz 63.8 dB μ V/m/15 MHz 65.0 dB μ V/m/20 MHz	41 dB μ V/m/5 MHz at 6km 44 dB μ V/m/10 MHz at 6km 45.8 dB μ V/m/15 MHz at 6km 47.0 dB μ V/m/20 MHz at 6km
FDD 900 MHz ^{*2}	59 dB μ V/m/5 MHz	35 dB μ V/m/5 MHz at 9km
FDD 1800 MHz ^{*2}	65 dB μ V/m/5 MHz	41 dB μ V/m/5 MHz at 9km
FDD 2100 MHz Preferential codes ^{*3}	65 dB μ V/m/5 MHz	37 dB μ V/m/5 MHz at 6km
FDD 2100 MHz Non-preferential codes ^{*3}	37 dB μ V/m/5 MHz	-
TDD 2100 MHz Preferential codes ^{*3}	37 dB μ V/m/5 MHz	-
TDD 2100 MHz Non-preferential codes ^{*3}	21 dB μ V/m/5 MHz	-
FDD 2600 MHz ^{*4}	65 dB μ V/m/5 MHz 68 dB μ V/m/10 MHz 69.8 dB μ V/m/15 MHz 71.0 dB μ V/m/20 MHz	49 dB μ V/m/5 MHz at 6km 52.0 dB μ V/m/10 MHz at 6km 53.8 dB μ V/m/15 MHz at 6km 55 dB μ V/m/20 MHz at 6km
TDD 2600 MHz ^{*4}	21 dB μ V/m/5 MHz	-
Propagation prediction assumptions:		
<ul style="list-style-type: none"> • 10% of the time • 50% of locations 		

^{*1} from ECC Rec 11(04)

^{*2} from ECC Rec 08(02)

^{*3} from ERC Rec 01-01

^{*4} from ECC Rec 11(05)

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 8, except where stations are listed in section 5 or an arrangement exists between operators as outlined in section 6.

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

In order to ensure the optimum network performance for UMTS and LTE 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 and other radio parameters, in accordance with ECC Recommendations (01)01, (08)02, (11)04 and (11)05 for UMTS and LTE signals **using the same centre frequency in border areas.**

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

SCRAMBLING CODE GROUPS	21 - 52	0-20 + 53-63
UK	PREFERENTIAL	NON PREFERENTIAL
REPUBLIC OF IRELAND	NON PREFERENTIAL	PREFERENTIAL

For the TDD mode (at 1900 – 1920 MHz and 2570 – 2620 MHz), 3GPP TS 25.223 defines 32 “scrambling code groups” in § 7.2, numbered {0 to 31}.

Table 8: UMTS-TDD Scrambling Code Groups

SCRAMBLING CODE GROUPS	11 - 26	0-10 + 27-31
UK	PREFERENTIAL	NON PREFERENTIAL
REPUBLIC OF IRELAND	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. Each country can use all PCI groups away from the border areas.

Table 9: LTE PCI Groups

PCI GROUPS	168 - 419	0-167 + 420-503
UK	PREFERENTIAL	NON PREFERENTIAL
REPUBLIC OF IRELAND	NON PREFERENTIAL	PREFERENTIAL

4 PREDICTION OF PROPAGATION

The field strength prediction method shall be according to the latest version of Recommendation ITU-R P.1546-³ with the parameters shown at the foot of each table in this document, 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)

³ Recommendation ITU-R P.1546, Method for point-to-area predictions for terrestrial services in the Frequency range 30 MHz to 3 000 MHz

5 COORDINATED STATIONS

The stations listed below have been agreed by both Administrations to be coordinated. Any subsequent change in the parameters given in the table shall void any acceptance of coordination for the corresponding station or stations.

Table 10: Coordinated stations

	Name	Freq Band MHz	Modulation	Individual Channel bandwidth	Lat	Long	East	North	Ground H AMSL (m)	H AGL (m)	EIRP dBm	Ant. Style	Pol	3dB BW Degs	Az Degs E of N.	Ant. Style
1	KEEPER	2500-2690	Dig/Anl	8 MHz	52 45 05	08 15 30	194,374	166,699	695	10	54	Omni	H			
2	WOODCOCK	2500-2690	Dig/Anl	8 MHz	52 43 25	08 42 40	151,959	163,842	300	15	54	Omni	H	360		HMD12-VW-05
3	WOLFTRAP	2500-2690	Dig/Anl	8 MHz	53 05 30	07 35 50	226,981	204,636	489	12	54	Omni	V			
4	SLIEVE BAWN	2500-2690	Dig/Anl	8 MHz	53 43 40	08 04 00	195,600	275,351	258	15	54	Omni	H			
5	DUNMURRY	2500-2690	Dig/Anl	8 MHz	53 11 54	06 56 02	271,239	216,960	231	15	55	Omni	H			
6	MOUNT ORIEL	2500-2690	Dig/Anl	8 MHz	53 47 29	06 30 44	298,036	283,455	247	15	53	Omni	H			
7	BALLYGUILLE	2500-2690	Analog	8 MHz	52 58 31	06 02 42	331,308	193,397	188	10	54	Omni	H			
8	FORTH MOUNTAIN	2500-2690	Dig/Anl	8 MHz	52 18 00	06 34 55	296,725	117,418	237	15	53	Omni	H			
9	RATHFADDEN	2500-2690	Digital QAM	8 MHz	52 15 41	07 07 41	259,528	112,533	74	15	57	Omni	V			
10	CORK AIRPORT	2500-2690	Dig/Anl	8 MHz	51 50 54	08 27 39	168,247	66,319	176	15	57	Omni	H			
11	NOWEN HILL	2500-2690	Dig/Anl	8 MHz	51 43 19	09 14 31	114,188	52,888	535	15	54	Omni	H			
12	MISH	2500-2690	Dig/Anl	8 MHz	52 13 04	09 43 43	81,875	108,731	427	15	55	Omni	H			
13	KNOCKANORE	2500-2690	Dig/Anl	8 MHz	52 31 20	09 36 10	91,224	142,404	268	15	54	Omni	V			

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14	CARRON MOUNTAIN	2500-2690	Dig/Anl	8 MHz	52 18 21	08 33 44	161,655	117,269	447	15	54	Card	V	360	Omni	HMD12-VW-05
15	BARNESMORE	2500-2690	Analog	8 MHz	54 43 03	07 56 35	203,750	385,500	470	30	42	Card	H	40	245	SD 26 4505H NV
16	SLEVE BUOY	2500-2690	Digital	8 MHz	52 39 22	06 29 20	302,243	157,166	213	30	34	Card	H	180		HMD16HC-W-05
17	BALLYSPELLAN	2500-2690	Dig/Anl	8 MHz	52 45 35	07 30 40	233,001	167,735	305	35	54	Omni	H			
18	GLENCOUM WOOD	2500-2690	Dig/Anl	8 MHz	52 33 28	07 01 23	266,250	145,601	344	15	54	Card	V	180	320	HMD16VC-W-05
19	BRALLEE	2500-2690	Dig/Anl	8 MHz	54 11 24	08 39 30	157,031	326,992	330	30	55	Omni	H			
20	NAUL	2500-2690	Digital QAM	8 MHz	53 34 32	06 15 41	315,200	259,800	180	80	59	Card	V	180	185	HMD16VC-W-05
21	CLASHMORE	2500-2690	Dig/Anl	8 MHz	52 02 10	07 44 49	217,364	87,140	302	30	55	Omni	H			
22	TONABROCKY	2500-2690	Digital QAM	8 MHz	53 17 27	09 06 40	125,913	227,299	300	90	58	Omni	H			
23	CAVAN	2500-2690	Digital	8 MHz	53 57 20	07 17 40	246,300	300,900	321	30	54	Card	H			
24	MONAGHAN	2500-2690	Digital	8 MHz	54 10 44	07 02 00	263,100	325,900	214	30	54	Card	V			

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6 ARRANGEMENT FOR PLANNING AT AN OPERATIONAL LEVEL

A "Framework" MoU between the administrations of the Republic Of Ireland and the United Kingdom, which enables planning arrangements between mobile operators, subject to agreement of the Administrations, was signed on 1st May 2005⁴.

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 5 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 Republic Of Ireland and the United Kingdom 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 1st 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.

7 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.

⁴ Agreement between the administrations of the United Kingdom and Ireland concerning the approval of planning arrangements between operators of mobile radio communications network 1st May 2005

8 COORDINATION PROCEDURE

Exchanges of information for coordination/notification purposes shall be in the format set out in the HCM agreement Annex 2A (revised at Vilnius 2005)⁵

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 the RoI 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 the RoI and the UK agree to facilitate the exchange of information between authorised users of the band.

9 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.

10 TERMINATION OF THE MOU

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

11 Date of entry into force

This MoU will enter into force on the date of signature.

Done in London, 07 July 2014

For the Administration of
United Kingdom

For the Administration of
Republic Of Ireland

[Signature Redacted]

[Signature Redacted]

Robert Cooper

Jim Connolly

⁵ Agreement between the administrations of ... on the Coordination of frequencies between 29.7 MHz and 39.5 GHz for fixed service and land mobile service (HCM Agreement) Vilnius, 2005