The award of 800 MHz and 2.6 GHz spectrum - Annexes

Information Memorandum

Publication date: 24 July 2012

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Annex 1

Template Spectrum Access 800 MHz/1800 MHz/2.6 GHz licence

Office of Communications (Ofcom)
Wireless Telegraphy Act 2006

SPECTRUM ACCESS [800MHz/1800MHz/2.6GHz] LICENCE

Licence no: **[xxxxxx]**

Date of issue: **[xx xxxx] 2013**

Fee payment date (from [xx xxxxxxxx] [2033]) **[xx xxxxxxxxxx] (annually)**

1. The Office of Communications (Ofcom) grants this wireless telegraphy licence ("the Licence") to

   [Licensee Name]
   (Company registration number [xxxxxxx])
   ("the Licensee")
   [Address]
   [xxxxxxxxxx]
   [xxxxxxxxxx]
   [xxx xxx]

   to establish, install and use wireless telegraphy stations and/or wireless telegraphy apparatus as described in the Schedules to this Licence (together "the Radio Equipment") subject to the terms set out below.

Licence Term

2. This Licence shall continue in force until revoked by Ofcom or surrendered by the Licensee.

Licence Variation and Revocation

3. Pursuant to Schedule 1 paragraph 8 of the Wireless Telegraphy Act 2006 ("the Act"), Ofcom may not revoke this Licence under schedule 1 paragraph 6 of the Act except:

   (a) at the request, or with the consent, of the Licensee;

   (b) if there has been a breach of any of the terms of this Licence;

   (c) in accordance with schedule 1 paragraph 8(5) of the Act;

   (d) if it appears to Ofcom to be necessary or expedient to revoke the Licence for the purpose of complying with a direction by the Secretary of State given to

Ofcom under section 5 of the Act or section 5 of the Communications Act 2003;

(e) if, in connection with the transfer or proposed transfer of rights and obligations arising by virtue of the Licence, there has been a breach of any provision of regulations made by Ofcom under the powers conferred by section 30(1) and 30(3) of the Act[1];

(f) for reasons related to the management of the radio spectrum, provided that in such a case the power to revoke may only be exercised after at least five years' notice is given in writing (such notice not to be given before xx xxxx 2028);

(g) if the Licensee has been found to the reasonable satisfaction of Ofcom to have been involved in any act, or omission of any act, constituting a breach of the Wireless Telegraphy (Licence Award) Regulations 2012 ("the Regulations"); or

(h) [TO BE INCLUDED ONLY IN A LICENCE FOR THE 1800 MHZ BAND] [if the Licensee is not approved as a Purchaser (as defined in the commitments provided by France Télécom and Deutsche Telekom to the European Commission, and given effect to by the European Commission's Decision in *Case No. COMP/M.5650 – T-Mobile/Orange* dated 1 March 2010 ("the Commitments")) in accordance with Section D of the Commitments].

4. Ofcom may only revoke or vary this Licence by notification in writing to the Licensee and in accordance with schedule 1 paragraphs 6, 6A and 7 of the Act.

Transfer

5. This Licence may not be transferred. The transfer of rights and obligations arising by virtue of this Licence may however be authorised in accordance with regulations made by Ofcom under powers conferred by section 30 of the Act[2].

Changes to Licensee details

6. The Licensee shall give prior notice to Ofcom in writing of any changes to the Licensee's name and/or address as recorded in paragraph 1 of this Licence.

Fees

7. In accordance with the Regulations, the sum payable in respect of this Licence is £[xxxxxxxxxxxxxxx].

8. From [xx xxxxxxx 2033,] the Licensee shall each year pay to Ofcom the relevant fee(s) as provided in section 12 of the Act and the regulations made thereunder on or

[1] These are regulations on spectrum trading.
[2] See Ofcom's website for the latest position on spectrum trading and the types of trade which are permitted.

before the fee payment date shown above, or on or before such dates as are notified in writing to the Licensee.

9. The Licensee shall also pay interest to Ofcom on any amount which is due to Ofcom under the terms of this Licence or provided for in any regulations made by Ofcom under sections 12 and 13(2) of the Act from the date such amount falls due until the date of payment, calculated with reference to the Bank of England base rate from time to time. In accordance with section 15 of the Act any such amount and any such interest is recoverable by Ofcom.

10. If the Licence is surrendered, revoked or varied, no refund, whether in whole or in part, of any amount which is due under the terms of this Licence, payable in accordance with the Regulations, or provided for in any regulations made by Ofcom under sections 12 and 13(2) of the Act will be made, except at the absolute discretion of Ofcom.

Radio Equipment Use

11. The Licensee shall ensure that the Radio Equipment is established, installed and used only in accordance with the provisions specified in the Schedules to this Licence. Any proposal to amend any detail specified in any of the Schedules to this Licence must be agreed with Ofcom in advance and implemented only after this Licence has been varied or reissued accordingly.

12. The Licensee shall ensure that the Radio Equipment is operated in compliance with the terms of this Licence and is used only by persons who have been authorised in writing by the Licensee to do so and that such persons are made aware of, and of the requirement to comply with, the terms of this Licence.

Access and Inspection

14. The Licensee shall permit any person authorised by Ofcom:

(a) to have access to the Radio Equipment; and

(b) to inspect this Licence and to inspect, examine and test the Radio Equipment,

at any and all reasonable times or, when in the opinion of that person an urgent situation exists, at any time, to ensure the Radio Equipment is being used in accordance with the terms of this Licence.

Modification, Restriction and Closedown

15. Any person authorised by Ofcom may require the Radio Equipment or any part thereof, to be modified or restricted in use, or temporarily or permanently closed down immediately if in the opinion of the person authorised by Ofcom:

(a) a breach of this Licence has occurred; and/or

(b) the use of the Radio Equipment is, or may be, causing or contributing to undue interference to the use of other authorised radio equipment.

16. Ofcom may require any of the Radio Equipment to be modified or restricted in use, or temporarily closed down either immediately or on the expiry of such period as may be specified in the event of a national or local state of emergency being declared. Ofcom may only exercise this power after a written notice has been served on the Licensee or a general notice applicable to holders of a named class of licence has been published.

Geographical Boundaries

17. Subject to the requirements of any coordination procedures notified to the Licensee pursuant to paragraph 4 of Schedule[s] [1 and/or 2] to this Licence, the Licensee is authorised to establish, install and use the Radio Equipment in the United Kingdom. For the avoidance of doubt, the United Kingdom includes the United Kingdom territorial sea (measured in accordance with section 1 of the Territorial Sea Act 1987) and does not include the Channel Islands or the Isle of Man.

Interpretation

18. In this Licence:

(a) the establishment, installation and use of the Radio Equipment shall be interpreted as establishment and use of wireless telegraphy stations and installation and use of wireless telegraphy apparatus for wireless telegraphy as specified in section 8(1) of the Act;

(b) the expression “interference” shall have the meaning given by section 115 of the Act;

(c) the expressions “wireless telegraphy station” and “wireless telegraphy apparatus” shall have the meanings given by section 117 of the Act;

(d) the Schedule(s) form part of this Licence together with any subsequent Schedule(s) which Ofcom may issue as a variation to this Licence; and

(e) the Interpretation Act 1978 shall apply to the Licence as it applies to an Act of Parliament.

Issued by Ofcom

Office of Communications

Annex 2

Template licence schedules

Annex 2A - Template licence schedule for the 800 MHz band without coverage obligation

Template licence

Draft schedule: licences for the 800 MHz band without coverage obligation

SCHEDULE [ ] TO LICENCE NUMBER: [xxxxxx]

Schedule Date: **[xxxxxx]**

Licence category: **Spectrum Access Licence (790 – 862 MHz)**

1. Description of Radio Equipment

References in this Schedule to the Radio Equipment are references to any wireless telegraphy station or wireless telegraphy apparatus that is established, installed and/or used under this Schedule.

2. Interface Requirements for the Radio Equipment

Use of the Radio Equipment shall be in accordance with the following Interface Requirement:

IR 2090: Terrestrial systems capable of providing electronic communications services in the 800 MHz band

3. Special conditions relating to the Radio Equipment

a) Subject to paragraph 3(b) of this Schedule, during the period that this Licence remains in force, unless consent has otherwise been given by Ofcom, the Licensee shall compile and maintain accurate written records of the following details relating to the Radio Equipment:

i) postal address (including post code);

ii) National Grid Reference, to at least 1 metre resolution;

iii) antenna height (above ground level), type, and boresight bearing east of true north (if applicable);

iv) radio frequencies which the Radio Equipment is able to use and radio frequencies which the Radio Equipment uses;

v) the technical characteristics of the Radio Equipment both in terms of transmission and reception of wireless telegraphy;

and the Licensee must produce these records if requested by any person authorised by Ofcom.

b) The conditions relating to the keeping of records contained in sub-paragraphs 3(a)(ii) and (iii) of this Schedule shall not apply in respect of femtocell equipment and smart/intelligent low power repeater equipment.

c) The Licensee shall submit to Ofcom copies of the records detailed in sub-paragraph 3(a) above at such intervals as Ofcom may notify to the Licensee.

d) The Licensee shall provide to:

i) Ofcom;

ii) the entity established in accordance with paragraphs 2.1 – 2.2 of the "*Notice of DTT interference mitigation procedures required under spectrum access licences for the 800 MHz band"* notified to it by Ofcom in accordance with paragraph 4 of this Schedule; and/or

iii) the Oversight Board

in such manner and at such times as they may reasonably require, such documents or other information as they may require for the purposes of taking steps to mitigate interference to users of the electromagnetic spectrum in the 470-790 MHz band, or to make recommendations to Ofcom or Government with respect to such steps being taken.

4. Co-ordination at frequency and geographical boundaries and compliance with other procedures relating to interference

The Licensee shall ensure that the Radio Equipment is operated in compliance with such co-ordination procedures as may be notified to the Licensee by Ofcom from time to time. The Licensee shall also ensure that it complies with any other procedures relating to the mitigation of interference as may be notified to the Licensee by Ofcom from time to time.

5. International cross-border coordination

The Licensee shall ensure that the Radio Equipment is operated in compliance with such cross-border co-ordination and sharing procedures as may be notified to the Licensee by Ofcom from time to time.

6. Permitted Frequency Blocks

Subject to the emissions permitted under paragraph 8 of this Schedule, the Radio Equipment may only transmit within the following frequency bands (the "Permitted Frequency Blocks"):

Downlink frequencies	**Uplink frequencies**
[791 to 811 MHz]	[832 to 852 MHz]

7. Maximum power within the Permitted Frequency Blocks

The power transmitted in the Permitted Frequency Blocks shall not exceed:

a) Downlink frequencies

	Maximum EIRP
Radio Equipment	61dBm/(5 MHz) EIRP*

* The maximum EIRP relates to the EIRP of a specific piece of Radio Equipment irrespective of the number of transmit antennas.

b) Uplink frequencies[1]

Radio Equipment	**Maximum mean power**
Fixed or installed Radio Equipment	23dBm EIRP*
Mobile or nomadic Radio Equipment	23dBm TRP*

* The maximum mean power relates to the EIRP or TRP of a specific piece of Radio Equipment irrespective of the number of transmit antennas.

8. Maximum power outside the Permitted Frequency Blocks

For transmissions on the downlink frequencies, the EIRP emanating from the Radio Equipment transmissions at any frequency outside the Permitted Frequency Blocks shall not exceed the higher (least stringent) of (a) the baseline requirements and (b) the transition requirements for that frequency.

Baseline requirements

Frequency range	**Maximum mean EIRP**	**Measurement bandwidth**
832 to 862 MHz	−49.5 dBm*	5 MHz

* The maximum EIRP relates to the EIRP of a specific piece of Radio Equipment irrespective of the number of transmit antennas.

Transition requirements

Frequency range (within the range 791MHz to 821MHz only)	**Maximum mean 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 upper block edge	22 dBm*	5 MHz
+5 to +10 MHz from upper block edge	18 dBm*	5 MHz
Remaining downlink frequencies	11 dBm*	1 MHz

* The maximum EIRP applies per antenna (for one to four antennas).

[1] Consumer user equipment will be authorised by means of a licence exemption under section 8 of the Wireless Telegraphy Act 2006

Transition requirements

Frequency range	Maximum mean EIRP	Measurement bandwidth
790 to 791 MHz	17.4 dBm*	1 MHz
821 to 832 MHz	15 dBm*	1 MHz

* The maximum EIRP applies per antenna (for one to four antennas).

Baseline requirements

Frequency range	In-block EIRP, P, dBm/(10 MHz)**	Maximum mean EIRP in frequency range	Measurement bandwidth
470 to 790 MHz	P ≥ 59	0 dBm*	8 MHz
	36 ≤ P < 59	(P−59) dBm*	8 MHz
	P < 36	−23 dBm*	8 MHz

* The maximum EIRP relates to the EIRP of a specific piece of Radio Equipment irrespective of the number of transmit antennas.
** This is the in-block EIRP measured in a bandwidth of 10MHz.

9. Interpretation of terms in this schedule

In this Schedule:

a) "dBm" means the power level in decibels (logarithmic scale) referenced against 1milliwatt (i.e. a value of 0dBm is 1 milliwatt);

b) "EIRP" means the equivalent isotropically radiated power. This is the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain);

c) "femtocell" means Radio Equipment transmitting on the downlink frequencies, which operates at a power not exceeding 20dBm EIRP per carrier, and which is or will be used only by and under the control of the Licensee, following the establishment of a telecommunications link between the femtocell and a network of the Licensee;

d) "Fixed or installed" means used or installed at specific fixed points;

e) "IR" means a United Kingdom Radio Interface Requirement published by Ofcom in accordance with Article 4.1 of Directive 1995/5/EC of the European Parliament and of the Council on radio equipment and telecommunications terminal equipment (RTTE) and the mutual recognition of their conformity.

f) "lower block edge" means, in relation to each Permitted Frequency Block, the lowest frequency in that Permitted Frequency Block;

g) "measurement bandwidth" means the size of an individual spectrum segment within the specified frequency range that is used to measure compliance with the specified power limit;

h) “mobile or nomadic” means intended to be used while in motion or during halts at unspecified points;

i) “Oversight Board” has the meaning given to it in the “*Notice of DTT interference mitigation procedures required under spectrum access licences for the 800 MHz band”* notified to the Licensee under paragraph 4 of this Schedule;

j) “Permitted Frequency Blocks” has the meaning given to it in paragraph 6 of this Schedule;

k) “smart/intelligent low power repeater” means a repeater which operates with power not exceeding 24dBm EIRP per carrier, which may be established by customers of the Licensee who have written agreements with the Licensee and:

- The Licensee has ultimate control of the repeater, i.e. each individual repeater can be disabled remotely by the Licensee;
- The repeater operates only on the Licensee’s frequencies and with their valid Public Land Mobile Network Identifier;
- Must not cause undue interference to other spectrum users; and
- The repeater only transmits on the uplink frequencies when actively carrying a call (voice, video or data) or signalling from serviced handsets.

l) “TRP” means the total radiated power. This is the integral of the power transmitted in different directions over the entire radiation sphere;

m) “upper block edge” means, in relation to each Permitted Frequency Block, the highest frequency in that Permitted Frequency Block.

Annex 2B - Template schedule: licence for the 800 MHz band with coverage obligation

Template licence

Draft schedule: licence for the 800 MHz band with coverage obligation

SCHEDULE [ ] TO LICENCE NUMBER: [xxxxxx]

Schedule Date: **[xxxxxx]**

Licence category: **Spectrum Access Licence (790 – 862 MHz)**

1. Description of Radio Equipment

References in this Schedule to the Radio Equipment are references to any wireless telegraphy station or wireless telegraphy apparatus that is established, installed and/or used under this Schedule.

2. Interface Requirements for the Radio Equipment

Use of the Radio Equipment shall be in accordance with the following Interface Requirement:

IR 2090: Terrestrial systems capable of providing electronic communications services in the 800 MHz band

3. Special conditions relating to the Radio Equipment

a) Subject to paragraph 3(b) of this Schedule, during the period that this Licence remains in force, unless consent has otherwise been given by Ofcom, the Licensee shall compile and maintain accurate written records of the following details relating to the Radio Equipment:

i) postal address (including post code);

ii) National Grid Reference, to at least 1 metre resolution;

iii) antenna height (above ground level), type, and boresight bearing east of true north (if applicable);

iv) radio frequencies which the Radio Equipment is able to use and radio frequencies which the Radio Equipment uses;

v) the technical characteristics of the Radio Equipment both in terms of transmission and reception of wireless telegraphy;

and the Licensee must produce these records if requested by any person authorised by Ofcom.

b) The conditions relating to the keeping of records contained in sub-paragraphs 3(a)(ii) and (iii) of this Schedule shall not apply in respect of femtocell equipment and smart/intelligent low power repeater equipment.

c) The Licensee shall submit to Ofcom copies of the records detailed in sub-paragraph 3(a) above at such intervals as Ofcom may notify to the Licensee.

d) The Licensee shall provide to:

i) Ofcom;

ii) the entity established in accordance with paragraphs 2.1 – 2.2 of the "*Notice of DTT interference mitigation procedures required under spectrum access licences for the 800 MHz band"* notified to it by Ofcom in accordance with paragraph 4 of this Schedule; and/or

iii) the Oversight Board

in such manner and at such times as they may reasonably require, such documents or other information as they may require for the purposes of taking steps to mitigate interference to users of the electromagnetic spectrum in the 470-790 MHz band, or to make recommendations to Ofcom or Government with respect to such steps being taken.

4. Co-ordination at frequency and geographical boundaries and compliance with other procedures relating to interference

The Licensee shall ensure that the Radio Equipment is operated in compliance with such co-ordination procedures as may be notified to the Licensee by Ofcom from time to time. The Licensee shall also ensure that it complies with any other procedures relating to the mitigation of interference as may be notified to the Licensee by Ofcom from time to time.

5. International cross-border coordination

The Licensee shall ensure that the Radio Equipment is operated in compliance with such cross-border co-ordination and sharing procedures as may be notified to the Licensee by Ofcom from time to time.

6. Coverage Obligation

a) The Licensee shall by no later than 31 December 2017 provide, and thereafter maintain, an electronic communications network that is capable of providing, with 90% confidence, a mobile telecommunications service with a sustained downlink speed of not less than 2 megabits per second when that network is lightly loaded, to users:

i) in an area within which at least:

a. 98% of the population of the United Kingdom lives, and

b. 95% of the population of each of England, Wales, Scotland and Northern Ireland lives; and

ii) at indoor locations that meet the condition specified in paragraph 6(b)(ii) of this Schedule, which are within any residential premises within the area specified in paragraph 6(a)(i) of this Schedule.

b) For the purposes of paragraph 6(a)(ii) of this Schedule:

i) the service must be provided using radio equipment which is not situated inside the relevant residential premises; and

ii) the condition referred to is that the radio signal propagation loss from the outside of the building to the location inside the building does not exceed:

a. 13.2dB for radio signals in the frequency ranges 791MHz – 821MHz and 832MHz – 862MHz;

b. 13.7dB for radio signals in the frequency ranges 880MHz – 915MHz and 925MHz – 960MHz;

c. 16.5dB for radio signals in the frequency ranges 1710MHz – 1785MHz and 1805MHz – 1880MHz;

d. 17.0dB for radio signals in the frequency ranges 1900MHz – 1980MHz and 2110MHz – 2170MHz;

e. 17.9dB for radio signals in the frequency range 2500MHz – 2690MHz;

f. any other propagation loss notified to the Licensee by Ofcom in respect of radio signals in any other frequency band.

7. Assessment of compliance with coverage obligation

Ofcom will assess the Licensee's compliance with paragraph 6 of this Schedule by reference to the document "*4G Coverage Obligation Compliance Verification Methodology: LTE"* published by Ofcom, or such other documents as Ofcom may notify to the Licensee.

8. Permitted Frequency Blocks

Subject to the emissions permitted under paragraph 10 of this Schedule, the Radio Equipment may only transmit within the following frequency bands (the "Permitted Frequency Blocks"):

Downlink frequencies	Uplink frequencies
811 to 821 MHz	852 to 862 MHz

9. Maximum power within the Permitted Frequency Blocks

The power transmitted in the Permitted Frequency Blocks shall not exceed:

a) Downlink Frequencies

	Maximum EIRP
Radio Equipment	61dBm/(5 MHz) EIRP*

* The maximum EIRP relates to the EIRP of a specific piece of Radio Equipment irrespective of the number of transmit antennas.

b) Uplink Frequencies[1]

Radio Equipment	**Maximum mean power**
Fixed or installed Radio Equipment	23dBm EIRP*
Mobile or nomadic Radio Equipment	23dBm TRP*

* The maximum mean power relates to the EIRP or TRP of a specific piece of Radio Equipment irrespective of the number of transmit antennas.

10. Maximum power outside the Permitted Frequency Blocks

For transmissions on the downlink frequencies, the EIRP emanating from the Radio Equipment transmissions at any frequency outside the Permitted Frequency Blocks shall not exceed the higher (least stringent) of (a) the baseline requirements and (b) the transition requirements for that frequency.

Baseline requirements

Frequency range	**Maximum mean EIRP**	**Measurement bandwidth**
832 to 862 MHz	−49.5 dBm*	5 MHz

* The maximum EIRP relates to the EIRP of a specific piece of Radio Equipment irrespective of the number of transmit antennas.

Transition requirements

Frequency range (within the range 791MHz to 821MHz only)	**Maximum mean 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 upper block edge	22 dBm*	5 MHz
+5 to +10 MHz from upper block edge	18 dBm*	5 MHz
Remaining downlink frequencies	11 dBm*	1 MHz

* The maximum EIRP applies per antenna (for one to four antennas).

[1] Consumer user equipment will be authorised by means of a licence exemption under section 8 of the Wireless Telegraphy Act 2006

Transition requirements

Frequency range	Maximum mean EIRP	Measurement bandwidth
790 to 791 MHz	17.4 dBm*	1 MHz
821 to 832 MHz	15 dBm*	1 MHz

* The maximum EIRP applies per antenna (for one to four antennas).

Baseline requirements

Frequency range	In-block EIRP, P, dBm/(10 MHz)**	Maximum mean EIRP in frequency range	Measurement bandwidth
470 to 790 MHz	P ≥ 59	0 dBm*	8 MHz
	36 ≤ P < 59	(P−59) dBm*	8 MHz
	P < 36	−23 dBm*	8 MHz

* The maximum EIRP relates to the EIRP of a specific piece of Radio Equipment irrespective of the number of transmit antennas.
** This is the in-block EIRP measured in a bandwidth of 10MHz.

11. Interpretation of terms in this schedule

In this Schedule:

a) “dBm” means the power level in decibels (logarithmic scale) referenced against 1milliwatt (i.e. a value of 0dBm is 1 milliwatt);

b) “EIRP” means the equivalent isotropically radiated power. This is the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain);

c) “femtocell” means Radio Equipment transmitting on the downlink frequencies, which operates at a power not exceeding 20dBm EIRP per carrier, and which is or will be used only by and under the control of the Licensee, following the establishment of a telecommunications link between the femtocell and a network of the Licensee;

d) “Fixed or installed” means used or installed at specific fixed points;

e) "IR" means a United Kingdom Radio Interface Requirement published by Ofcom in accordance with Article 4.1 of Directive 1995/5/EC of the European Parliament and of the Council on radio equipment and telecommunications terminal equipment (RTTE) and the mutual recognition of their conformity.

f) “lower block edge” means, in relation to each Permitted Frequency Block, the lowest frequency in that Permitted Frequency Block;

g) “measurement bandwidth” means the size of an individual spectrum segment within the specified frequency range that is used to measure compliance with the specified power limit;

h) “mobile or nomadic” means intended to be used while in motion or during halts at unspecified points;

i) “Oversight Board” has the meaning given to it in the “*Notice of DTT interference mitigation procedures required under spectrum access licences for the 800 MHz band”* notified to the Licensee under paragraph 4 of this Schedule;

j) “Permitted Frequency Blocks” has the meaning given to it in paragraph 8 of this Schedule;

k) “smart/intelligent low power repeater” means a repeater which operates with power not exceeding 24dBm EIRP per carrier, which may be established by customers of the Licensee who have written agreements with the Licensee and:

- The Licensee has ultimate control of the repeater, i.e. each individual repeater can be disabled remotely by the Licensee;
- The repeater operates only on the Licensee’s frequencies and with their valid Public Land Mobile Network Identifier;
- Must not cause undue interference to other spectrum users; and
- The repeater only transmits on the uplink frequencies when actively carrying a call (voice, video or data) or signalling from serviced handsets.

l) “TRP” means the total radiated power. This is the integral of the power transmitted in different directions over the entire radiation sphere;

m) “upper block edge” means, in relation to each Permitted Frequency Block, the highest frequency in that Permitted Frequency Block.

Annex 2C - Template Schedule: licence for the 1800 MHz band

Template licence

Draft Schedule: licence for the 1800 MHz band

SCHEDULE [ ] TO LICENCE NUMBER: [xxxxxx]

Schedule Date: **[xxxxxx]**

Licence category: **Spectrum Access Licence (1800 MHz)**

1. Description of Radio Equipment

In this Licence, the Radio Equipment means the base transceiver stations or repeater stations forming part of the Network (as defined in paragraph 2 below).

2. Purpose of the Radio Equipment

The Radio Equipment shall form part of a radio telecommunications network ("the Network"), in which User Stations communicate by radio with the Radio Equipment to provide a telecommunications service.

3. Interface requirements for the Radio Equipment

Use of the Radio Equipment shall be in accordance with the following Interface Requirements:

IR 2014 – Public Wireless Networks and/or
IR 2019 – Third Generation Mobile and/or
IR 2087 - 900 / 1800 MHz LTE and WiMAX.

4. Special Conditions relating to the Radio Equipment

a) Subject to paragraph 4(b) below, during the period that this Licence remains in force, the Licensee shall compile and maintain accurate written records of the following details relating to the Radio Equipment:

i) postal address (including post code);

ii) National Grid Reference, to at least 1 metre resolution;

iii) antenna height (above ground level),type, and boresight bearing east of true north (if applicable);

iv) radio frequencies which the Radio Equipment is able to use and radio frequencies which the Radio Equipment uses;

v) the technical characteristics of the Radio Equipment both in terms of transmission and reception of wireless telegraphy;

vi) the number of subscribing customers using the Network;

and the Licensee must produce the above records when a person authorised by Ofcom requires him to do so.

b) The conditions relating to the keeping of records contained in sub-paragraphs 4(a)(i), 4(a)(ii) and 4(a)(iii) of this Schedule shall not apply In respect of femtocell equipment and smart/intelligent low power repeater equipment.

c) The Licensee shall submit to Ofcom copies of the records detailed in sub-paragraph 4(a) above at such intervals as Ofcom may notify to the Licensee.

d) The Licensee shall, upon request, supply Ofcom or any person authorised on their behalf with the name and address of any subscribing customers to the Network, or require its agents to provide such information on its behalf.

5. Co-ordination at frequency and geographical boundaries

The Licensee shall ensure that the Radio Equipment is operated in compliance with such co-ordination procedures as may be notified to the Licensee by Ofcom from time to time.

6. International cross-border coordination

The Licensee shall ensure that the Radio equipment is operated in compliance with such cross-border co-ordination and sharing procedures as may be notified to the Licensee by Ofcom from time to time.

7. Frequencies of Operation

From 1 October 2013, the Radio Equipment may operate on any of the following frequency bands:

Downlink Frequencies	Uplink frequencies
1721.7-1731.7 MHz	1816.7-1826.7 MHz

From 1 October 2015, the Radio Equipment may operate on any of the following frequency bands:

Downlink Frequencies	Uplink frequencies
1721.7-1736.7 MHz	1816.7-1831.7 MHz

8. Radio Frequency Carrier Spacing

In the absence of bilateral or multilateral agreements which have been notified to Ofcom specifying alternative arrangements between the Licensee and the licensee(s) of neighbouring networks the Licensee must ensure that in respect of the frequencies set out at paragraph 7 of this schedule:

- the centre frequency of any of their GSM carriers is 100 kHz or more inside any edge of their permitted frequency bands; and
- the centre frequency of any of their UMTS carriers is 2.7 MHz or more inside any edge of their permitted frequency bands where a neighbouring licensee has deployed a GSM carrier or carriers (including GSM-R) in the immediately adjacent spectrum;
- the centre frequency of any of their UMTS carriers is 2.5 MHz or more inside any other edge of their permitted frequency bands;
- the channel edge of any of their LTE channels is 200 kHz or more inside any edge of their permitted frequency bands where a neighbouring licensee has deployed a GSM carrier or carriers (including GSM-R) in the immediately adjacent spectrum;
- the channel edge of any of their LTE channels does not extend beyond their permitted frequency bands;
- the channel edge of any of their WiMAX channels is 200 kHz or more inside any edge of their permitted frequency bands where a neighbouring licensee has deployed a GSM carrier or carriers (including GSM-R) in the immediately adjacent spectrum; and
- the channel edge of any of their WiMAX channels does not extend beyond their permitted frequency bands.

9. ITU Class of Emission

For GSM:	271KG7W
For UMTS:	5M00D7W
For 1.4 MHz LTE:	1M40D7W
For 3 MHz LTE:	3M00D7W
For 5 MHz LTE:	5M00D7W
For 10 MHz LTE:	10M0D7W
For 15 MHz LTE:	15M0D7W
For 20 MHz LTE:	20M0D7W
For 5 MHz WiMAX:	5M00D7W
For 10 MHz WiMAX:	10M0D7W

10. Maximum Permissible e.i.r.p.

The maximum e.i.r.p. per carrier for GSM is 32 dBW
The maximum e.i.r.p. per carrier for UMTS is 32 dBW
The maximum e.i.r.p. per carrier for LTE is 31 dBW per 5 MHz
The maximum e.i.r.p. per carrier for WiMAX is 31 dBW per 5 MHz

11. Interpretation

In this Schedule:

(a) “e.i.r.p.” means the equivalent isotropically radiated power. This is the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain);

(b) "IR" means a United Kingdom Radio Interface Requirement published by Ofcom in accordance with Article 4.1 of Directive 1995/5/EC of the European Parliament and of

the Council on radio equipment and telecommunications terminal equipment (RTTE) and the mutual recognition of their conformity.

(c) "ITU" means the International Telecommunications Union, and "Class of Emission" shall have the meaning as defined in the ITU Radio Regulations Appendix 1.

(d) "User Station" means any vehicle mounted or hands portable mobile station designed for mobile use and/ or any station designed or adapted to be established and used from static locations which meet the appropriate technical performance requirements as set out in the Wireless Telegraphy (Exemption) Regulations and complies with the appropriate Interface Regulation listed in paragraph 3;

(e) “A femtocell” is a base station of the Network which operates at a power not exceeding 20dBm e.i.r.p. per carrier which may be established by customers of the Network but which is or will be used only by and under the control of the Network, following the establishment of a telecommunications link between the femtocell and the Network;

(f) A “smart/intelligent low power repeater” is a repeater of the Network which operates with power not exceeding 24dBm e.i.r.p. per carrier, which may be established by customers of the Network who have written agreements with the Licensee and:

- The Licensee has ultimate control of the repeater, i.e. each individual repeater can be disabled remotely by the Licensee;
- The repeater operates only on the Licensee’s frequencies and with their valid Public Land Mobile Network Identifier;
- Must not cause undue interference to other spectrum users; and
- The repeater only transmits on the Licensee’s Base Receive frequencies when actively carrying a call (voice, video or data) or signalling from serviced handsets.

(g) “GSM system” means an electronic communications network that complies with GSM standards, as published by ETSI, in particular EN 301 502 and EN 301 511 and “GSM” means pertaining to such a network or its radio equipment;

(h) “GSM-R” means the variant of GSM for railways as specified in IR2064; and

(i) “UMTS system” means an electronic communications network that complies with the UMTS standards as published by ETSI, in particular EN 301 908-2, EN 301 908-3 and EN 301 908-11 and “UMTS” means pertaining to such a network or its radio equipment.

(j) “LTE system” means an electronic communications network that complies with the LTE standards as published by ETSI, in particular EN 301 908-1, EN 301 908-13, EN 301 908-14, EN 301 908-15 and EN 301 908-11 and “LTE” means pertaining to such a network or its radio equipment.

(k) “WiMAX system” means an electronic communications network that complies with the WiMAX standards as published by ETSI, in particular EN 301 908-1, EN 301 908-21 and EN 301 908-22 and “WiMAX” means pertaining to such a network or its radio equipment.

Ofcom

Annex 2D - Template Schedule: standard power licences for the 2.6 GHz band (paired spectrum)

Template licence

Draft Schedule: standard power licences for the 2.6 GHz band (paired spectrum)

SCHEDULE [ ] TO LICENCE NUMBER: [xxxxxx]

Schedule Date: **[xxxxxx]**

Licence category: **Spectrum Access Licence (2500 MHz – 2690 MHz)**

1. Description of Radio Equipment

References in this Schedule to the Radio Equipment are references to any wireless telegraphy station or wireless telegraphy apparatus that is established, installed and/or used under this Schedule.

2. Interface Requirements for the Radio Equipment

Use of the Radio Equipment shall be in accordance with the following Interface Requirement:

> IR 2072: Terrestrial systems capable of providing electronic communications services in the band 2500 to 2690 MHz

3. Special conditions relating to the Radio Equipment

a) Subject to paragraph 3(b) of this Schedule, during the period that this Licence remains in force, unless consent has otherwise been given by Ofcom, the Licensee shall compile and maintain accurate written records of the following details relating to the Radio Equipment:

   i) postal address (including post code);

   ii) National Grid Reference, to at least 1 metre resolution;

   iii) antenna height (above ground level), type, and boresight bearing east of true north (if applicable);

   iv) radio frequencies which the Radio Equipment is able to use and radio frequencies which the Radio Equipment uses; and

   v) the technical characteristics of the Radio Equipment both in terms of transmission and reception of wireless telegraphy

   and the Licensee must produce these records if requested by any person authorised by Ofcom.

b) The conditions relating to the keeping of records contained in sub-paragraphs 3(a)(ii) and (iii) of this Schedule shall not apply in respect of femtocell equipment and smart/intelligent low power repeater equipment.

c) The Licensee shall submit to Ofcom copies of the records detailed in sub-paragraph 3(a) above at such intervals as Ofcom may notify to the Licensee.

4. Co-ordination at frequency and geographical boundaries

The Licensee shall ensure that the Radio Equipment is operated in compliance with such co-ordination procedures as may be notified to the Licensee by Ofcom from time to time.

5. International cross-border coordination

The Licensee shall ensure that the Radio Equipment is operated in compliance with such cross-border co-ordination and sharing procedures as may be notified to the Licensee by Ofcom from time to time.

6. Permitted Frequency Blocks

Subject to the emissions permitted under paragraph 8 of this Schedule, the Radio Equipment may only transmit within the following frequency bands (the "Permitted Frequency Blocks"):

Downlink frequencies	**Uplink frequencies**
[2620 to 2690 MHz]	[2500 to 2570 MHz]

7. Maximum power within the Permitted Frequency Blocks

The power transmitted in the Permitted Frequency Blocks shall not exceed:

a) Downlink frequencies

	Maximum EIRP
Radio Equipment	61dBm/(5 MHz) EIRP

b) Uplink frequencies[1]

Radio Equipment	**Maximum mean power**
Mobile or nomadic Radio Equipment	31dBm/(5 MHz) TRP
Fixed or installed Radio Equipment	35dBm/(5 MHz) EIRP

[1] Consumer use equipment will be authorised by means of a licence exemption under section 8 of the Wireless Telegraphy Act 2006

8. Maximum power outside the Permitted Frequency Blocks

For transmissions on the downlink frequencies, the EIRP emanating from the Radio Equipment transmissions at any frequency outside the Permitted Frequency Blocks shall not exceed the higher (least stringent) of (a) the baseline requirements and (b) the block specific requirements for that frequency.

(a) Baseline requirements

Frequency range	**Maximum mean EIRP**	**Measurement bandwidth**
2500 to 2615 MHz	−45dBm	1 MHz
2615 to 2700 MHz	4dBm	1 MHz
2700 to 3100 MHz	−45dBm	1 MHz

(b) Block-specific requirements

Frequency range	**Maximum mean EIRP**	**Measurement bandwidth**
Start of band (2500 MHz) to −5 MHz from lower block edge	Baseline requirement level	
−5 MHz to −1 MHz from lower block edge	4dBm	1 MHz
−1 MHz to −0.2 MHz from lower block edge	$3 + 15(\Delta_F+0.2)$ dBm	30 kHz
−0.2 MHz to 0 MHz from lower block edge	3dBm	30 kHz
0 MHz to 0.2 MHz from upper block edge	3dBm	30 kHz
0.2 MHz to 1 MHz from upper block edge	$3 − 15(\Delta_F−0.2)$ dBm	30 kHz
1 MHz to 5 MHz from upper block edge	4dBm	1 MHz
5 MHz from upper block edge to end of band (2690 MHz)	Baseline requirement level	
Where: Δ_F is the frequency offset from the relevant block edge (in MHz)		

9. Interpretation of terms in this Schedule

In this Schedule:

a) “dBm” means the power level in decibels (logarithmic scale) referenced against 1milliwatt (i.e. a value of 0dBm is 1 milliwatt);

b) "EIRP" means the equivalent isotropically radiated power. This is the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain);

c) "femtocell" means Radio Equipment transmitting on the downlink frequencies, which operates at a power not exceeding 20dBm EIRP per carrier, and which is or will be used only by and under the control of the Licensee, following the establishment of a telecommunications link between the femtocell and a network of the Licensee;

d) "Fixed or installed" means used or installed at specific fixed points;

e) "IR" means a United Kingdom Radio Interface Requirement published by Ofcom in accordance with Article 4.1 of Directive 1995/5/EC of the European Parliament and of the Council on radio equipment and telecommunications terminal equipment (RTTE) and the mutual recognition of their conformity;

f) "lower block edge" means, in relation to each Permitted Frequency Block, the lowest frequency in that Permitted Frequency Block;

g) "measurement bandwidth" means the size of an individual spectrum segment within the specified frequency range that is used to measure compliance with the specified power limit;

h) "mobile or nomadic" means intended to be used while in motion or during halts at unspecified points;

i) "Permitted Frequency Blocks" has the meaning given to it in paragraph 6 of this Schedule;

j) "smart/intelligent low power repeater" means a repeater which operates with power not exceeding 24dBm EIRP per carrier, which may be established by customers of the Licensee who have written agreements with the Licensee and:

- The Licensee has ultimate control of the repeater, i.e. each individual repeater can be disabled remotely by the Licensee;
- The repeater operates only on the Licensee's frequencies and with their valid Public Land Mobile Network Identifier;
- Must not cause undue interference to other spectrum users; and
- The repeater only transmits on the uplink frequencies when actively carrying a call (voice, video or data) or signalling from serviced handsets.

k) "TRP" means the total radiated power. This is the integral of the power transmitted in different directions over the entire radiation sphere; and

l) "upper block edge" means, in relation to each Permitted Frequency Block, the highest frequency in that Permitted Frequency Block.

Annex 2E - Template schedule : licences for the 2.6 GHz band (unpaired spectrum)

Template licence

Draft schedule : licences for the 2.6 GHz band (unpaired spectrum)

SCHEDULE [ ] TO LICENCE NUMBER: [xxxxxx]

Schedule Date: **[xxxxxx]**

Licence category: **Spectrum Access Licence (2500 MHz – 2690 MHz)**

1. Description of Radio Equipment

References in this Schedule to the Radio Equipment are references to any wireless telegraphy station or wireless telegraphy apparatus that is established, installed and/or used under this Schedule.

2. Interface Requirements for the Radio Equipment

Use of the Radio Equipment shall be in accordance with the following Interface Requirement:

IR 2072: Terrestrial systems capable of providing electronic communications services in the band 2500 to 2690 MHz

3. Special conditions relating to the Radio Equipment

a) Subject to paragraph 3(b) of this Schedule, during the period that this Licence remains in force, unless consent has otherwise been given by Ofcom, the Licensee shall compile and maintain accurate written records of the following details relating to the Radio Equipment:

i) postal address (including post code);

ii) National Grid Reference, to at least 1 metre resolution;

iii) antenna height (above ground level), type, and boresight bearing east of true north (if applicable);

iv) radio frequencies which the Radio Equipment is able to use and radio frequencies which the Radio Equipment uses;

v) the technical characteristics of the Radio Equipment both in terms of transmission and reception of wireless telegraphy

and the Licensee must produce these records if requested by any person authorised by Ofcom.

b) The conditions relating to the keeping of records contained in sub-paragraphs 3(a)(ii) and (iii) of this Schedule shall not apply in respect of femtocell equipment and smart/intelligent low power repeater equipment.

c) The Licensee shall submit to Ofcom copies of the records detailed in sub-paragraph 3(a) above at such intervals as Ofcom may notify to the Licensee.

4. Co-ordination at frequency and geographical boundaries

The Licensee shall ensure that the Radio Equipment is operated in compliance with such co-ordination procedures as may be notified to the Licensee by Ofcom from time to time.

5. International cross-border coordination

The Licensee shall ensure that the Radio Equipment is operated in compliance with such cross-border co-ordination and sharing procedures as may be notified to the Licensee by Ofcom from time to time.

6. Permitted Frequency Blocks

Subject to the emissions permitted under paragraph 8 of this Schedule, the Radio Equipment may only transmit within the following frequency bands (the "Permitted Frequency Blocks"):

Unrestricted frequencies (uplink and downlink):	[2575 to 2615 MHz]
Restricted frequencies (uplink and downlink):	[2570 to 2620 MHz]

7. Maximum power within the Permitted Frequency Blocks

For downlink transmissions, the power transmitted in the Permitted Frequency Blocks shall not exceed:

	Maximum EIRP
Radio Equipment in unrestricted frequencies	61dBm/(5 MHz) EIRP
Radio Equipment in restricted frequencies	25dBm/(5 MHz) EIRP

For uplink transmissions, the power transmitted in the Permitted Frequency Blocks shall not exceed[1]:

Radio Equipment	**Maximum mean power**
Mobile or nomadic Radio Equipment	31dBm/(5 MHz) TRP

[1] Consumer user equipment will be authorised by means of a licence exemption under section 8 of the Wireless Telegraphy Act 2006

Fixed or installed Radio Equipment	35dBm/(5 MHz) EIRP

8. Maximum power outside the Permitted Frequency Blocks

Unrestricted frequencies

For downlink transmissions on unrestricted frequencies, the EIRP emanating from the Radio Equipment transmissions at any frequency outside the Permitted Frequency Blocks shall not exceed the higher (least stringent) of (a) the baseline requirements and (b) the block specific requirements.

(a) Baseline requirements

Frequency range	**Maximum mean EIRP**	**Measurement bandwidth**
2500 to 2615 MHz	−45dBm	1 MHz
2615 to 2700 MHz	4dBm	1 MHz
2700 to 3100 MHz	−45dBm	1 MHz

(b) Block-specific requirements

Frequency range	**Maximum mean EIRP**	**Measurement bandwidth**
Start of band (2500 MHz) to −5 MHz from lower boundary of unrestricted frequencies	Baseline requirement level	
−5 MHz to −1 MHz from lower boundary of unrestricted frequencies	4dBm	1 MHz
−1 MHz to −0.2 MHz from lower boundary of unrestricted frequencies	$3 + 15(\Delta_F+0.2)$ dBm	30 kHz
−0.2 MHz to 0 MHz from lower boundary of unrestricted frequencies	3dBm	30 kHz
0 MHz to 0.2 MHz from upper boundary of unrestricted frequencies	3dBm	30 kHz
0.2 MHz to 1 MHz from upper boundary of unrestricted frequencies	$3 − 15(\Delta_F−0.2)$ dBm	30 kHz
1 MHz to 5 MHz from upper boundary of unrestricted frequencies	4dBm	1 MHz
5 MHz from upper boundary of unrestricted frequenciesto end of band (2690 MHz)	Baseline requirement level	
Where: Δ_F is the frequency offset from the relevant boundary of unrestricted frequencies (in MHz)		

Restricted frequencies

For downlink transmissions on restricted frequencies, the EIRP emanating from the Radio Equipment transmissions at any frequency outside the Permitted Frequency Blocks shall not exceed the higher (least stringent) of (a) the baseline requirements and (if applicable) (b) the alternative block-specific requirements:

(a) Baseline requirements

Frequency range	**Maximum mean EIRP**	**Measurement bandwidth**
2500 to 2615 MHz	−45dBm	1 MHz
2615 to 2700 MHz	4dBm	1 MHz
2700 to 3100 MHz	−45dBm	1 MHz

(b) Alternative block-specific requirements

The following block-specific requirements apply to base stations with outdoor antennas meeting the conditions in paragraph 9, and to base stations with indoor antennas, subject to the "*Notice of coordination procedure for the licences covering the 2.6 GHz band – Deployment of mobile electronic communication networks in unpaired restricted blocks and in spectrum adjacent to unpaired restricted blocks*" notified by Ofcom to the Licensee:

Frequency range	**Maximum mean EIRP**	**Measurement bandwidth**
Start of band (2500 MHz) to −5 MHz from lower edge of restricted frequencies	−22dBm	1 MHz
−5 MHz to −1 MHz from lower boundary of restricted frequencies	−18dBm	1 MHz
−1 MHz to −0.2 MHz from lower boundary of restricted frequencies	$-19 + 15(\Delta_F+0.2)$ dBm	30 kHz
−0.2 MHz to 0 MHz from lower boundary of restricted frequencies	−19dBm	30 kHz
0 MHz to 0.2 MHz from upper boundary of restricted frequencies	−19dBm	30 kHz
0.2 MHz to 1 MHz from upper boundary of restricted frequencies	$-19 - 15(\Delta_F-0.2)$ dBm	30 kHz
1 MHz to 5 MHz from upper boundary of restricted frequencies	−18dBm	1 MHz
5 MHz from upper boundary of restricted frequencies to end of band (2690 MHz)	−22dBm	1 MHz
Where: Δ_F is the frequency offset from the relevant boundary of restricted frequencies (in MHz)		

9. Antenna height limit for base stations using alternative block specific EIRP limits

The highest point of outdoor antenna systems of base stations using the alternative block-specific EIRP limits shall be no more than 12m above ground level.

10. Interpretation of terms in this schedule

In this Schedule:

a) "dBm" means the power level in decibels (logarithmic scale) referenced against 1milliwatt (i.e. a value of 0dBm is 1 milliwatt);

b) "downlink transmission" means transmission from a base station to a terminal station;

c) “EIRP” means the equivalent isotropically radiated power. This is the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain);

d) “femtocell” means Radio Equipment transmitting on the downlink frequencies, which operates at a power not exceeding 20dBm EIRP per carrier, and which is or will be used only by and under the control of the Licensee, following the establishment of a telecommunications link between the femtocell and a network of the Licensee;

e) “Fixed or installed” means used or installed at specific fixed points;

f) “IR” means a United Kingdom Radio Interface Requirement published by Ofcom in accordance with Article 4.1 of Directive 1995/5/EC of the European Parliament and of the Council on radio equipment and telecommunications terminal equipment (RTTE) and the mutual recognition of their conformity.

g) “measurement bandwidth” means the size of an individual spectrum segment within the specified frequency range that is used to measure compliance with the specified power limit;

h) “mobile or nomadic” means intended to be used while in motion or during halts at unspecified points;

i) “Permitted Frequency Blocks” has the meaning given to it in paragraph 6 of this this Schedule;

j) “smart/intelligent low power repeater” means a repeater which operates with power not exceeding 24dBm EIRP per carrier, which may be established by customers of the Licensee who have written agreements with the Licensee and:

- The Licensee has ultimate control of the repeater, i.e. each individual repeater can be disabled remotely by the Licensee;
- The repeater operates only on the Licensee’s frequencies and with their valid Public Land Mobile Network Identifier;
- Must not cause undue interference to other spectrum users; and
- The repeater only transmits on the uplink frequencies when actively carrying a call (voice, video or data) or signalling from serviced handsets.

k) “TRP” means the total radiated power. This is the integral of the power transmitted in different directions over the entire radiation sphere; and

l) “uplink transmission” means transmission from a terminal station to a base station.

Annex 2F - Template schedule: low power concurrent licences for the 2.6 GHz band (paired spectrum)

Template licence

Draft schedule: low power concurrent licences for the 2.6 GHz band (paired spectrum)

SCHEDULE [ ] TO LICENCE NUMBER: [xxxxxx]

Schedule Date: **[xxxxxx]**

Licence category: **Spectrum Access Licence (2500 MHz – 2690 MHz)**

1. Description of Radio Equipment

References in this Schedule to the Radio Equipment are references to any wireless telegraphy station or wireless telegraphy apparatus that is established, installed and/or used under this Schedule.

2. Interface Requirements for the Radio Equipment

Use of the Radio Equipment shall be in accordance with the following Interface Requirement:

> IR 2091: Low power concurrent terrestrial systems capable of providing electronic communications services in the band 2500 to 2690 MHz

3. Special conditions relating to the Radio Equipment

a) Subject to paragraph 3(b) of this Schedule, during the period that this Licence remains in force, unless consent has otherwise been given by Ofcom, the Licensee shall compile and maintain accurate written records of the following details relating to the Radio Equipment:

   i) postal address (including post code);

   ii) National Grid Reference, to at least 1 metre resolution;

   iii) antenna height (above ground level), type, and boresight bearing east of true north (if applicable);

   iv) radio frequencies which the Radio Equipment is able to use and radio frequencies which the Radio Equipment uses;

   v) the technical characteristics of the Radio Equipment both in terms of transmission and reception of wireless telegraphy

   and the Licensee must produce these records if requested by any person authorised by Ofcom.

b) The conditions relating to the keeping of records contained in sub-paragraphs 3(a)(ii) and (iii) of this Schedule shall not apply in respect of femtocell equipment and smart/intelligent low power repeater equipment.

c) The Licensee must submit to Ofcom copies of the records detailed in sub-paragraph 3(a) above at such intervals as Ofcom may notify to the Licensee.

4. Co-ordination at frequency and geographical boundaries

The Licensee shall ensure that the Radio Equipment is operated in compliance with such co-ordination procedures as may be notified to the Licensee by Ofcom from time to time.

5. International cross-border coordination

The Licensee shall ensure that the Radio Equipment is operated in compliance with such cross-border co-ordination and sharing procedures as may be notified to the Licensee by Ofcom from time to time.

6. Code of practice on engineering coordination

a) The Licensee shall use best endeavours to agree with the Notified Licensees within six months of the date of issue of this Licence, engineering coordination principles to be set out in an industry Code of Practice on Engineering Coordination ("the Code of Practice").

b) The objective of the Code of Practice shall be to secure the efficient use of the radio spectrum such that stations for wireless telegraphy and apparatus for wireless telegraphy shall be established or installed, sited, used and transmit in a manner that will allow services in the Permitted Frequency Blocks, whether similar, competing or otherwise (including those offered by the Notified Licensees) to be employed in neighbouring premises (including premises on different floors in the same building).

c) In developing the Code of Practice the Licensee and the Notified Licensees shall at a minimum consider principles relating to:

   i) avoidance of interference by limiting transmission power to that which is no greater than necessary for service of customers;

   ii) selection of sites in a manner that will minimise the probability of interference arising;

   iii) siting of equipment within customer premises and at other sites in a manner that will minimise the probability of interference arising;

   iv) arrangements for communicating information between companies to facilitate engineering coordination;

   v) efficient use of radio frequency resources, using the minimum resources necessary to service customers; and

   vi) mitigation techniques to manage interference.

d) The Code of Practice shall be provided to Ofcom as soon as reasonably practicable after it is agreed.

e) The Licensee and the Notified Licensees may agree changes to the Code of Practice. When agreed, the revised Code of Practice must be provided to Ofcom as soon as reasonably practicable.

f) The Licensee shall use its best endeavours to adhere to the Code of Practice (as revised under sub-clause (e)) when establishing and using wireless telegraphy stations and installing and using wireless telegraphy apparatus.

g) If a Code of Practice is not agreed within six months as required by paragraph 6(a) above, or, where at any time the objective described in paragraph 6(b) above is in Ofcom's sole opinion not being secured, the Licensee shall adhere to the terms of a code of practice on engineering coordination containing any principles that Ofcom in its sole discretion deems necessary to secure that objective ("Ofcom's Code of Practice").

h) Any breach of Ofcom's Code of Practice shall constitute a breach of this Licence.

7. Permitted Frequency Blocks

Subject to the emissions permitted under paragraph 9 of this Schedule, the Radio Equipment may only transmit within the following frequency bands (the "Permitted Frequency Blocks"):

Downlink frequencies	**Uplink frequencies**
[2620 to 2690 MHz]	[2500 to 2570 MHz]

8. Maximum power within the Permitted Frequency Blocks

The power transmitted in the Permitted Frequency Blocks shall not exceed:

a) Downlink Frequencies

	Maximum EIRP
Radio Equipment	30dBm EIRP

b) Uplink Frequencies[1]

Radio Equipment	**Maximum mean power**
Mobile or nomadic Radio Equipment	23dBm TRP (total radiated power)
Fixed or installed Radio Equipment	23dBm EIRP

[1] Consumer user equipment will be authorised by means of a licence exemption under section 8 of the Wireless Telegraphy Act 2006

9. Maximum power outside the Permitted Frequency Blocks

For transmissions on the downlink frequencies, the EIRP emanating from the Radio Equipment transmissions at any frequency outside the Permitted Frequency Blocks shall not exceed the higher (least stringent) value of (a) the baseline requirements and (b) the block specific requirements for that frequency.

Baseline requirements

Frequency range	**Maximum mean EIRP**	**Measurement bandwidth**
2500 to 2615 MHz	−45dBm	1 MHz
2615 to 2700 MHz	4dBm	1 MHz
2700 to 3100 MHz	−45dBm	1 MHz

Block-specific requirements

Frequency range	**Maximum mean EIRP**	**Measurement bandwidth**
Start of band (2500 MHz) to −5 MHz from lower block edge	Baseline requirement level	
−5 MHz to −1 MHz from lower block edge	4dBm	1 MHz
−1 MHz to −0.2 MHz from lower block edge	$3 + 15(\Delta_F+0.2)$ dBm	30 kHz
−0.2 MHz to 0 MHz from lower block edge	3dBm	30 kHz
0 MHz to 0.2 MHz from upper block edge	3dBm	30 kHz
0.2 MHz to 1 MHz from upper block edge	$3 − 15(\Delta_F−0.2)$ dBm	30 kHz
1 MHz to 5 MHz from upper block edge	4dBm	1 MHz
5 MHz from upper block edge to end of band (2690 MHz)	Baseline requirement level	
Where: Δ_F is the frequency offset from the relevant block edge (in MHz)		

10. Antenna height

The highest point of an outdoor antenna system of any Radio Equipment shall not exceed a height of 12m above ground level.

11. Interpretation of terms in this schedule

In this Schedule:

a) “Code of Practice” has the meaning given to it in paragraph 6 of this Schedule;

b) “dBm” means the power level in decibels (logarithmic scale) referenced against 1milliwatt (i.e. a value of 0dBm is 1 milliwatt);

c) “EIRP” means the equivalent isotropically radiated power. This is the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain);

d) “femtocell” means Radio Equipment transmitting on the downlink frequencies, which operates at a power not exceeding 20dBm EIRP per carrier, and which is or will be used only by and under the control of the Licensee, following the establishment of a telecommunications link between the femtocell and a network of the Licensee;

e) “Fixed or installed” means used or installed at specific fixed points;

f) "IR" means a United Kingdom Radio Interface Requirement published by Ofcom in accordance with Article 4.1 of Directive 1995/5/EC of the European Parliament and of the Council on radio equipment and telecommunications terminal equipment (RTTE) and the mutual recognition of their conformity;

g) “lower block edge” means, in relation to each Permitted Frequency Block, the lower frequency in that Permitted Frequency Block;

h) “measurement bandwidth” means the size of an individual spectrum segment within the specified frequency range that is used to measure compliance with the specified power limit;

i) “mobile or nomadic” means intended to be used while in motion or during halts at unspecified points;

j) "Notified Licensees" means the holders of wireless telegraphy licences which relate to the Permitted Frequency Blocks that are notified to the Licensee by Ofcom from time to time;

k) “Ofcom’s Code of Practice” has the meaning given to it in paragraph 6 of this Schedule;

l) “Permitted Frequency Blocks” has the meaning given to it in paragraph 7 of this Schedule;

m) “smart/intelligent low power repeater” means a repeater which operates with power not exceeding 24dBm EIRP per carrier, which may be established by customers of the Licensee who have written agreements with the Licensee and:

- The Licensee has ultimate control of the repeater, i.e. each individual repeater can be disabled remotely by the Licensee;
- The repeater operates only on the Licensee’s frequencies and with their valid Public Land Mobile Network Identifier;
- Must not cause undue interference to other spectrum users; and
- The repeater only transmits on the uplink frequencies when actively carrying a call (voice, video or data) or signalling from serviced handsets.

n) “TRP” means the total radiated power. This is the integral of the power transmitted in different directions over the entire radiation sphere; and

o) “upper block edge” means, in relation to each Permitted Frequency Block, the highest frequency in that Permitted Frequency Block.

Annex 3

Notice of coordination procedure required under spectrum access licences for the 2.6 GHz band (Radar)

Notice of coordination procedure required under spectrum access licences for the 2.6 GHz band

Coordination with aeronautical radionavigation radar in the 2.7 GHz band

Notice

Publication date: [DATE]

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Section 1

Introduction

1.1 This Notice is notified to each 2.6 GHz licensee under their respective 2.6 GHz licences.

1.2 There is a cross-Government radar remediation programme in place to ensure that radars in the 2.7 GHz band (2700-3100 MHz) are modified to become more resilient to interference from the 2.6 GHz band (2500 MHz to 2690 MHz). However, even after this programme is completed the radars will have some sensitivity to emissions from the 2.6 GHz band.

1.3 This Notice specifies the protection thresholds and coordination procedure that Ofcom considers are necessary to ensure the protection of existing radars operating in the 2.7 GHz bands from potential harmful interference from the deployment of networks in the 2.6 GHz band.

1.4 There are different protection thresholds before and after radars are modified. The protection thresholds will be less restrictive once the modification has been completed at each radar site.

1.5 In this Notice:

"2.6 GHz band" means the following frequencies: 2500 MHz – 2690 MHz;

"2.6 GHz base stations" means base stations which are licensed to transmit using frequencies in the 2.6 GHz band;

"2.6 GHz fixed or installed terminal stations" means fixed or installed terminal stations which are not exempt from licensing by the Wireless Telegraphy Act (Exemption) Regulations and which are licensed to transmit using frequencies in the 2.6 GHz band;

"2.6 GHz licensee" means the licensee under a licence authorising use in the United Kingdom of frequencies in the 2.6 GHz band;

"2.7 GHz band" means the following frequencies: 2700 MHz – 3100 MHz;

"base station" means radio equipment that transmits to terminal stations;

"2.6 GHz deployments" means 2.6 GHz bases stations and 2.6 GHz fixed or installed terminal stations deployed by a 2.6 GHz licensee;

"the CAA" means the Civil Aviation Authority;

"the in-band communications signal threshold" means the threshold that the 2.6 GHz licensee must comply with as specified in this Notice;

"MOD" means the Ministry of Defence;

"OOB emissions" means out of band emissions;

“Protected Radar” means the list of radars set out at Annex 3 to this Notice;

“radar” means aeronautical radionavigation radar; and

“terminal station” means Radio Equipment that receives downlink transmissions from base stations.

Section 2

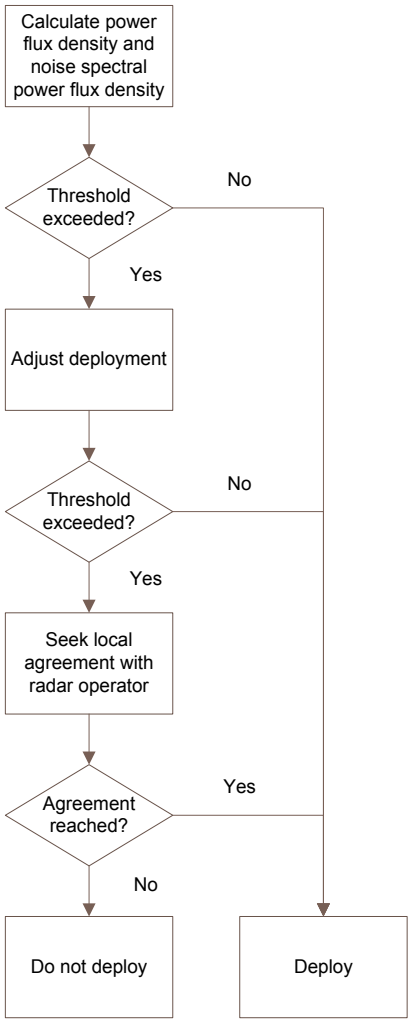
The coordination procedure

Overview of procedure

2.1 When planning its network deployment, the 2.6 GHz licensee must check whether the protection thresholds set out in this document would be exceeded as a result of any proposed 2.6 GHz deployment. To do so, the 2.6 GHz licensee will need to calculate the communications signal and the out of band noise at the relevant Protected Radar location(s) (see section 4). If these calculations show that the relevant threshold(s) will not be exceeded as a result of the planned deployment, then deployment can go ahead. If the calculations show that the relevant threshold(s) would be exceeded as a result of the planned deployment, the 2.6 GHz licensee may consider adjusting the deployment.

2.2 If it is not possible to adjust the deployment so that the threshold(s) are not exceeded, the 2.6 GHz licensee may only proceed to deployment if agreement is reached with the operator(s) of the relevant radar(s).

Flowchart illustrating coordination procedures


Calculate power flux density and noise spectral power flux density
Threshold exceeded?
No
Yes
Adjust deployment
Threshold exceeded?
No
Yes
Seek local agreement with radar operator
Agreement reached?
Yes
No
Do not deploy
Deploy

Section 3

Radars to be protected

The Protected Radar list

3.1 Details of the existing civil and military radars requiring protection are set out in the Protected Radar list at Annex 3 to this Notice. The area where the radar is protected is limited by the current position and within the airfield boundary. The 2.6 GHz licensee must ensure that its planned deployment is able to comply with the thresholds in relation to all of that area.

3.2 The protection thresholds and coordination procedure apply to the protection of radars listed on the Protected Radar list at the time a new 2.6 GHz deployment is made.

3.3 The protection thresholds and coordination procedure do not apply to the protection of any new radar from 2.6 GHz deployments in the 2.6 GHz band already in operation when the radar is deployed. However, where a radar operator does wish to deploy a new radar and there is a 2.6 GHz licensee with an existing 2.6 GHz deployments that may interfere with that new radar, it would be open to the parties to seek to resolve between themselves any coordination issues that would arise as a result of the intended radar deployment. Any such agreement must be recorded in writing in a form agreed by both the 2.6 GHz licensee and the radar operator. The 2.6 GHz licensee must maintain a record of all such agreements, and make them available to Ofcom on request.

3.4 The Protected Radar list will be updated and re-issued from time to time. It is the responsibility of the 2.6 GHz licensee to ensure that it uses the most recent version when planning its deployment.

Section 4

Radar protection thresholds

Protection thresholds

4.1 Protected Radars are subject to remediation work to make them less susceptible to interference from signals in the 2.6 GHz band. Table 1 contains two values for the in-band communications signal threshold, one value for pre-remediation and one value for post-remediation. The threshold for communications out of band noise remains the same before and after radars have been modified.

4.2 Subject to paragraph 4.9, in relation to each Protected Radar:

4.2.1 Before that Protected Radar has been remediated, the 2.6 GHz licensee must ensure that cumulative emissions from all deployment in the 2.6 GHz band do not exceed the pre-remediation threshold in Table 1.

4.2.2 After that Protected Radar has been remediated, the 2.6 GHz licensee must ensure that cumulative emissions from all deployment in the 2.6 GHz band do not exceed the post-remediation threshold in Table 1.

4.3 The Protected Radar list at Annex 3 (as updated and re-issued from time to time) specifies which Protected Radars have been remediated.

Table 1: Radar protection thresholds

	In-band communication signal		**Communications out of band noise**
	Pre-remediation	**Post-remediation**	**Pre- and post-remediation**
	Power flux density threshold for signals in the 2570-2690 MHz band (dBm/m^2) [1,2]	**Power flux density threshold for signals in the 2570-2690 MHz band (dBm/m^2) [1,2]**	**Noise spectral power flux density threshold at 2720 MHz to 3100 MHz (dBm/MHz/m^2) [1,2]**
Radar protection thresholds	-74+10*log$_{10}$ ($\frac{BW}{120}$)	5+10*log$_{10}$ ($\frac{BW}{120}$)	-131 +10*log$_{10}$ ($\frac{BW}{120}$)
Where: BW is the total 2.6 GHz bandwidth assigned to the licensee for downlink transmissions (combining both paired and unpaired spectrum) in the band 2570 – 2690 MHz Note [1]: The protection thresholds are defined at the peak of the main radar beam. Note [2]: The protection thresholds are defined during the 'on' period of the transmit signal.			

Compliance with the thresholds

4.4 Prior to deployment, the 2.6 GHz licensee must assess whether the protection thresholds specified in Table 1 will be exceeded as a result of its planned deployment in the 2.6 GHz band for any Protected Radar.

4.5 In carrying out this assessment the 2.6 GHz licensee must use the appropriate propagation model as follows:

4.5.1 For 2.6 GHz deployments further than 1.5 km from the Protected Radar, ITU-R P.452-14 with the parameters given in Annex 1.

4.5.2 For 2.6 GHz deployments at or within 1.5 km from the Protected Radar, ITU-R P.525-2 (Free Space Path Loss) + 6 dB additional margin[1].

4.6 The 2.6 GHz licensee must ensure that the protection thresholds are not exceeded in any pointing direction of the Protected Radar antenna using the relative horizontal antenna gain pattern described in Annex 2. The horizontal radar polar diagram will be used to sum all the communications signals according to the radar antenna sensitivity in different horizontal directions. The radar antenna peak gain is accounted for in the protection thresholds and radar antenna polar diagrams provided are referenced to the maximum radar antenna gain.

4.7 The summed field strength is the value that must not exceed threshold limits. The 2.6 GHz licensee must take into account in its analysis the OOB emissions that would be generated in the presence of closely spaced 2.6 GHz deployments.

4.8 The 2.6 GHz licensee must maintain records of its calculations and assessments and make these available to Ofcom if required.

Exceeding the threshold

4.9 The thresholds may only be exceeded in relation to a specific Protected Radar if the 2.6 GHz licensee has reached an agreement with the operator of that Protected Radar. However, any such agreement would be limited to that specific Protected Radar, and would not remove the obligation of the 2.6 GHz licensee to comply with the relevant thresholds in relation to other Protected Radars. Any such agreement must be recorded in writing in a form agreed by both the 2.6 GHz licensee and the radar operator. The 2.6 GHz licensee must maintain a record of all such agreements, and make them available to Ofcom on request.

[1] This margin accounts for multipath. It represents a single multipath base station signal reflection received coherently at the radar via a reflecting structure or surface (i.e. buildings, vehicles, pylons, reflective ground structures, etc.). This is assumed when a base station is located within 1.5 km range of the radar.

Annex 1

Modelling parameters

Propagation model

A1.1 The path loss will be calculated using Recommendation ITU-R P.452 “Prediction procedure for the evaluation of microwave interference between stations on the surface of the Earth at frequencies above 0.7 GHz”[2].

A1.2 It predicts signal levels exceeded for a given percentage of time, the assessment will use a time percentage of 0.1% as included in the table below.

A1.3 Predictions are based on the terrain profile and clutter along the path.

A1.4 A propagation correction due to clutter shall be applied. This is based on a representative clutter height assigned to each clutter category.

Table A1.1: ITU-R P.452

Time percentage	0.100%
Sea level surface refractivity N0	325
deltaN = [N(0m) - N(1000m)]	45
Dry air pressure (hPa)	1013
Temperature (°C)	15.0
Nominal path center latitude (°)	51.0
Clear-air propagation attenuation components included:	Line of sight/Diffraction - Diffraction - Multipath and focussing effects - Gaseous absorption Tropospheric scatter - Gaseous absorption Ducting/Layer reflection - Gaseous absorption
The path centre latitude may be selected on a case by case basis.	

Terrain database

A1.5 Ordnance Survey “Land-form Panorama®” 50 m resolution digital terrain map data shall be used.

Clutter database

A1.6 The 50 metre resolution clutter dataset produced by Infoterra shall be used.

[2] www.itu.int/rec/R-REC-P.452/en

A1.7 This dataset identifies 10 different clutter categories. For location variation these are mapped to the required clutter designations with heights.

A1.8 The default parameters for representative clutter heights are as defined in ITU-R P.452.

Table A1.2: Infoterra clutter code mapping

Infoterra Clutter Code	Description	Nominal height (m)
0	Open	4
1	Suburban	9
2	Urban	20
3	Villages	5
4	Open in Urban	4
5	Forest	15
6	Water	0
7	Dense Urban	25
8	Park recreation	4
10	Industry	20

Annex 2

Antenna pattern

Radar horizontal antenna pattern

A2.1 The table below shows the radar horizontal antenna pattern (symmetrical about 180 degrees) that must be used for power density calculations.

Table A2.1: Antenna pattern

Angle from boresight (degrees)		Gain wrt to peak (dB)
At or above angle:	Below angle:	
0	0.5	0
0.5	0.6	-1
0.6	0.7	-2
0.7	0.8	-3
0.8	0.9	-5
0.9	1	-7
1	2	-10
2	3	-15
3	4	-30
4	15	-20
15	16	-25
16	30	-30
30	31	-35
31	60	-40
60	61	-35
61	120	-30
120	121	-35
121	180	-40

Annex 3

Protected Radar list

List of military and civil radars to be protected

A3.1 The radars to which these coordination procedures apply are listed in the table below. The area where the radar is protected is limited by the current position and within the airfield boundary[3].

A3.2 This list was issued on [date].

Table A3.1: Protected radar list

Name	Location	Post Code	Remediated
Allanshill radar station		AB43 7LS	No
Belfast City Airport	Sydenham by-Pass, Belfast	BT3 9JH	No
Belfast International	Belfast	BT29 4AA	No
Birmingham International Airport	Diamond House, Birmingham	B26 3QJ	No
Blackpool Airport	Squires Gate Lane, Blackpool	FY4 2QS	No
Bournemouth International Airport	Hurn, Christchurch, Dorset	BH23 6SE	No
Bristol Airport	Control Tower Building, Bristol	BS48 3DY	No
Cambridge Airport	Newmarket Road, Cambridge	CB5 8RX	No
Cardiff International Airport	Rhoose, Barry, South Glamorgan	CF62 3BD	No
Coventry Airport	Siskin Parkway West Middlemarch Business Park Coventry	CV3 4PB	No
Cromer radar station		NR27 0LD	No
Cumbernauld wind farm	1 Waterloo Street, Glasgow	G2 6AY	No
Durham Tees Valley Airport	Darlington, County Durham	DL2 1LU	No
East Midlands International Airport	Castle Donington, Derby	DE74 2SA	No
Edinburgh Airport	Edinburgh, Lothian	EH12 9DN	No
Exeter & Devon Airport	Clyst Honiton, Exeter	EX5 2BD	No
Farnborough Aerodrome	Farnborough, Hampshire	GU14 6XA	No

[3] The CAA has records of airfield boundaries as part of its aerodrome licensing, available at http://www.caa.co.uk/default.aspx?catid=375&pagetype=90&pageid=5373. The MOD [*details of source document to be updated prior to publication*]

Glasgow Airport	Paisley, Strathclyde	PA3 2ST	No
Glasgow Prestwick International Airport	Prestwick, Ayrshire	KA9 2PL	No
Hawarden Airport	Broughton, Chester, North Wales	CH4 0DR	Yes
Hibaldstow radar station	New Control Tower, Oglet Lane Hale Village, Liverpool	L24 5RJ	No
Humberside Airport	Kirmington, Ulceby South Humberside	DN39 6YH	No
Inverness Airport	Inverness	IV2 7JB	No
Kincardine radar station		PO15 7FL	No
Leeds Bradford International Airport	Yeadon, Leeds	LS19 7TU	No
Liverpool Airport	Liverpool	L24 1YD	No
London Gatwick Airport	West Sussex	RH6 0NP	No
London Heathrow Airport	Hounslow, Middlesex	TW6 2QW	No
Stansted Airport	Stansted, Essex	CM24 1QW	No
Manchester Airport	Manchester	M90 1QX	No
Manston Airport	Manston, Ramsgate, Kent	CT12 5BP	No
Newcastle International Airport	Woolsington, Newcastle upon Tyne	NE13 8BZ	No
Newquay Cornwall Airport	Carloggas,St, Mawgan, Newquay Cornwall	TR8 4RQ	No
Norwich Airport	Amsterdam Way, Norwich	NR6 6JA	No
Oxford Airport	Langford Lane, Kidlington Oxfordshire	OX5 1RA	No
Robin Hood Airport	Hayfield Lane, Doncaster South Yorkshire	DN9 3XA	No
Southampton International Airport	Southampton Hampshire	SO18 2NL	No
London Southend Airport	Southend-on-Sea, Essex	SS2 6YF	No
St Annes radar station		FY8 4NU	No
Sumburgh Airport	Virkie Shetland	ZE3 9JP	No
Aberporth	Parcllyn, Cardigan Ceredigion	SA43 2BU	No
Benson	Wallingford, Oxon	OX10 6AA	No
Boscombe Down	Salisbury Wiltshire	SP4 OJF	No
Brize Norton	Oxford	OX18 3LX	No
Brizlee Wood	Anwick Northunberland	NE66 3HX	No
Coningsby	Lincoln	LN4 4SY	No
Cosford	Wolverhampton	WV7 3EX	No
Cosford T101	Wolverhampton	WV7 3EX	No
Cosford Tac	Wolverhampton	WV7 3EX	No

Cranwell	Sleaford, Lincolnshire	NG34 8HB	No
Culdrose	Helston, Cornwall	TR12 7RH	No
Hartland Point		EX39 6AU	No
Honington	Bury St Edmunds Suffolk	IP31 1EE	No
Lakenheath	Brandon, Suffolk	IP27 9PN	No
Leeming	Northallerton, North Yorkshire	DL7 9NJ	No
Leuchars	Leuchars, Fife	KY16 0JX	No
Linton-on-Ouse	York, North Yorkshire	YO30 2AJ	No
Lossiemouth	Lossiemouth, Morayshire	IV31 6SD	No
Manorbier	Tenby Dyfed	SA70 7SH	No
Marham	King's Lynn, Norfolk	PE33 9NP	No
Middle Wallop	Stockbridge, Hampshire	SO20 8DY	No
Odiham	Hook, Hampshire	RG29 1QT	No
Portland	Portland, Dorset	DT5 1EQ	No
Portreath	Redruth, Cornwall	TR16 4RA	No
Scampton	Lincoln, Lincolnshire	LN1 2ST	No
Shawbury	Shrewsbury, Shropshire	SY4 4DZ	No
Spadeadam BH	Gilsland, Brampton, Cumbria	CA8 7AT	No
Spadeadam DWF	Gilsland, Brampton, Cumbria	CA8 7AT	No
St Kilda Airwatch	There is no postcode available		No
St Kilda Seawatch	There is no postcode available		No
Staxton Wold	Scarborough, North Yorkshire	YO12 4TJ	No
Topcliffe	Thirsk, North Yorkshire	YO7 3QE	No
Valley	Holyhead, Isle of Anglesey	LL65 3NY	No
Waddington	Lincoln, Lincolnshire	LN5 9NB	No
Wembury Point	Postcode nearest to the site.	PL9 0BG	No
West Freugh	Stranraer, Wigtownshire	DG9 9DN	No
Wittering	Peterborough	PE8 6HB	Yes
Yeovilton	Ilchester, Somerset	BA22 8HT	No

Annex 4

Notice of coordination procedure for the licences covering the 2.6 GHz band (Restricted Blocks)

Deployment of mobile electronic communication networks in unpaired restricted blocks and in spectrum adjacent to unpaired restricted blocks

Notice of coordination procedure required under spectrum access licences for the 2.6 GHz band

Deployment of mobile electronic communication networks in unpaired restricted blocks and in spectrum adjacent to unpaired restricted blocks

Notice

Publication date: [DATE]

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Section 1

Introduction

1.1 This Notice is notified to each 2.6 GHz licensee under their respective 2.6 GHz licences.

1.2 This Notice specifies the coordination procedure that Ofcom considers is necessary to manage the adjacent frequency coexistence between the use of restricted blocks in the unpaired frequencies from 2570 to 2620 MHz and unrestricted blocks in the 2.6 GHz band.

1.3 Restricted blocks are unpaired 5 MHz spectrum blocks at specific frequencies in the 2.6GHz band. They are identified in paragraph 6 of the relevant schedules to the 2.6 GHz licences as “restricted frequencies”

1.4 This Notice covers coordination between each 2.6 GHz licensee holding one or more restricted blocks and the 2.6 GHz licensee(s) holding the adjacent 5 MHz spectrum below the restricted block, and specifies the requirements on coordination between 2.6 GHz licensees that must be followed before 2.6 GHz base stations using the alternative block-specific requirements set out in the 2.6 GHz licences can be established and brought into operation.

1.5 In this Notice:

“alternative block-specific requirements” means the requirements set out in the relevant schedule to the 2.6 GHz licence, under the heading “Alternative block-specific requirements”;

“2.6 GHz band” means the following frequencies: 2500 MHz – 2690 MHz;

“2.6 GHz base stations” means base stations which are licensed to transmit using frequencies in the 2.6 GHz band;

“2.6 GHz licence” means a licence authorising use in the United Kingdom of frequencies in the 2.6 GHz band;

“2.6 GHz licensee” means the licensee under a 2.6 GHz licence;

“Adjacent Block Licensees” means the 2.6 GHz licensees holding spectrum in a block of spectrum below a restricted block;

“restricted block” means any spectrum block(s) identified in paragraph 6 of the relevant schedules to the 2.6 GHz licences as “restricted frequencies”;

“Restricted Block Licensee” means a 2.6 GHz licensee wishing to deploy a 2.6 GHz base station in a restricted block.

Section 2

Deployments in restricted blocks

Use of restricted blocks without coordination with adjacent licensees

2.1 Commission Decision 2008/477/EC (the Decision) provides a set of block edge masks for out-of-block emissions in relation spectrum in the 2.6 GHz band.

2.2 For restricted blocks, the power limit at each out-of-block frequency is given by the higher value of the baseline requirements and the alternative block-specific requirements.

2.3 The baseline requirements are set out in the relevant schedule to the 2.6 GHz licences, under the heading “Baseline requirements”. For the avoidance of doubt, this Notice does not require coordination with adjacent 2.6 GHz licensees in relation to the use of restricted blocks within the limits specified by the baseline requirements.

2.4 The alternative block-specific requirements apply to the use of restricted blocks in cases where antennas are placed indoors or where the antenna is below a certain height. These alternative parameters do not apply at geographic boundaries with other Member States.

2.5 The establishment and bringing into use of a restricted block base station that uses the alternative block-specific requirements instead of the baseline requirements is subject to the successful prior application of the coordination procedure in Section 3 of this Notice.

Section 3

Coordination procedure

Information request to adjacent frequency licensee(s)

3.1 A 2.6 GHz licensee wishing to deploy a 2.6 GHz base station in a restricted block using the alternative block-specific requirements (the “Restricted Block Licensee”) must send an information request to all of the 2.6 GHz licensees holding spectrum in the adjacent block of spectrum below the restricted block in question (the “Adjacent Block Licensees”). The purpose of the information request is to determine whether the antenna(s) of any 2.6 GHz base station(s) that is/are deployed and operational fall within the distances specified in Annex from the proposed antenna of the 2.6GHz base station in the restricted block.

3.2 The following details of the proposed 2.6 GHz base station in the restricted block must be included in the information request:

a) postal address (including post code);

b) National Grid Reference of transmitting antenna, to 1m resolution;

c) location: indoor or outdoor; and

d) radio frequencies which the base station is proposed to use.

Response required and time limit

3.3 The Adjacent Block Licensees must respond to the information request within 30 business days of the date of receipt.

3.4 Their response must confirm either that:

a) there is no operational 2.6 GHz base station using frequencies in a block of spectrum which is adjacent to the restricted block that has an antenna or antennas within the coordination distance from the antenna or antennas of the proposed 2.6 GHz base station in the restricted block; or

b) there is a 2.6 GHz base station that is operational in a block of spectrum which is adjacent to the restricted block, and which has an antenna or antennas within the distances specified in Annex 1 from the transmitting antenna of the proposed 2.6GHz base station in the restricted block. This response must be accompanied by the following details of any such operational 2.6 GHz base station:

i) location (National Grid Reference of receiving antenna, to 1m resolution);

ii) antenna height above ground level;

iii) frequencies in use; and

iv) bandwidth in use.

Coordination of the base station in the restricted block

3.5 On the basis of the responses received, paragraphs 3.6 to 3.9.describe the actions to be taken by the relevant 2.6 GHz licensees.

No operational base station within the coordination distance

3.6 If all responses confirm only the information specified in paragraph 3.4 a), the Restricted Block Licensee may establish and bring into use a 2.6 GHz base station at the location specified in the information request using the alternative block-specific requirements. In this case, the 2.6 GHz base station in the restricted block is considered to have been successfully coordinated and the Restricted Block Licensee is permitted to bring it into use with immediate effect.

No response within specified period

3.7 In the case where none of the Adjacent Block Licensees has responded within the period specified in paragraph 3.3, the 2.6 GHz base station in the restricted block is considered to have been successfully coordinated. The Restricted Block Licensee may with immediate effect establish and bring into use a 2.6 GHz base station at the location specified in the information request using the alternative block-specific requirements.

2.6 GHz base station that is deployed and operational within the coordination distance

3.8 If a response confirms the information covered by paragraph 3.4 b), the Restricted Block Licensee must obtain written agreement from the Adjacent Block Licensee(s) that responded on this basis, before establishing and bringing into use a 2.6 GHz base station using the alternative out-of-block requirements at the location specified in the information request. If such agreement is obtained, the 2.6 GHz base station in the restricted block is considered to have been successfully coordinated and the Restricted Block Licensee may with immediate effect establish and bring into use a 2.6 GHz base station at the location specified in the information request using the alternative out-of-block requirements.

3.9 Where there is more than one Adjacent Block Licensee, the Restricted Block Licensee does not require written agreement from any Adjacent Block Licensees whose responses confirmed only the information specified in paragraph 3.4 a) or from any Adjacent Block Licensees that did not respond within the period specified in paragraph 3.3.

Retention of information for Adjacent Block Licensees

3.10 The details of successfully coordinated 2.6 GHz base stations may be retained by the Adjacent Block Licensee for the purposes of assessing the potential impact on new installations in the frequency block adjacent to the restricted block from successfully coordinated 2.6 GHz base stations in the restricted block.

Requirements on continuity of service of coordinated 2.6 GHz base stations in the restricted block

3.11 If a successfully coordinated 2.6 GHz base station in the restricted block is taken out of service for a continuous period exceeding six months, it shall no longer be

considered to have been successfully coordinated. After such a period the Restricted Block Licensee must repeat the coordination process in this section before being permitted to establish and bringing into use a 2.6 GHz base station in the restricted block at the same location.

Deployment near a geographical border

3.12 Restricted Block Licensees wishing to establish and bring into use a 2.6 GHz base station in a restricted block whose antennas are within the coordination distance specified in Annex 1 to this Notice from an international land border must comply with the baseline requirements.

Compliance with the coordination requirements

3.13 Restricted Block Licensees must maintain records of:

a) their information requests to the Adjacent Block Licensees;

b) responses received from Adjacent Block Licensees;

c) evidence of occasions where an Adjacent Block Licensee has not responded within the period specified in paragraph 3.3; and

d) all agreements with Adjacent Block Licensees to site antennas of 2.6 GHz base stations in a restricted block with alternative technical parameters within the coordination distance.

3.14 Restricted Block Licensees must make these records available to Ofcom at such intervals as Ofcom shall notify to the licensee.

Section 4

Deployment in the frequency block adjacent to restricted blocks

4.1 This Notice does not preclude 2.6 GHz licensees that hold spectrum in the adjacent block below a restricted block from establishing and bringing into use base stations whose antennas are within the coordination distances in Annex from antennas of successfully coordinated 2.6 GHz base stations in a restricted block. Any such deployment is at the 2.6 GHz licensee's own risk and there is no requirement on the Restricted Block Licensee to make any changes to their deployment in these circumstances.

Annex 1

Coordination distances

Tables A1.1 and A1.2 show the coordination distances for use of restricted blocks with the alternative block-specific requirements.

Table A1.1: coordination distance from indoor antenna of a 2.6 GHz base station in a restricted block

Characteristics of 2.6 GHz base station in frequency block adjacent to the restricted block	Coordination distance between the antenna of a 2.6 GHz base station in a restricted block and the antenna of a 2.6 GHz base station in an adjacent block or an international land border
Base station with maximum EIRP 30dBm or lower	20m
Base station with maximum EIRP above 30dBm	70m

Table A1.2: coordination distance from outdoor antenna of a 2.6 GHz base station in a restricted block

Characteristics of 2.6 GHz base station in frequency block adjacent to the restricted block	Coordination distance between the antenna of a 2.6 GHz base station in a restricted block antenna and the antenna of a 2.6 GHz base station in an adjacent block or an international land border
Base station with maximum EIRP 30dBm or lower	40m
Base station with maximum EIRP above 30dBm	160m

Annex 5

Notice of DTT interference mitigation procedures required under spectrum access licences for the 800 MHz band

Notice of DTT interference mitigation procedures required under spectrum access licences for the 800 MHz band

Notice

Publication date: [DATE]

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Section 1

Introduction

1.1 This Notice is notified to each Licensee of spectrum in the frequency bands 791 to 821 MHz and 832 MHz to 862 MHz (the 800 MHz spectrum) listed in Annex 1 (the Licensee(s)) under their respective licences for the use of those frequencies (the Licence(s)).

1.2 This Notice requires the Licensees to set up, own and operate an entity that will deliver a consumer help scheme to households whose primary means of receiving television services is by means of digital terrestrial television ("DTT") and whose DTT reception is disrupted by the transmission of mobile services that are being provided by the Licensees. This scheme is referred to in this Notice as the "Single Consumer Help Scheme" and must be operated in accordance with the provisions of this Notice.

1.3 This Notice also sets out details of how each Licensee, and the entity that they set up, own and operate to deliver the Single Consumer Help Scheme, will be required to work with an Oversight Board. The Oversight Board will be set up by HM Government and will oversee the entity established by the Licensees, monitor its performance and make recommendations to it.

1.4 Section 4 of this Notice contains a Glossary of terms, defining how these should be interpreted for the purposes of this document.

Section 2

Establishment and Functioning of a Single Consumer Help Scheme

Establishment of an entity to deliver a Single Consumer Help Scheme

2.1 Each Licensee shall co-ordinate with the other Licensees listed in Annex 1 for the purposes of mitigating interference caused to households whose primary means of receiving television services transmitted in the 470 – 790 MHz electromagnetic spectrum band is by means of DTT, where that DTT reception is being interfered with (or is likely to be interfered with) by the transmission of mobile services that are being provided by the Licensee. Each Licensee shall, in particular:

2.1.1 together with the other Licensees, jointly establish a legal entity (the Entity) that the Licensees shall together own and operate for the purposes of delivering a Single Consumer Help Scheme to the households identified in paragraph 2.1;

2.1.2 within six weeks of being granted its Licence, nominate a representative to be appointed on that Licensee's behalf as a member of the Board (or other decision-making governance structure) of the Entity;

2.1.3 participate in the day-to-day governance and operation of the Entity, insofar as being jointly responsible for its decisions, activities and liabilities;

2.1.4 act in accordance with all the documents or rules governing the constitution, structure and operation of the Entity;

2.1.5 co-operate with the Entity and, in particular, comply in a timely manner with any instruction or request reasonably given or made by the Entity.

2.2 Subject to paragraph 2.3, where the Licensees acting together have, within six weeks of the date of the grant of the Licences to the Licensees listed in Annex 1, failed to establish the Entity under paragraph 2.1.1, the Licensees will be required jointly to establish the Entity using such documentation as Ofcom may require, and in accordance with such directions as Ofcom may make in this regard.

2.3 Each Licensee may, where unanimous agreement is reached with the other Licensees listed in Annex 1, make a request to Ofcom to extend the time period specified in paragraph 2.2. Ofcom will consider any such requests and notify each Licensee of its decision as soon as practicable.

Funding the provision of the Single Consumer Help Scheme

2.4 Each Licensee shall make the following payments into a bank account (or bank accounts) to be notified to it by Ofcom, for the purposes of funding the Entity and the activities of the Oversight Board:

2.4.1 the sum of £20,000,000 (twenty million pounds) for each block of 2 x 5 MHz of spectrum held under its Licence, to be transferred within fourteen days of the establishment of the Entity ("the first payment");

2.4.2 the sum of £5,000,000 (five million pounds) for each block of 2 x 5 MHz of spectrum held under its Licence, to be transferred one year after the date on which the first payment is made ("the second payment"); and

2.4.3 the sum of £5,000,000 (five million pounds) for each block of 2 x 5 MHz of spectrum held under its Licence, to be transferred one year after the date on which the second payment is made.

2.5 On the dissolution of the Entity the Licensee shall, in accordance with paragraph 2.6, be entitled to a share of any monies that were paid by the Licensees pursuant to paragraph 2.4 of this Notice and which have not been spent in funding in any way either the Entity or the Oversight Board.

2.6 The share to which each Licensee shall be entitled shall either be calculated in proportion to the amount of the 800 MHz spectrum held by each Licensee under its Licence or be otherwise divided in accordance with any agreement reached unanimously between them.

Licensees' co-operation with the Oversight Board

2.7 Each Licensee shall nominate a representative to be appointed to represent that Licensee as a member of the Oversight Board.

2.8 Each Licensee shall, through its participation in the Entity, co-operate with the Oversight Board and shall, in particular:

2.8.1 have due regard to any recommendations reasonably given to the Licensee by the Oversight Board for the purposes of mitigating interference to the households identified in paragraph 2.1;

2.8.2 ensure that its representative attends meetings and participates in any committee organised or convened by the Oversight Board for the purposes of mitigating interference caused to households identified in paragraph 2.1;

2.8.3 ensure that the Oversight Board may audit the Entity at such times as the Oversight Board considers appropriate.

2.9 Each Licensee shall ensure that through its participation in the Entity, and before communicating with, or providing support to, households, or commencing transmissions under its Licence, it agrees with the Oversight Board a Memorandum of Understanding setting out how the Entity and the Oversight Board will interact.

2.10 Subject to paragraph 2.11, where a Memorandum of Understanding has not been agreed in accordance with paragraph 2.9 within 6 weeks of the date of the grant of the Licences to the Licensees listed in Annex 1, Ofcom will (in consultation with the Oversight Board) prepare and notify a Memorandum of Understanding to the Licensees and the Licensees shall comply with that Memorandum of Understanding through its participation in the Entity.

2.11 Each Licensee may, through its participation in the Entity, make a request to Ofcom to extend the time period specified in paragraph 2.10. Any such request must be

made with the agreement of each Licensee listed in Annex 1. Ofcom will consider such requests and notify each Licensee of its decision as soon as practicable.

Period for which the Entity established to deliver the Single Consumer Help Scheme must operate

2.12 Each Licensee shall, subject to paragraph 2.14, continue to own and operate the Entity until at least the sooner of:

2.12.1 the end of a period of 12 months after the date of completion of each Licensee's roll-out of the network with which it intends to provide services using frequencies in the 800 MHz band (network roll-out); or

2.12.2 31 December 2018.

2.13 Each Licensee shall, in circumstances where it seeks to rely on paragraph 2.12.1:

2.13.1 provide to the Oversight Board evidence of the fact that:

a) it has completed its network roll-out prior to any such cessation; and

b) it is the unanimous intention of each Licensee to cease the ownership and operation of the Entity;

2.13.2 comply with any decision of Ofcom as to whether or not it may cease to own and operate the Entity.

2.14 Each Licensee may, through its participation in the Entity, make a request to the Oversight Board to recommend to Ofcom that Ofcom bring forward the date specified in paragraph 2.12. Any such request must be made with the agreement of each Licensee listed in Annex 1. Ofcom will consider such requests and notify each Licensee of its decision as soon as practicable.

2.15 Each Licensee shall, where a request is made in accordance with paragraph 2.14, also comply with the steps set out in paragraphs 2.13.1 – 2.13.2.

2.16 Each Licensee shall, from the date provided for in either paragraphs 2.12 or 2.14, whichever is the earliest, take such steps as Ofcom may direct in connection with the dissolution of the Entity and with the ceasing of that body's operations.

2.17 Each Licensee may, on the dissolution of the Entity, agree with the other Licensees listed in Annex 1 any arrangements with respect to the ownership of any intellectual property owned or held by the Entity.

Obligations after the Entity established to deliver the Single Consumer Help Scheme has ceased to operate

2.18 After the Entity has ceased to operate, each Licensee shall continue to ensure that it does not cause harmful interference to other users of the electromagnetic spectrum, in accordance with the terms and conditions of its Licence.

Section 3

Mitigating interference to DTT households

General obligations

3.1 Each Licensee shall, through its participation in the Entity, before commencing transmissions under its Licence:

3.1.1 inform households identified in paragraph 2.1 who are receiving DTT services within a 2 km radius of a base station that they may experience interference with those services; and

3.1.2 inform such households that assistance is available to mitigate such interference.

3.2 Each Licensee shall, through its participation in the Entity, comply with the Key Performance Indicators ("KPIs"), set out in Annex 2 to this Notice (including the relevant Standards, Reporting Requirements and Operational Conditions set out therein), as may be revised by Ofcom from time to time in accordance with Annex 3 of this Notice.

3.3 Each Licensee may, in circumstances where it considers there is a clear and demonstrable case for doing so, make a request to the Oversight Board through its participation in the Entity to recommend to Ofcom that it should change the KPIs in accordance with the parameters set out in Annex 3 of this Notice.

3.4 Ofcom shall, in circumstances where it considers that there should be a change made to the KPIs in accordance with paragraph 3.3, notify such change to each Licensee, including (where appropriate) the period of time for which the change will continue to apply.

Code of Service

3.5 Each Licensee shall, through its participation in the Entity, ensure that within 6 weeks of the date of the grant of the Licences to the Licensees listed in Annex 1 and, in any event, before the Licensee communicates with, or provides support to, households, or commences transmissions under its Licence:

3.5.1 the Entity prepares a "Code of Service" which sets out the standards and level of service that the Entity commits to deliver to the households described in paragraph 2.1.

3.5.2 the Entity consults with the Oversight Board in relation to the preparation of the Code of Service and takes due account of the advice of the Oversight Board on the content of the Code of Service;

3.5.3 the Code of Service is published (for example, on the Entity's website); and

3.5.4 the Entity has due regard to the Code of Service in carrying out its activities.

3.6 Subject to paragraph 3.7, where a Code of Service has not been agreed in accordance with paragraph 3.5 within 6 weeks of the date of the grant of the Licences to the Licensees listed in Annex 1, Ofcom will (in consultation with the Oversight Board) prepare and notify a Code of Service to the Licensees and the Licensees shall comply with that Code of Service through its participation in the Entity.

3.7 Each Licensee may, through its participation in the Entity, make a request to Ofcom to extend the time period specified in paragraph 3.5. Any such request must be made with the agreement of each Licensee listed in Annex 1. Ofcom will consider such requests and notify each Licensee of its decision as soon as practicable.

Complaints

3.8 Each Licensee shall, through its participation in the Entity, ensure that:

3.8.1 the Entity prepares a complaints procedure for the purposes of enabling households to complain to the Entity about the service they have received from the Entity;

3.8.2 the complaints procedure shall include (amongst other things the Licensee considers appropriate to include in that procedure):

a) a mechanism by which complaints may, within a reasonable time, be escalated to an independent body in circumstances where these have not been satisfactorily resolved to the complainant's satisfaction; and

b) details as to the types of actions and remedies the Entity may take in circumstances where that independent body determines that the entity has not acted appropriately;

3.8.3 the Entity consults with the Oversight Board in preparing the complaints procedure, and takes due account of its views;

3.8.4 the Entity demonstrates to the reasonable satisfaction of the Oversight Board that it has put in place a complaints procedure prior to the commencement by the Entity of any form of communication with the households described in paragraph 2.1; and

3.8.5 the complaints procedure is published (for example, on the Entity's website) before the commencement by the Entity of any form of communication with the households described in paragraph 2.1.

Interference Forecasting

3.9 Each Licensee shall, through its participation in the Entity, ensure that in carrying out its activities the Entity uses a single model to forecast predicted levels of interference with DTT receivers.

3.10 Each Licensee shall, through its participation in the Entity, ensure that:

3.10.1 prior to using any single model in accordance with paragraph 3.9, the Entity first consults the Oversight Board on that model and agrees it with Ofcom;

3.10.2 prior to making any amendments to the model, the Entity first consults with the Oversight Board on those amendments and agrees them with Ofcom;

3.10.3 the Oversight Board is able to audit the model from time to time, including (but not limited to) facilitating the Oversight Board with access to the relevant software, input parameters and underlying algorithms.

Provision of filters

3.11 Each Licensee shall, through its participation in the Entity, ensure that households identified at paragraph 2.1 have filters sent to them either:

3.11.1 where those households are within a 1.5km radius of a base station, before the Licensee commences transmissions under its Licence; or

3.11.2 on request by such households, providing that:

a) that household does not rely primarily on a set-top aerial to receive DTT services; and

b) a filter has not already been provided to that household.

Installation support

3.12 Each Licensee shall, through its participation in the Entity, ensure that arrangements are made to install filters for vulnerable[1] households.

3.13 Each Licensee shall, through its participation in the Entity, ensure that up to £12,000.000 (twelve million pounds) of the funding referred to in paragraph 2.4 is made available for the purposes of providing monetary assistance in accordance with paragraph 3.14 to households identified at paragraph 2.1:

3.13.1 that are not vulnerable households;

3.13.2 whose reception of television services on the DTT platform is affected by interference;

3.13.3 whose television installation employs a mast-head amplifier at roof-top height which is not part of a communal aerial system, and

3.13.4 who require the services of a reputable installer to fit a filter to the mast-head amplifier in order to prevent interference to its reception of television services on the DTT platform.

3.14 The monetary assistance that is to be provided by the Entity to each eligible household under paragraph 3.13 is a voucher in the sum of at least £50.00 (fifty pounds) plus VAT which can be redeemed with such installers as determined by the Entity. The Licensees shall ensure that a list of such installers is made public (for example on the internet website of the Entity).

[1] As defined in Section 4 of this Notice.

Platform changes and bespoke mitigation assistance

3.15 Each Licensee shall, through its participation in the Entity, ensure that arrangements are made for a trained technician to install an alternative, but equivalent, television platform (for example, satellite or cable) (a "platform change") in households where:

3.15.1 a filter has already been sent to that household; and

3.15.2 that filter (either alone, or in combination with any network-based mitigation that the Licensee has determined appropriate) has failed to prevent the loss of reception by that household of television services received over the DTT platform.

3.16 Each Licensee shall, through its participation in the Entity ensure that the total number of platform changes provided does not exceed a maximum total as may be notified to it by Ofcom from time to time.

3.17 Each Licensee shall, through its participation in the Entity report on a monthly basis to the Oversight Board as to the number of platform changes that have been made in that month and the total number of platform changes that have been made as at that reporting date.

3.18 Each Licensee shall, through its participation in the Entity, provide to a household a solution that is specifically tailored to restoring that household's reception of television services received over the DTT platform in circumstances where:

3.18.1 a filter has not been capable of preventing interference to that household's reception of television services received over the DTT platform and a platform change is not available; and

3.18.2 the cost of providing such a solution would not exceed £10,000 (ten thousand pounds) per household.

3.19 For the purposes of paragraph 3.18.2, the amount per household may be aggregated in circumstances where a single solution is capable of mitigating interference to more than one household's reception of television over the DTT platform in a particular geographic area.

Section 4

Glossary

In this Notice, including in the Annexes thereto, the following terms shall have the meanings set out below.

4.1 "Communal household" means the number of individual dwellings, each with a separate address, served by a single DTT receiver aerial with the signal boosted through an amplifier and distributed to each dwelling;

4.2 "Contact Centre" means the point of contact that the Licensee ensures is established in accordance with paragraph 3.1.3;

4.3 "dBm" means the power level in decibels (logarithmic scale) referenced against 1milli Watt (i.e. a value of 0 dBm is 1 mW);

4.4 "DTT" means Digital Terrestrial Television;

4.5 "DTT platform" means the platform by which DTT services are transmitted;

4.6 "Entity" means the entity jointly set up, owned and operated by the Licensees to deliver a Single Consumer Help Scheme;

4.7 "filter" means a device designed to attenuate certain electromagnetic frequencies to mitigate interference to the reception of DTT services from transmissions made under the Licences;

4.8 "KPIs" means the Key Performance Indicators (comprising Standards, Requirements and Operational Conditions) as set out in Annex 2 of this Licence;

4.9 "Licence" means a licence granted by Ofcom authorising transmissions within some or all of (i) the downlink frequencies 791 to 821 MHz and (ii) the uplink frequencies 832 to 862 MHz;

4.10 "Licensee" means the holder of a Licence;

4.11 "mast-head amplifier" means a device used to amplify DTT signals which is located adjacent to the aerial that is being used to receive those signals;

4.12 "mobile services" means mobile services that are transmitted under the Licences;

4.13 "Oversight Board" means the board that oversees the Entity, monitors its performance and makes recommendations to it;

4.14 "reputable installer" means an aerial installer belonging to a recognised association or trade body and who holds such certain relevant qualifications as the Entity may determine;

4.15 "relevant reporting region" means the DTT coverage areas that have been notified to each Licensee by Ofcom;

4.16 "set-top aerial" means an aerial for the reception of DTT services designed to be located in the same room or viewing location as the television set;

4.17 “Single Consumer Help Scheme” means the help scheme that each Licensee must, working jointly with each of the other Licensees, provide to households whose primary means of receiving television services transmitted in the 470 – 790 MHz electromagnetic spectrum band is by means of DTT, where that DTT reception is being interfered with (or is likely to be interfered with) by the transmission of mobile services that are being provided by the Licensees, as specified in these procedures;

4.18 “Terrestrial” means radio transmission on the ground to other ground-based systems, but excludes transmission to or between satellite systems;

4.19 “vulnerable household” means a household for which one or more occupant is (or are all) either:

4.19.1 aged seventy-five or over;

4.19.2 entitled to receive one or more of the following:

4.19.3 Disability Living Allowance;

4.19.4 Attendance Allowance;

4.19.5 Constant Attendance Allowance;

4.19.6 Mobility Supplement;

4.19.7 residing in a care home and have been so residing for six months or more;

4.19.8 registered as blind or partially blind;

and whose primary means of receiving television services transmitted in the 470 – 790 MHz electromagnetic spectrum band is by means of DTT, where that DTT reception is being interfered with (or is likely to be interfered with) by the transmission of mobile services that are being provided by the Licensee.

Annex 1

List of [Licences/Licensees]

A2.1

Annex 2

Key Performance Indicators ("KPIs")

KPI 1 – Information Provision

Objective of the KPI		
• To ensure that households affected by DTT interference are supplied with information in good time before interference occurs.		
Standards	**Reporting Requirement(s)**	**Operational Condition(s)**
S1. The Licensee must ensure that 99.9% of households forecast[2] to experience interference to their reception of DTT services within a 2 km radius of a base station[3] have information[4] delivered[5] to them at least four weeks, and no earlier than twelve weeks, in advance of that base station being activated. For the purpose of interpreting KPI thresholds, these should be applied by rounding up to the nearest household.	RR1. The Licensee must report its progress against the Standard S1 of this KPI to the Oversight Board at fortnightly intervals during the twelve week period immediately prior to the date on which the Licensee intends to activate its base station. The Licensee must report whether it considers the KPI in relation to the activation of a base station has been met or not.	OC1. The Licensee must, in the event that it has not complied with the Standard S1 of this KPI by the date on which it intends to activate its base station, delay activation of that base station until such time as it can satisfy the Oversight Board that that Standard has been met. The Licensee must ensure that it reports to the Oversight Board at a time when it considers that Standard S1 of this KPI has been met.

[2] For the purposes of KPIs 1 and 2, the term "households forecast to experience interference" means the population of addresses within either a 2km radius of a base station (KPI 1) or a 1.5km radius of a base station (KPI 2), produced by MitCo through its comparison and correlation of address data (e.g. Royal Mail Address Point) with its interference forecasting map.
[3] For the purposes of counting households where base station coverage areas overlap, households within the coverage of two or more base stations are considered relevant to each base station and therefore success or failure against a KPI standard is counted against all relevant base stations.
[4] This means information that: a) is clear and easily interpreted by households with a focus on raising awareness of the possibility of interference and when it may occur in their area; b) informs households of the services they are eligible to receive from MitCo and how and when these will be provided; how they can contact MitCo; and c) informs of other courses of action open to them where MitCo is not required to provide a service to them.
[5] For the purpose of these KPIs, the term "delivered" means that the relevant item (e.g. information or filter) has been provided to the household or reasonable efforts have been made to provide to the household (e.g. an attempted delivery to their address). It does not mean that MitCo has simply "despatched" an item from its warehouses within the time period.

KPI 2 – Proactive Filter Provision

Objective of the KPI		
• To ensure a significant proportion of households receive filters before experiencing any interference to their DTT reception.		
Standards	**Reporting Requirement(s)**	**Operational Condition(s)**
S2. Where a Licensee activates a base station, it must ensure that no more than 10% of households (not including communal households) forecast to experience interference[6] to their reception of DTT services within a 1.5 km radius of that base station[7] request that a filter be delivered[8] to them within four weeks following the activation of the base station. For the purpose of interpreting KPI thresholds, these should be rounded up to the nearest household.	RR2. The Licensee must report to the Oversight Board four weeks after the activation of a base station, indicating whether or not it considers that it has complied with the Standard S2 of this KPI. The Licensee must provide evidence of: a) The number of requests for a filter that it has received from households within 1.5 km of the relevant base station; b) The number of households forecast to experience interference to their DTT services within the 1.5 km radius of the relevant base station; and c) The number of households reported under point (a) expressed as a percentage of the number reported under point (b).	OC2. In the event that the Licensee has not complied with the Standard S2 of this KPI, it must ensure that any further base stations activated in the relevant reporting region within four weeks from the point at which the Licensee reports to the Oversight Board that Standard S2 of this KPI has not been met comply with "test conditions". The purpose of test conditions is to test for interference. For the purposes of this Operational Condition OC2, "test conditions" means that the Licensee must: a) Activate further base stations at the transmission limit of 64dBm (or maximum transmitting power if less than 64dBm) for a period of fifteen minutes each day, commencing at a time chosen by the Licensee during the hours of 7am – 6pm; b) Ensure that prior to a further base station being activated under point (a), written information has

[6] See footnote 1.
[7] See footnote 2
[8] See footnote 4.

		been delivered to 99% of households forecast to experience interference to their reception of DTT services within a 1.5 km radius of that base station; c) Ensure that the written information under point (b): i. Informs households of the date, time, duration and purpose of the test conditions; ii. Informs households of appropriate actions to take in the event that they experience interference to their DTT equipment during the test conditions; and iii. Includes contact details for the Licensee's mitigation services. The requirement to comply with test conditions will cease four weeks from the date on which the Licensee reported to the Oversight Board that the Standard S2 of this KPI had not been met. After the requirement under this Operational Condition OC2 to comply with test conditions ceases, the Licensee may resume normal operation of any base stations that have been operating under test conditions, in accordance with the Licence. The Licensee must report to the Oversight Board its compliance with this Operational Condition OC2 on a fortnightly basis while the required test conditions

		are in operation. The application of test conditions to a base station required by this Operational Condition OC2 does not preclude it from being subject to the rest of the KPI framework set out in the Notice.

KPI 3 – Reactive Filter Provision

Objective of the KPI		
• To ensure that households experiencing interference receive filters in a timely manner and in accordance with standard practice in the market for delivery / postal services.		
Standards	**Reporting Requirement(s)**	**Operational Condition(s)**
S3. The Licensee must ensure that where households contact Licensees or the Entity reporting interference to their DTT services: a) At least 86% of filters are delivered to the households within the relevant reporting region within three working days of households notifying the Licensee of the interference; b) At least 94% of filters are delivered to the households within the relevant reporting region within four working days of households notifying the Licensee or the Entity of the interference; and c) At least 99% of filters are delivered to the households within the relevant reporting region within six working days of	RR3. The Licensee must report to the Oversight Board at the end of each calendar month, by each reporting region, as to whether it considers that it has complied with the Standard S3 of this KPI, and provide evidence as to the proportion of households within the relevant reporting region that it reasonably considers have had filters delivered within the following timeframes: a) Within three working days of having reported interference; b) Within four working days of having reported interference; c) Within six working days of having reported interference; and d) more than six working	OC3. In the event that the Licensee has not complied with the Standard S3 of this KPI, it must ensure that any further base stations activated in the relevant reporting region within four weeks from the point at which the Licensee reports to the Oversight Board that Standard S3 of this KPI has not been met comply with “test conditions”. The purpose of test conditions is to test for interference. For the purposes of this Operational Condition OC3, “test conditions” means that the Licensee must: a) Activate further base stations at the transmission limit of 64dBm (or maximum transmitting power if less

households notifying the Licensee or the Entity of the interference. For the purpose of interpreting KPI thresholds, these should be rounded up to the nearest household.	days after having reported interference. For the purpose of reporting against the Standard S3 of this KPI, evidence may also include: a) Information from the postal agent used by the Licensee relating to the proportion of completed deliveries within the prescribed delivery timescales; or b) A reasonable level of random sampling of households within particular DTT transmitter areas to ascertain delivery times.	than 64dBm) for a period of fifteen minutes each day, commencing at a time chosen by the Licensee during the hours of 7am – 6pm; b) Ensure that prior to a further base station being activated under point (a), written information has been delivered to 99% of households forecast to experience interference to their reception of DTT services within a 1.5 km radius of that base station; c) Ensure that the written information under point (b): i. Informs households of the date, time, duration and purpose of the test conditions; ii. Informs households of appropriate actions to take in the event that they experience interference to their DTT equipment during the test conditions; and iii. Includes contact details for the Licensee's mitigation services. The requirement to comply with test conditions will cease four weeks from the date on which the Licensee reported to the Oversight Board that the Standard S3 of this KPI had not been met. After the requirement under this Operational Condition OC3 to comply with test conditions ceases, the Licensee may resume normal operation of any base stations that have

		been operating under test conditions, in accordance with the Licence. The Licensee must report to the Oversight Board its compliance with this Operational Condition OC3 on a fortnightly basis while the required test conditions are in operation. The application of test conditions to a base station required by this Operational Condition OC3 does not preclude it from being subject to the rest of the KPI framework set out in the Notice.

KPI 4 – Installation Support to Vulnerable Households

Objective of the KPI		
• To ensure that households who are eligible for additional support receive installation services from Licensees in a timely manner and in accordance with standard practice in the marketplace.		
Standards	**Reporting Requirement(s)**	**Operational Condition(s)**
S4. The Licensee must ensure that, where it is arranging the installation of filters for vulnerable households (where the vulnerable household is not a communal household): a) 50% of such installations within the relevant reporting region are completed within eight working days from the date on which a vulnerable household makes a request; and	RR4. The Licensee must report to the Oversight Board at the end of each calendar month as to whether it considers that it has complied with Standard S4 of this KPI for the relevant reporting region in that calendar month. The Licensee must provide evidence as to: a) The number of instances that calendar month where a vulnerable	OC4. In the event that the Licensee has not complied with the Standard S4 of this KPI, it must ensure that any further base stations activated in the relevant reporting region within four weeks from the point at which the Licensee reports to the Oversight Board that Standard S4 of this KPI has not been met comply with "test conditions". The purpose of "test

b) 99% of such installations within the relevant reporting region are completed within twelve working days from the date on which a vulnerable household makes a request. For the purpose of interpreting KPI thresholds, these should be rounded up to the nearest household.	household has requested the installation of a filter; b) The date on which the request was made; c) The date on which the filter was installed; d) The percentage of filter installations completed within eight working days from the date of the household's request; and e) The percentage of filter installations completed within twelve working days from the date of the household's request.	conditions" is to test for interference. For the purposes of this Operational Condition OC4, "test conditions" means that the Licensee must: a) Activate further base stations at the transmission limit of 64dBm (or maximum transmitting power if less than 64dBm) for a period of fifteen minutes each day, commencing at a time chosen by the Licensee during the hours of 7am – 6pm; b) Ensure that prior to a further base station being activated under point (a), written information has been delivered to 99% of households forecast to experience interference to their reception of DTT services within a 1.5 km radius of that base station; c) Ensure that the written information under point (b): i. Informs households of the date, time, duration and purpose of the test conditions; ii. Informs households of appropriate actions to take in the event that they experience interference to their DTT equipment during the test conditions; and iii. Includes contact details for the Licensee's mitigation services. The requirement to comply with test conditions will cease

		four weeks from the date on which the Licensee reported to the Oversight Board that the Standard S4 of this KPI had not been met. After the requirement under this Operational Condition OC4 to comply with test conditions ceases, the Licensee may resume normal operation of any base stations that have been operating under test conditions, in accordance with the Licence. The Licensee must report to the Oversight Board its compliance with this Operational Condition OC4 on a fortnightly basis while the required test conditions are in operation. The application of test conditions to a base station required by this Operational Condition OC4 does not preclude it from being subject to the rest of the KPI framework set out in the Notice.

KPI 5 – Platform Change Provision

Objective of the KPI		
• To ensure that for households where filters are ineffective, Licensees consider the case for platform changes and provide such installations, as appropriate, in a timely manner.		
Standards	**Reporting Requirement(s)**	**Operational Condition(s)**
S5. The Licensee must ensure that, where a household reports that a filter does not work effectively to	RR5. The Licensee must report to the Oversight Board at the end of each calendar month as to	OC5. In the event that the Licensee has not complied with the Standard S5 of this KPI, it must ensure that any

mitigate interference caused to its DTT services and, consequently, it is arranging for households to have a platform change in accordance with paragraph 3.15 of this Notice: a) 99% of such platform changes, within the relevant reporting region, are completed within fifteen working days from the date on which the household reported its filter was not working. For the purpose of interpreting KPI thresholds, these should be rounded up to the nearest household.	whether it considers that it has complied with Standard S5 of this KPI for the relevant reporting region in that calendar month. The Licensee must provide evidence as to: a) The number of instances during that calendar month where a household has requested a platform change; b) The number of instances during that calendar month where the Licensee has agreed to provide a platform change; c) The date on which the household for which the requirement for a platform change was established originally reported that its filter was not working; d) The date on which the platform change was completed; and e) The percentage of households for which the platform change was completed within fifteen working days from the date of the household's request.	further base stations activated in the relevant reporting region within four weeks from the point at which the Licensee reports to the Oversight Board that Standard S5 of this KPI has not been met comply with "test conditions". The purpose of test conditions is to test for interference. For the purposes of this Operational Condition OC4, "test conditions" means that the Licensee must: a) Activate further base stations at the transmission limit of 64dBm (or maximum transmitting power if less than 64dBm) for a period of fifteen minutes each day, commencing at a time chosen by the Licensee during the hours of 7am – 6pm; b) Ensure that prior to a further base station being activated under point (a), written information has been delivered to 99% of households forecast to experience interference to their reception of DTT services within a 1.5 km radius of that base station; c) Ensure that the written information under point (b): i. Informs households of the date, time, duration and purpose of the test conditions; ii. Informs households of appropriate actions to take in the event that they experience

		interference to their DTT equipment during the test conditions; and iii. Includes contact details for the Licensee's mitigation services. The requirement to comply with test conditions will cease four weeks from the date on which the Licensee reported to the Oversight Board that the Standard S5 of this KPI had not been met. After the requirement under this Operational Condition OC5 to comply with test conditions ceases, the Licensee may resume normal operation of any base stations that have been operating under test conditions, in accordance with the Licence. The Licensee must report to the Oversight Board its compliance with this Operational Condition OC5 on a fortnightly basis while the required test conditions are in operation. The application of test conditions to a base station required by this Operational Condition OC5 does not preclude it from being subject to the rest of the KPI framework set out in the Notice.

KPI 6 - Complaints

Objective of the KPI

• To ensure Licensees minimise the occurrence of complaints[9] from households regarding their required service standards (defined in other KPIs) and respond promptly to issues where they fail or risk failing to meet the requirements of the KPIs set out in this Notice.		
Standards	**Reporting Requirement(s)**	**Operational Condition(s)**
S6. The Licensee must ensure that it has put in place adequate arrangements with regards to the provision of filters and platform changes, such that, for each base station: Over a twelve week period from the activation of a base station: a) No more than 5% of households within 1.5 km of the relevant base station, who have requested a filter under paragraph 3.11.2 ("Provision of filters") complain to the Licensee or the Entity that they have not received a filter within six working days of making their request; and b) No more than 5% of vulnerable households within 1.5 km of the relevant base station who have requested the installation of a filter under paragraph 3.12 ("Installation support") complain that they have not received the installation within twelve working days of making their request. For the purpose of interpreting KPI thresholds, these should be rounded up to the nearest	RR6. For each base station, once activated, the Licensee must report to the Oversight Board every four weeks over a twelve week period as to whether it considers that it has complied with Standard S6 of this KPI for the relevant base station. The Licensee must provide evidence as to: a) The number and nature of the complaints regarding reactive filter provision and installation support that have been made to date; and b) The number of those complaints as a percentage of the total number of households that are potentially within the scope of KPI S6(a). If, at the end of the twelve week period for the relevant base station, Standard S6 set out at S6(a) and S6(b) has not been breached, then the Licensee will no longer be required to report to the Oversight Board on the standard for the relevant base station.	OC6. The Licensee must, in the event that it has not complied with the Standard S6 of this KPI: a) Reduce the in-block transmission level of the relevant base station by 6 dB for three weeks, or until such time as the Oversight Board is satisfied that the Licensee is able to meet the Standard S6, whichever is shorter. b) Provide, or arrange to be provided, a written apology to each household that has been eligible for installation support and who has had to wait longer than twelve working days before a technician first attended their house. The Licensee must report to the Oversight Board at a time when it considers that the Standard S6 of this KPI has been met.

[9] For the purposes of interpreting KPI 6, a "complaint" relates to a report from a household as to whether or not the Entity has delivered on a service requirement under this KPI. It does not relate to whether or not the customer is satisfied with the service more generally.

household.		

Annex 3

Parameters for adjusting Key Performance Indicators

Limits to proposed changes in KPIs based on majority voting by the Oversight Board

KPI	Parameters	Value	Range limit for changes
KPI 1: Information provision	Radial distance from base station	2 km	+/- 0.5 km
	% of forecast households served	99.9%	+/- 10 percentage points
	Timeframe ahead of base station activation	4 weeks	+/- 1 week
	Reporting cycle to base station activation	Every 2 weeks	+/- 2 weeks
	Time period for reporting before base station activation	For 12 weeks	+/- 3 weeks
KPI 2: Proactive filter provision	Radial distance from base station	1.5 km	+/- 0.25 km
	% of forecast households served	10%	+/- 10 percentage points
	Timeframe after base station activation	4 weeks	+/- 1 week
KPI 3: Reactive filter provision	% of households served	Various: 86%, 94% and 99%	+/- 10 percentage points
	Timeframes for service delivery	Various: 3 working days; 4 working days; and 6 working days	+/- 2 working days
	Reporting and compliance cycle	Every calendar month	+/- calendar month
KPI 4: Installation support to vulnerable households	% of households served	Various: 50%; 99%	+/- 10 percentage points
	Timeframes for service delivery	Various: 8 working days; 12 working days	+/- 5 working days
	Reporting and	Every calendar	+/- calendar month

	compliance cycle	month	
KPI 5: Platform change	% of households served	99%	+/- 10 percentage points
	Timeframes for service delivery	15 working days	+/- 5 working days
KPI 6: Complaints	% of households requesting a service	5%	+/- 5 percentage points
	Timeframes for service delivery	Various: 6 working days; 12 working days	+/- 5 working days
	Reporting and compliance cycle	Every 4 weeks	+/- 1 week
	Time period for reporting and compliance	For 12 weeks	+/- 3 weeks

Limits to proposed changes in OCs based on majority voting by the Oversight Board

KPI	Parameters	Value	Range limit for change
Operational Condition in relation to 'delayed base station switch-on' applicable to OC 1	N/a	N/a	N/a
Operational Condition in relation to 'test conditions' applicable to OCs 2, 3, 4 and 5	Radial distance from Base Station	1.5 km	+/- 0.25 km
	% of households served	99%	+/- 10 percentage points
	Transmission power limit	64dBm (or maximum transmitting power if less than 64dBm)	+/- 3 dB
	'Test condition' duration	For 4 weeks	+/- two weeks
	Reporting during 'test conditions'	Every 2 weeks	+/- two weeks
Operational Condition in relation to 'power reduction' applicable to OC 6	Transmission power reduction	6 dB	+/- 6 dB
	Timeframe of power reduction	3 weeks	+/- 1 week

Annex 6

Notice of transitional restrictions on Mobile Networks in the 800 MHz band for protection of DTT in channels 61 and 62

Notice of transitional restrictions on Mobile Networks in the 800 MHz band for protection of DTT in channels 61 and 62

Notice

Publication date: [DATE]

Notice of transitional restrictions on Mobile Networks in the 800 MHz band for protection of DTT in channels 61 and 62

Section 1

Introduction

1.1 This Notice specifies the transitional requirements for ensuring the protection of DTT services broadcasting on channel 61 (790-798 MHz) and 62 (798 to 806 MHz) during 2013 from potential harmful interference from mobile services in the 800 MHz band. The protection requirements in this Notice must be met on an ongoing basis until DTT services are cleared from the 800 MHz band.

1.2 800 MHz licensees are required to comply with this Notice by paragraph 4 of the relevant Schedule to their licences.

1.3 In this Notice:

- “800 MHz band” means the following range of frequencies: 791-862 MHz;
- “800 MHz licensee” means a licensee under a licence authorising use for mobile services in the United Kingdom of frequencies in the 800 MHz band;
- “DTT” means Digital Terrestrial Television
- “Protected Service Area” has the meaning given to it in paragraph 2.2.

Section 2

DTT Service Areas to be Protected

2.1 The DTT transmitters to which this Notice applies are listed in Annex 1.

2.2 The protected service area for a particular DTT transmitter listed in Annex 1 is the polygon area formed by joining the relevant test points for that transmitter as listed in Annex 2. The test point data in Annex 2 is also available as a CSV file from the Ofcom website at http://stakeholders.ofcom.org.uk/spectrum/spectrum-awards/.

2.3 The proposed timetable for clearing each DTT transmitter from channel 61 and/or 62 is included in Annex 1 to this Notice. DTT clearance will take place on a transmitter by transmitter basis. A protected service area is cleared when its associated transmitter is cleared, and at that stage the transitional restrictions described in this Notice will no longer apply to that DTT transmitter and associated protected service area.

2.4 The timetable is subject to change and this Notice will be updated throughout 2013, with the inclusion of exact dates around four months ahead of each clearance event; and inclusion of the word “cleared” next to transmitters once they have been cleared. Amended versions of this Notice will be notified to the Licensees, and placed on Ofcom’s website, at http://stakeholders.ofcom.org.uk/spectrum/spectrum-awards/. It is the 800 MHz licensees’ responsibility to ensure that they refer to the correct version of this Notice.

Section 3

DTT Protection Requirements

3.1 800 MHz licensees must not site 800 MHz base stations within the protected service area of a DTT transmitter listed in Annex 1 while it is still operating on channel 61 or 62 and is therefore not marked as “cleared” in that annex.

3.2 While a DTT transmitter continues to broadcast on either channel 61 or 62, the 800 MHz licensees must not exceed the protection requirements at any relevant test point. The protection requirements are set out in Table 1 in terms of maximum permitted field strengths. Compliance with the maximum permitted field strengths may take account of any horizontal angular antenna discrimination of the DTT receive aerial in accordance with para 4.2 below.

3.3 Figure 1 shows the relationship between channels 61 and 62 and each 5 MHz block in the 800 MHz award. With regard to the FDD downlink spectrum (791 to 821 MHz), block 1 overlaps in frequency with DTT channel 61 (part or all of those two blocks share the same frequencies); block 2 overlaps with channel 61 and 62; whilst block 3 overlaps with channel 62.

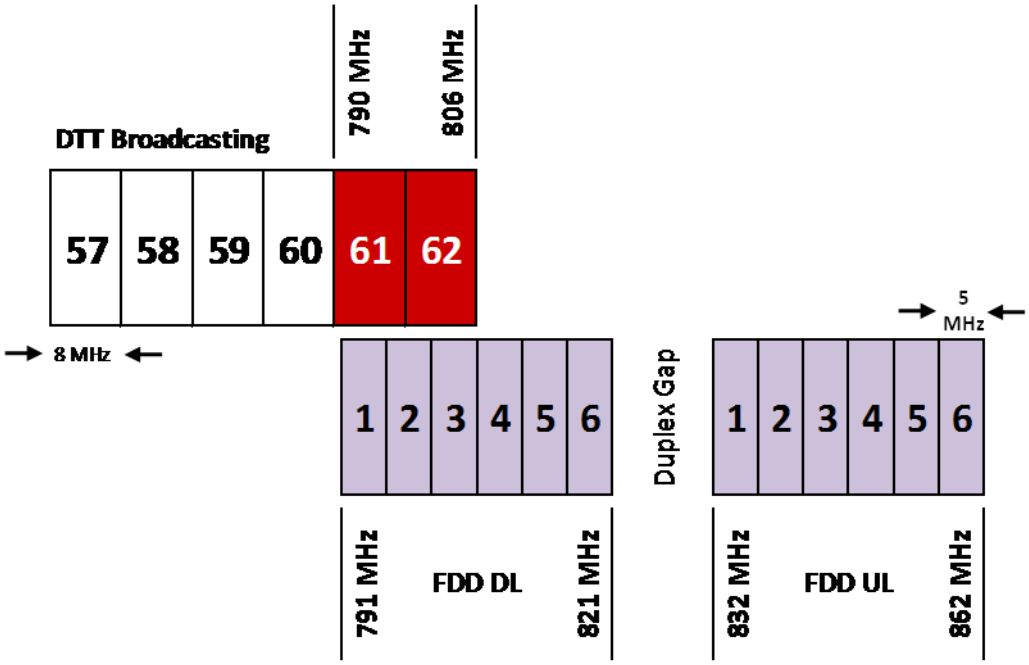

Figure 1. DTT channels 61 and 62 overlap with 800 MHz award blocks

3.4 The maximum permitted cumulative co-channel and adjacent channel interferences are specified over 1 MHz bandwidths as indicated in Table 1 below.

Table 1. Maximum cumulative field strength

DTT reception at test point	Licensee's in-block signal measured over 1 MHz	Maximum cumulative field strength from the licensee's in-block signal measured at a test point[1]
Ch 61	Falls within ch 61 (790 - 798 MHz)	20 dBµV/m/MHz
	Falls outside ch 61 (798 – 821 MHz)	65 dBµV/m/MHz
Ch 62	Falls within ch 62 (798 – 806 MHz)	20 dBµV/m/MHz
	Falls outside ch 62 (790 – 798 MHz, 806 – 821 MHz)	65 dBµV/m/MHz
Ch 61 & 62[2]	Falls within ch 61 or 62 (790 – 806 MHz)	20 dBµV/m/MHz
	Falls outside ch 61 and 62 (806 – 821 MHz)	65 dBµV/m/MHz

3.5 For example, an 800 MHz licensee whose block includes 1 MHz segments which fall within channel 61 must ensure that the cumulative field strength from all of that 800 MHz licensee's mobile base stations received at a test point where channel 61 is in use by DTT, and in a specific 1 MHz segment within channel 61, does not exceed 20 dBµV/m.

3.6 The accumulation of interfering field strengths must be carried out using the Bonn Summation method[3], where the power sum is obtained as follows:

- Sort the interferers in decreasing order of field strength received at a test point.
- Starting with the highest interfering source, the power values equivalent to the received interfering field strengths are added, one after the other.
- At each summation, the equivalent field strength (EFS) is compared to the previous one.
- If the increase in EFS is greater than or equal to 0.5 dB, the summation process continues and the next interferer is taken into account.
- If the increase in EFS is less than 0.5 dB, the summation process is stopped and 0.5 dB is added instead, giving the result of the power sum.

3.7 Table 2 shows one example of the Bonn Summation method for six transmitters with different field strengths. The result of the Bonn Summation can be found at the bottom row: 18.95 dBµV/m/MHz.

[2] Applies to the Winter Hill DTT transmitter only

[3] The Bonn Summation method is used for accumulating interferers in the Maastricht Special Arrangement at http://www.ero.dk/3E3D092C-60A7-4CD0-AADE-B48B36F374D3

Table 2 - Example Bonn Summation

Transmitter Number	Field Strength at test point (*TXFS*) dBµV/m/MHz	Power Factor µV/m/MHz	Power Sum (*PS*) µV/m/MHz	Equivalent Field Strength (*EFS*) dBµV/m/MHz	Increase in EFS dB	Comment	Resulting Field Strength dBµV/m/MHz
TX1	13.55	22.65	22.65	13.55	-	Start with highest field strength	13.55
TX2	12.73	18.75	41.40	16.17	2.62	>0.5dB EFS increase	16.17
TX3	11.88	15.42	56.82	17.54	1.37	>0.5dB EFS increase	17.54
TX4	11.21	13.21	70.03	18.45	0.91	>0.5dB EFS increase	18.45
TX5	8.31	6.78	76.81	18.85	0.40	<0.5dB EFS increase, stop and add 0.5dB	18.95
TX6	6.98	4.99	-	-	-	Ignore TX6 as power sum stopped at TX5	18.95
	↑	↑		↑			↑
	Sort by decreasing order of field strength	$10^{\frac{TXFS}{10}}$		$10 \log_{10} PS$			<20 dBµV/m/MHz threshold

Section 4

Compliance with the DTT Protection Requirements

4.1 800 MHz licensees must maintain records of their calculations and assessments and make these available to Ofcom if required.

4.2 Compliance with the maximum permitted field strengths may take account of any horizontal angular discrimination of the DTT receive aerial. Any aerial discrimination must be obtained using Figure 1 of Recommendation ITU-R BT.419-3[4] as given for broadcasting Bands IV and V. Each test point receive aerial must be assumed to point directly at its DTT transmitter (whose coordinates are given in Annex 1). For example, if an interfering mobile base station is at a 70° angle relative to the direction of peak response (pointing direction) of the DTT receive aerial, then the DTT receive aerial provides 16dB discrimination. Thus the maximum permitted co-channel interfering field strength, if this is the only interferer falling within channel 61 or 62, would then be 20 + 16 = 36 dBµV/m/MHz. If antenna discrimination is adopted, then the Bonn Summation method must be applied taking into account the horizontal angular discrimination of the DTT receive antenna at the test point in relation to each interferer; i.e. the field strength at the receive antenna for each interferer is reduced in the calculation by the relevant receive aerial discrimination value.

4.3 In carrying out this assessment, the 800 MHz licensee must use the recommendation ITU-R P.1546-4 propagation model[5] with the parameters specified below.

Time percentage	1%
Location percentage	50%
DTT receive antenna height, h_2	10 m above ground level
Default base station antenna height, h_a (if no real data is known)	50 m above ground level
Default base station antenna effective height, h_{eff} (if no real data is known)	100 m
Use of terrain clearance angle correction?	No

4.4 Where base station antenna heights above ground (h_a) are known, then they should be used. The default value given in the table above should be used only where no real data is known.

4.5 Base station antenna effective heights (h_{eff}) can be estimated from general geographic information (such as terrain databases), or by using the ITU SRTM3

[4] http://www.itu.int/rec/R-REC-BT.419-3-199006-I/en
[5] http://www.itu.int/rec/R-REC-P.1546-4-200910-I/en

tool[6]. The default value given in the table above should be used only where no other data is available.

4.6 Compliance with the 20 dBµV/m/MHz co-channel and 65 dBµV/m/MHz adjacent channel thresholds should first be assessed on the basis of predictions. However, if actual interference is caused to DTT services by mobile networks despite the predictions, the relevant 800MHz licensee must take remedial action, which may include switching off the interfering mobile base stations until the affected DTT transmitter is cleared.

[6] http://www.itu.int/SRTM3/

Annex 1

DTT Transmitters using channel 61 or channel 62 in 2013

4.7 NGR X National Grid Reference Eastings

4.8 NGR Y National Grid Reference Northings

4.9 ERP kW Effective Radiated Power in kilowatts

4.10 Site Ht m Site Height above ordnance datum in metres

4.11 Ant Ht m Antenna Height above ground level in metres

4.12 Pol Polarisation: H = Horizontal, V = Vertical.

Transmitter Name	NGR X	NGR Y	Channel	ERP kW	Site Ht m	Ant Ht m	Pol	Clearance Month
Burry Port	244930	201960	61	0.002	77	15.8	V	Mar 2013
Ebbw Vale	315990	208820	62	0.1	442	62.2	V	Mar 2013
Llangeinor	290530	188660	62	0.038	306	47.4	V	Mar 2013
Taffs Well	312370	184850	62	0.0104	149	37	V	Mar 2013
Ynysowen	308204	199282	62	0.016	342	24	V	Mar 2013
Tonypandy	298690	192490	62	0.002	224	34	V	Mar 2013
Fernhill	303072	199347	62	0.002	159	16	V	Mar 2013
Mynydd Bach	316851	192624	61	0.05	312	48	V	Mar 2013
Machen Upper	321120	189764	62	0.0072	151	28	V	Mar 2013
Brecon	305457	228755	61	0.2	223	48	V	Mar 2013
Ton Pentre	296040	195590	61	0.032	323	46.8	V	Mar 2013
Monmouth	352620	212770	62	0.046	194	23	V	Mar 2013
Abercynon	309375	195238	61	0.002	174	17	H	Mar 2013
Tynewydd	293152	199334	62	0.004	247	28	V	Mar 2013
Dowlais	307300	208850	61	0.01	397	23	V	Mar 2013
Tonyrefail	300941	187464	62	0.004	165	28	V	Mar 2013
Gellifendigaid	307000	193500	62	0.0024	199	15.8	H	Mar 2013

Transmitter Name	NGR X	NGR Y	Channel	ERP kW	Site Ht m	Ant Ht m	Pol	Clearance Month
South Maesteg	286000	189700	62	0.002	137	14	V	Mar 2013
Mendip	356437	148835	61	100	303	288	H	Mar 2013
Washford	305800	140990	62	0.0124	42	43.3	V	Mar 2013
Countisbury	274840	150080	62	0.042	302	15.6	H	Mar 2013
Hutton	336113	158867	62	0.04	73	37	V	Mar 2013
Portishead	345882	176417	62	0.0074	85	25	V	Mar 2013
Clearwell	357450	208460	62	0.002	207	34	V	Mar 2013
Woodcombe	295100	145800	62	0.01	79	16	V	Mar 2013
Kilve	314300	142500	62	0.003	101	17.4	H	Mar 2013
Halesowen	397100	282600	61	0.0025	150	15.4	V	Apr 2013
Keighley	406895	444380	61	2	305	51	V	Apr 2013
Winter Hill	366053	414463	61	100	439	287	H	Apr 2013
Winter Hill	366053	414463	62	100	439	287	H	Apr 2013
Selkirk	350060	629411	62	10	290	232.4	H	Apr 2013
Innerleithen	332550	636820	61	0.016	238	28	V	Apr 2013
Rumster Forest	319780	938540	62	10	217	237	H	Apr 2013
Tacolneston	613055	295727	62	100	64	199	H	May 2013
Salisbury	413646	128521	62	2	103	50	V	May 2013
Olivers Mount	504014	486916	61	1	151	42	V	May 2013

Transmitter Name	NGR X	NGR Y	Channel	ERP kW	Site Ht m	Ant Ht m	Pol	Clearance Month
Carmel	257685	215339	61	10	255	156	H	May 2013
Pontardawe	273277	203785	61	0.025	156	48	V	May 2013
Huntshaw Cross	252760	122075	62	20	200	159	H	May 2013
Ilfracombe	250703	146495	61	0.056	203	48	V	May 2013
Liverton	281160	73441	62	0.0025	152	20	V	Jun 2013
Kingskerswell	287240	68243	62	0.002	61	30	V	Jun 2013
Beer	323025	89677	62	0.0048	93	30	V	Jun 2013
Beaminster	349080	102493	62	0.015	163	37	V	Jun 2013
Dawlish	295100	77280	62	0.02	103	36	V	Jun 2013
Pennsylvania	293469	94889	61	0.002	110	21	V	Jun 2013
Bincombe Hill	368740	84880	62	0.0064	160	10	V	Jun 2013
Preston	370700	83300	61	0.02	49	8	V	Jun 2013
Plympton	253080	55533	61	0.4	113	50	V	Jun 2013
Newton Ferrers	254507	47575	62	0.002	72	35	V	Jun 2013
Modbury	266050	51407	62	0.002	64	12	H	Jun 2013
Port Isaac	199890	80500	62	0.05	68	18	V	Jun 2013
North Hessary Tor	257810	74200	62	0.0025	508	70	V	Jun 2013
Southway	247820	59920	62	0.002	103	17	V	Jun 2013
St Austell	200800	53560	62	0.25	188	52	V	Jun 2013
Penryn	178710	33450	62	0.044	73	34.3	V	Jun 2013
Truro	183580	44200	61	0.0044	58	29	V	Jun 2013
Helston	165140	27590	61	0.002	71	36.8	V	Jun 2013
Praa Sands	157200	28400	62	0.025	68	29.5	V	Jun 2013
Angus	339486	740784	61	10	312	234.6	H	Jul 2013

Transmitter Name	NGR X	NGR Y	Channel	ERP kW	Site Ht m	Ant Ht m	Pol	Clearance Month
Grandtully	291700	752700	61	0.002	122	5.5	V	Jul 2013
Lochearnhead	259495	722727	61	0.002	138	12	V	Jul 2013
Rosneath VP	225847	681196	61	2	105	111	V	Aug 2013
Rosneath HP	225847	681196	61	0.008	105	107	H	Aug 2013
Kinlochleven	217820	762980	62	0.0024	273	24	V	Aug 2013
Onich VP	201700	761800	61	0.0034	69	15	V	Aug 2013
Onich HP	201700	761800	61	0.0009	69	17	H	Aug 2013
Loch Feochan	186100	725600	61	0.0082	110	18	V	Aug 2013
Kilmelford	181650	710060	62	0.015	251	46.1	V	Aug 2013
Scalloway	439840	1139750	62	0.0058	72	27.7	V	Sep 2013
Swinster	444020	1172700	62	0.32	135	27.7	V	Sep 2013
Weisdale	437980	1151290	61	0.012	229	46	V	Sep 2013
Fodderty	251180	860660	61	0.024	186	37.8	V	Oct 2013
Inverness	266710	844780	62	0.0066	22	18	V	Oct 2013
Craigellachie	326251	844357	61	0.014	180	47	V	Oct 2013
Balblair Wood	259320	895270	62	0.0166	220	32.7	V	Oct 2013
Avoch	270200	855500	61	0.002	71	16.7	V	Oct 2013
Peterhead	411150	845280	62	0.1	42	50	V	Oct 2013
Gartley Moor	354630	832610	61	0.44	416	50	V	Oct 2013
Tullich	337900	798400	62	0.014	454	46.9	V	Oct 2013
Gourdon	382700	770900	62	0.002	20	8	V	Oct 2013
Scoval VP	118140	851440	62	0.032	243	47	V	Oct 2013

Transmitter Name	NGR X	NGR Y	Channel	ERP kW	Site Ht m	Ant Ht m	Pol	Clearance Month
Scoval HP	118140	851440	62	0.132	243	15	H	Oct 2013
Oxford	456714	210540	62	50	135	160	H	Oct 2013
Waltham	480942	323331	61	50	141	301	H	Oct 2013
Belper	433714	346255	62	0.006	190	31.4	V	Oct 2013
Stanton Moor	424566	363726	62	0.4	302	50	V	Oct 2013

Annex 2

DTT Service Areas - Test points for each DTT transmitter in Annex 1

#	Test point number
NGR X	National Grid Reference Eastings
NGR Y	National Grid Reference Northings

Abercynon

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	309489	196920	10	310461	195167	19	309440	194184	28	307714	195217
2	309792	196892	11	310443	194989	20	309266	194198	29	307746	195516
3	310014	196621	12	310394	194823	21	309098	194246	30	308012	195734
4	310115	196275	13	310318	194669	22	308941	194327	31	308216	195931
5	310117	195941	14	310215	194526	23	308800	194429	32	308371	196128
6	310238	195816	15	310089	194406	24	308679	194554	33	308546	196303
7	310335	195670	16	309944	194309	25	308343	194571	34	308756	196444
8	310407	195513	17	309785	194234	26	307993	194678	35	308954	196640
9	310449	195334	18	309615	194192	27	307735	194916	36	309186	196903

Angus

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	340344	794513	19	364755	740322	37	338989	700106	55	289441	741803
2	345050	794403	20	362203	738374	38	335051	696390	56	289329	745904
3	349737	793865	21	360118	736756	39	330141	691469	57	289256	750382
4	354360	792888	22	358357	735360	40	324378	687292	58	289377	754979
5	358888	791515	23	356956	734060	41	319611	688437	59	289934	759931
6	363036	789239	24	356236	732598	42	314983	690129	60	291768	764148
7	366517	785936	25	355515	731148	43	310898	692906	61	294323	767981
8	370270	783336	26	353848	730342	44	307144	696059	62	296483	772058
9	373745	780396	27	349661	731937	45	303989	699814	63	299305	775709
10	376986	777227	28	348444	731517	46	301463	703991	64	302466	779074
11	379902	773772	29	347325	731130	47	299443	708336	65	305935	782124
12	382543	770097	30	362410	707015	48	298064	712856	66	309972	784406
13	373178	759595	31	359817	704434	49	297211	717387	67	313967	786637
14	372451	755414	32	356718	702517	50	296085	721523	68	318033	788726
15	370537	751431	33	359234	684438	51	296054	725900	69	322285	790426
16	369312	748178	34	354040	683678	52	294610	729688	70	326546	792263
17	368758	745388	35	348869	683402	53	293500	733602	71	331001	793734
18	366918	742675	36	342466	701037	54	291261	737546	72	335652	794339

Avoch

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	270316	856517	10	270927	855494	19	270257	854658	28	268539	855571
2	270490	856500	11	270834	855408	20	270049	854397	29	268576	855871
3	270657	856450	12	270771	855321	21	267129	847651	30	268664	856169
4	270813	856367	13	270715	855256	22	268445	852566	31	268922	856361
5	271014	856327	14	270661	855180	23	268711	853761	32	269221	856463
6	271160	856200	15	270605	855115	24	268542	854156	33	269557	856441
7	271276	856051	16	270544	855028	25	268424	854528	34	269802	856422
8	271320	855861	17	270473	854941	26	268368	854886	35	269946	856551
9	271073	855635	18	270383	854821	27	268342	855243	36	270141	856511

Balblair Wood

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	259543	899284	10	260938	895235	19	259289	892039	28	256942	895376
2	260147	898784	11	261223	894902	20	258812	892524	29	256876	895824
3	260598	898244	12	261816	894313	21	258409	892839	30	257169	896192
4	260871	897633	13	262210	893542	22	257931	892945	31	257469	896494
5	260749	896779	14	262536	892472	23	257503	893183	32	257703	896819
6	260602	896227	15	262082	891875	24	257084	893487	33	257706	897466
7	260746	895999	16	261424	891496	25	256830	893931	34	257669	898548
8	260948	895792	17	260638	891501	26	256587	894386	35	258071	899380
9	260931	895502	18	259900	891750	27	256964	894952	36	258825	899398

Beaminster

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	349182	103452	10	350192	102430	19	349146	99782	28	347137	102460
2	349360	103439	11	350175	102252	20	348617	99465	29	347544	102734
3	349531	103382	12	350128	102075	21	347900	99050	30	347813	102943
4	349692	103314	13	350058	101909	22	346887	98571	31	348163	103028
5	349836	103212	14	349948	101776	23	346376	99176	32	348391	103104
6	349960	103077	15	349907	101543	24	345902	99748	33	348525	103225
7	350059	102932	16	349875	101188	25	345779	100528	34	348670	103324
8	350139	102775	17	349716	100900	26	346075	101348	35	348832	103400
9	350178	102597	18	349502	100457	27	346557	101999	36	349005	103443

Beer

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	323125	90615	10	324113	89599	19	323102	89069	28	320053	89660
2	323298	90601	11	323908	89458	20	322995	89015	29	320141	90181
3	323467	90543	12	323734	89371	21	322857	88950	30	320442	90633
4	323624	90474	13	323610	89318	22	322654	88853	31	321027	90857
5	323766	90372	14	323511	89263	23	322301	88681	32	321517	90983
6	323888	90248	15	323426	89231	24	321451	88271	33	322090	90864
7	323986	90102	16	323347	89188	25	319974	87870	34	322427	90836
8	324057	89945	17	323271	89156	26	317784	87771	35	322615	91034
9	324100	89777	18	323191	89112	27	320125	89136	36	322919	90796

Belper

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	433794	348745	10	436697	346240	19	433822	344762	28	432696	346212
2	434255	348837	11	436634	345739	20	433612	345039	29	432715	346401
3	434765	348885	12	436333	345325	21	433434	345160	30	432678	346623
4	435222	348699	13	436129	344901	22	433257	345248	31	432531	346945
5	435638	348424	14	435756	344609	23	433099	345358	32	432522	347278
6	435964	348048	15	435350	344417	24	432964	345502	33	432642	347591
7	436271	347661	16	434866	344425	25	432844	345656	34	432753	348014
8	436476	347207	17	434439	344533	26	432753	345823	35	433048	348261
9	436617	346729	18	434117	344553	27	432714	346012	36	433358	348686

Bincombe Hill

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	368841	85827	10	369838	84820	19	368825	83214	28	367832	84832
2	369014	85804	11	369821	84642	20	368506	83027	29	367848	84999
3	369183	85758	12	369775	84476	21	368123	82907	30	367894	85165
4	369341	85690	13	369700	84321	22	367795	83053	31	367969	85332
5	369484	85589	14	369599	84177	23	367496	83255	32	368070	85476
6	369607	85466	15	369475	84055	24	367242	83501	33	368195	85597
7	369706	85321	16	369331	83956	25	367240	83913	34	368338	85696
8	369779	85154	17	369172	83879	26	367395	84312	35	368497	85762
9	369823	84987	18	369048	83568	27	367569	84611	36	368666	85806

Brecon

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	305654	234849	10	311057	228609	19	305463	224740	28	296820	228883
2	306818	235228	11	310834	227678	20	304791	224897	29	297805	230220
3	308063	235238	12	310123	226946	21	304076	224922	30	298720	231336
4	309661	235532	13	309424	226369	22	303475	225290	31	300078	231999
5	311757	235828	14	308858	225823	23	302696	225461	32	301002	232659
6	312681	234465	15	308108	225536	24	301690	225614	33	301667	233491
7	312688	232652	16	307412	225327	25	300531	225948	34	302662	233894
8	312234	231002	17	306826	224959	26	299543	226658	35	303308	235195
9	311071	229577	18	306154	224783	27	299213	227721	36	304627	234491

Burry Port

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	245042	202917	10	247228	201849	19	244947	199826	28	244009	201947
2	245216	202890	11	247194	201460	20	244570	199793	29	244029	202114
3	245384	202840	12	246980	201133	21	244208	199904	30	244080	202290
4	245540	202768	13	246780	200827	22	244029	200333	31	244158	202444
5	245680	202664	14	246630	200476	23	244013	200801	32	244264	202585
6	245815	202549	15	246418	200137	24	244210	201285	33	244390	202704
7	246095	202495	16	246084	199925	25	244128	201443	34	244537	202799
8	246342	202354	17	245681	199893	26	244059	201601	35	244697	202861
9	246598	202146	18	245310	199859	27	244018	201769	36	244867	202900

Carmel

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	259010	259156	19	295689	214353	37	256947	186462	55	211883	216795
2	262805	258593	20	298742	210708	38	254489	187032	56	212084	220785
3	266512	257713	21	300857	206628	39	251558	185070	57	212678	224749
4	270362	257388	22	298175	203410	40	248548	184402	58	213450	228684
5	274195	256654	23	295817	200388	41	245596	184591	59	214575	232562
6	278352	256284	24	294163	197218	42	243527	186881	60	216080	236314
7	282190	254900	25	291978	194394	43	242980	191272	61	217617	240121
8	286250	253581	26	290746	190949	44	246386	199949	62	220511	243056
9	289754	251288	27	288877	187819	45	243963	199745	63	223386	245881
10	291254	246948	28	286349	185205	46	241697	200105	64	226689	248203
11	292143	242545	29	283604	182819	47	239801	201066	65	230165	250131
12	292387	238145	30	280996	180176	48	238009	202293	66	233332	252351
13	291939	233804	31	270055	192507	49	237592	204321	67	236700	254231
14	293578	230842	32	267781	192065	50	237163	206416	68	239776	256836
15	294901	227721	33	265624	191565	51	211089	200034	69	243170	259132
16	292071	223531	34	263518	191010	52	211673	204566	70	247406	258743
17	288657	219912	35	261498	189830	53	214149	209073	71	251367	258612
18	292489	217447	36	259498	185789	54	213164	212861	72	255175	259044

Clearwell

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	357552	209411	10	358547	208402	19	357525	206275	28	355380	208429
2	357726	209398	11	358529	208235	20	357152	206311	29	355450	208806
3	357894	209353	12	358483	208069	21	356785	206392	30	355527	209162
4	358052	209273	13	358408	207902	22	356451	206562	31	355712	209494
5	358194	209172	14	358306	207770	23	356138	206776	32	356099	209646
6	358317	209049	15	358227	207592	24	355876	207045	33	356496	209676
7	358416	208903	16	358255	207158	25	355658	207347	34	356845	209651
8	358489	208747	17	358092	206871	26	355509	207694	35	357182	209436
9	358533	208580	18	357850	206583	27	355430	208061	36	357378	209401

Countisbury

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	274930	150247	10	295273	169393	19	276407	149988	28	277273	147575
2	274949	150235	11	297337	167915	20	278685	149611	29	277082	147335
3	280649	178360	12	299777	166554	21	280095	148988	30	276809	147197
4	283430	178862	13	275226	150195	22	278750	148909	31	276555	147047
5	285599	177211	14	275280	150183	23	278193	148755	32	276288	146920
6	287547	175410	15	275350	150170	24	278068	148469	33	276011	146816
7	289413	173722	16	275447	150156	25	277875	148229	34	275719	146756
8	290911	171676	17	275595	150130	26	277686	147999	35	275426	146719
9	292548	169995	18	275850	150091	27	277479	147782	36	275137	146670

Craigellachie

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	326362	845579	10	330034	844301	19	326296	841917	28	325265	844386
2	326629	845842	11	329659	843717	20	325902	842125	29	325285	844574
3	327018	846124	12	329353	843210	21	325660	842608	30	325337	844752
4	327614	846481	13	328925	842817	22	325555	843066	31	325419	844917
5	328342	846657	14	327874	843036	23	325542	843456	32	325529	845071
6	328851	846392	15	327229	843270	24	325517	843702	33	325664	845202
7	329505	846114	16	327257	842713	25	325399	843849	34	325819	845311
8	330171	845679	17	327255	841710	26	325323	844017	35	325990	845386
9	330341	844997	18	326750	841775	27	325278	844196	36	326174	845416

Dawlish

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	295280	81889	10	296548	77192	19	295132	74461	28	290877	77307
2	296079	81739	11	296435	76971	20	292828	65275	29	291196	78012
3	296863	81546	12	296333	76784	21	293533	72958	30	291393	78686
4	298421	82561	13	296235	76586	22	292937	73516	31	291705	79325
5	297133	79438	14	296134	76399	23	292256	73874	32	292191	79838
6	301566	82356	15	296024	76179	24	291807	74506	33	292748	80238
7	303105	81582	16	295896	75937	25	291462	75181	34	293180	80852
8	296852	77786	17	295733	75617	26	291148	75844	35	293775	81341
9	296682	77456	18	295505	75177	27	290900	76561	36	294476	81771

Dowlais

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	307406	209807	10	308391	208788	19	307333	205814	28	304759	208855
2	307580	209782	11	308373	208610	20	306852	206068	29	304500	209372
3	307749	209734	12	308324	208444	21	306502	206508	30	304618	209870
4	307905	209664	13	308415	208187	22	306197	206837	31	305008	210230
5	308047	209562	14	308584	207761	23	305972	207186	32	305526	210420
6	308168	209437	15	308673	207225	24	305810	207534	33	306012	210500
7	308266	209291	16	308580	206659	25	305602	207816	34	306582	210256
8	308337	209134	17	308303	206153	26	305186	208046	35	306996	209948
9	308379	208955	18	307852	205872	27	304979	208428	36	307232	209788

Ebbw Vale

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	316255	219341	10	326651	208610	19	315830	193884	28	311756	208850
2	318395	220708	11	324714	207115	20	313874	197411	29	312381	209495
3	320230	219588	12	325735	205098	21	312988	200730	30	312547	210127
4	323873	221745	13	327199	202140	22	312262	202433	31	312419	210963
5	326085	220288	14	325762	200403	23	312088	204194	32	312390	211965
6	328289	218665	15	324265	198712	24	312390	205791	33	312629	213018
7	331252	217200	16	323909	194713	25	312647	206876	34	312654	214931
8	327168	212607	17	320340	196470	26	312350	207493	35	313630	215848
9	326616	210457	18	318606	192949	27	311762	208093	36	314432	219094

Fernhill

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	303188	200886	10	304759	199265	19	303138	198295	28	302155	199315
2	303466	200859	11	304730	198988	20	302964	198309	29	302173	199482
3	303785	200919	12	304579	198746	21	302797	198357	30	302222	199659
4	304059	200781	13	304301	198607	22	302640	198438	31	302299	199813
5	304304	200609	14	304044	198522	23	302498	198541	32	302272	200069
6	304515	200382	15	303787	198516	24	302377	198666	33	302320	200336
7	304685	200135	16	303642	198419	25	302280	198812	34	302421	200623
8	304674	199812	17	303482	198344	26	302209	198969	35	302638	200808
9	304740	199544	18	303313	198303	27	302166	199137	36	302910	200869

Fodderty

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	251305	861827	10	256094	860506	19	251165	858021	28	248955	860767
2	251504	861809	11	256842	859488	20	250663	857895	29	249396	861073
3	251696	861746	12	256366	858614	21	249960	857475	30	249847	861257
4	251927	861738	13	255806	857831	22	249181	857370	31	250201	861344
5	252286	861814	14	253950	858254	23	248240	857339	32	250406	861448
6	252764	861841	15	253024	858422	24	247677	857895	33	250554	861588
7	253326	861765	16	252494	858352	25	247355	858620	34	250723	861693
8	253957	861552	17	252077	858155	26	247710	859532	35	250908	861775
9	254850	861175	18	251630	858027	27	248222	860259	36	251104	861824

Gartley Moor

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	355007	858176	10	376481	832445	19	354620	823322	28	345223	832745
2	359165	856240	11	378606	828214	20	352653	821630	29	347298	834020
3	362746	853900	12	379675	823321	21	349648	819172	30	344949	836311
4	364546	849186	13	375990	820113	22	344407	815254	31	347012	837197
5	363471	842805	14	371260	818496	23	340051	815582	32	344744	841191
6	365033	841077	15	366931	817794	24	339745	820385	33	343271	846577
7	363652	837649	16	362219	819337	25	343358	826257	34	342976	853485
8	369793	837944	17	358168	822850	26	343104	828565	35	346298	856557
9	371942	835490	18	357191	817694	27	343058	830726	36	350312	859322

Gellifendigaid

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	307106	194449	10	308091	193430	19	307055	191669	28	306085	193467
2	307280	194435	11	308072	193263	20	306742	191686	29	306104	193644
3	307448	194387	12	308233	193016	21	306449	191791	30	306152	193810
4	307605	194306	13	308345	192702	22	306164	191919	31	306229	193965
5	307747	194204	14	308356	192357	23	305920	192113	32	306332	194107
6	307868	194079	15	308203	192082	24	305781	192404	33	306458	194227
7	307966	193933	16	307959	191886	25	305804	192749	34	306603	194325
8	308037	193776	17	307672	191758	26	305927	193058	35	306763	194400
9	308079	193608	18	307365	191696	27	306097	193300	36	306932	194441

Gourdon

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	382800	772000	10	383201	770907	19	382794	770408	28	381032	770917
2	382991	771988	11	383149	770841	20	382680	770264	29	381220	771194
3	383175	771932	12	383108	770796	21	382457	769987	30	381445	771405
4	383347	771853	13	383070	770752	22	381736	769088	31	381633	771582
5	383503	771741	14	383035	770708	23	378402	765731	32	381961	771614
6	383637	771607	15	383000	770663	24	380395	768916	33	382096	771747
7	383566	771351	16	382962	770619	25	380419	769550	34	382298	771779
8	383373	771118	17	382919	770563	26	380608	770128	35	382426	771935
9	383270	770996	18	382866	770497	27	380568	770529	36	382610	771990

Grandtully

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	291812	753712	10	292790	752685	19	291760	751709	28	290783	752737
2	291986	753686	11	292770	752507	20	291586	751725	29	290803	752903
3	292153	753637	12	292720	752342	21	291419	751774	30	290853	753069
4	292310	753566	13	292642	752188	22	291263	751856	31	290930	753234
5	292451	753462	14	292538	752046	23	291122	751960	32	291035	753376
6	292571	753337	15	292411	751926	24	291001	752085	33	291162	753495
7	292668	753189	16	292265	751830	25	290905	752233	34	291307	753592
8	292737	753021	17	292105	751756	26	290835	752390	35	291468	753655
9	292778	752852	18	291935	751716	27	290794	752558	36	291637	753695

Halesowen

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	397198	284243	10	398201	282563	19	397197	281562	28	395507	282565
2	397477	284131	11	398185	282385	20	397023	281573	29	395430	282876
3	397677	283876	12	398140	282218	21	396854	281618	30	395485	283187
4	397813	283620	13	398066	282062	22	396582	281496	31	395644	283454
5	397843	283330	14	397965	281918	23	396297	281496	32	395815	283721
6	397966	283208	15	397841	281795	24	395970	281541	33	396031	283954
7	398066	283063	16	397699	281695	25	395730	281719	34	396355	284021
8	398140	282908	17	397540	281618	26	395610	281986	35	396621	284143
9	398185	282730	18	397371	281573	27	395549	282275	36	396905	284221

Helston

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	165309	29689	10	166655	27469	19	165169	26510	28	164211	27577
2	165683	29639	11	166950	27144	20	164996	26551	29	164234	27743
3	165951	29304	12	167100	26748	21	164829	26603	30	164286	27907
4	166042	28821	13	167041	26361	22	164674	26687	31	164367	28071
5	166135	28528	14	166812	26070	23	164536	26794	32	164408	28269
6	166364	28406	15	166464	25896	24	164417	26921	33	164442	28535
7	166500	28200	16	166032	25959	25	164324	27070	34	164447	29003
8	166514	27932	17	165651	26143	26	164256	27229	35	164635	29362
9	166471	27689	18	165379	26267	27	164218	27398	36	164943	29571

Huntshaw Cross

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	253584	148041	19	299604	120892	37	251481	74024	55	222734	122811
2	255890	148054	20	298733	116893	38	247327	74633	56	222872	125422
3	258242	148055	21	297882	112972	39	243345	75963	57	237755	125045
4	260740	148265	22	296045	109327	40	239462	77327	58	239067	126039
5	263445	148570	23	293546	106085	41	235900	79407	59	240026	127000
6	266386	148860	24	291400	102881	42	232412	81398	60	240913	127896
7	269670	149198	25	289251	99789	43	229144	83685	61	213551	146023
8	273569	149779	26	287108	96731	44	226053	86135	62	242511	129572
9	277469	149651	27	284710	93880	45	223208	88835	63	243264	130406
10	281503	149056	28	282165	91156	46	220157	91310	64	244011	131218
11	286283	148502	29	279388	88661	47	217365	94111	65	244789	132074
12	292175	147986	30	276571	86157	48	216534	98282	66	244870	133985
13	293493	144065	31	273653	83645	49	220464	104656	67	244287	137676
14	295980	140776	32	270732	80780	50	220519	108172	68	244983	140014
15	298189	137228	33	267323	78573	51	220311	111329	69	245895	142724
16	298561	133049	34	263716	76440	52	220557	114460	70	247353	144884
17	298549	128922	35	259843	74628	53	221131	117457	71	249137	146946
18	299436	124956	36	255677	74141	54	222190	120158	72	251324	147483

Hutton

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	336219	160262	10	340975	158748	19	336183	157370	28	333150	158844
2	336514	160458	11	340535	157996	20	335946	157462	29	333335	159353
3	336923	160709	12	340234	157288	21	335719	157543	30	333851	159702
4	337574	161113	13	339854	156647	22	335460	157569	31	334303	159930
5	338201	161127	14	339171	156266	23	335038	157463	32	334843	159979
6	339258	161304	15	338331	156210	24	334509	157425	33	335281	159929
7	339960	160917	16	337526	156453	25	333980	157565	34	335534	159992
8	340651	160364	17	336880	156872	26	333652	157925	35	335751	160090
9	341557	159686	18	336469	157178	27	333115	158311	36	335983	160142

Ilfracombe

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	250809	147364	10	259395	146198	19	250522	137480	28	248450	146510
2	250983	147404	11	257968	144958	20	249025	137946	29	248763	146857
3	251189	147454	12	257310	143852	21	247996	139445	30	249360	147006
4	251454	147524	13	256841	142719	22	247720	141490	31	249721	147096
5	251836	147613	14	256374	141475	23	248132	143470	32	249975	147155
6	252480	147772	15	255912	139974	24	248407	144564	33	250174	147205
7	253785	148047	16	254669	139252	25	248038	144964	34	250344	147244
8	255661	148049	17	253802	137352	26	247721	145430	35	250500	147284
9	259556	147730	18	252169	136998	27	248143	146052	36	250651	147325

Innerleithen

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	332657	637909	10	335811	636770	19	332593	633713	28	331541	636835
2	332849	637894	11	335594	636250	20	332112	634077	29	331560	637024
3	333033	637847	12	335257	635821	21	331816	634660	30	331703	637178
4	333174	637711	13	335344	635208	22	331732	635296	31	331697	637378
5	333460	637763	14	335252	634563	23	331822	635873	32	331809	637532
6	333913	637845	15	334628	634383	24	331835	636163	33	331946	637664
7	334519	637858	16	334004	634371	25	331680	636287	34	332105	637772
8	335287	637735	17	333558	634177	26	331601	636456	35	332281	637859
9	335748	637317	18	333140	633716	27	331554	636646	36	332466	637900

Inverness

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	266865	846969	10	267797	844766	19	266722	842618	28	264330	844880
2	267216	846802	11	267776	844589	20	266316	842531	29	264381	845302
3	267558	846701	12	267799	844399	21	265876	842512	30	264506	845710
4	267752	846339	13	267831	844152	22	265492	842703	31	264700	846094
5	267866	845990	14	267826	843874	23	265148	842970	32	264958	846442
6	267885	845655	15	267770	843553	24	264855	843281	33	265272	846732
7	267872	845377	16	267647	843200	25	264620	843634	34	265632	846965
8	267823	845133	17	267394	842964	26	264451	844030	35	266026	847130
9	267787	844934	18	267084	842773	27	264353	844445	36	266466	847094

Keighley

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	406970	456925	10	417280	444379	19	407013	428031	28	385695	444370
2	408549	453267	11	419661	442163	20	404785	431789	29	385639	448130
3	409319	450776	12	424189	438168	21	401308	428716	30	385385	452214
4	410175	449888	13	424925	434100	22	399172	430807	31	384883	457100
5	411182	449356	14	424166	430057	23	398710	434490	32	389680	458834
6	412916	449338	15	423764	424503	24	398817	437505	33	394351	459360
7	414142	448496	16	418898	423858	25	398603	439519	34	400034	456341
8	414926	447264	17	413903	425498	26	396031	440377	35	402373	456954
9	417311	446204	18	409987	427535	27	389778	441332	36	404323	459314

Kilmelford

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	182021	715857	10	184998	709896	19	181641	708439	28	180391	710131
2	183101	716047	11	184544	709417	20	181353	708442	29	180520	710336
3	183715	714756	12	184043	709086	21	181075	708535	30	180635	710520
4	184290	714013	13	183714	708779	22	180758	708573	31	177308	712923
5	184787	713353	14	183221	708670	23	180341	708584	32	174750	716537
6	185024	712549	15	182785	708659	24	179850	708654	33	176537	716922
7	185034	711757	16	182476	708597	25	179718	709040	34	177396	718517
8	185148	711115	17	182214	708476	26	180025	709548	35	179830	716215
9	185250	710497	18	181925	708447	27	180234	709883	36	180982	716044

Kilve

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	314414	143962	10	315932	142424	19	314372	141449	28	313209	142470
2	314717	144135	11	315695	142195	20	314198	141463	29	313082	142705
3	315005	144053	12	315497	142020	21	314030	141510	30	313144	142927
4	315409	144146	13	315249	141935	22	313873	141591	31	313296	143102
5	315683	143930	14	315146	141792	23	313731	141693	32	313382	143323
6	315922	143693	15	315020	141672	24	313610	141818	33	313435	143623
7	316095	143389	16	314876	141574	25	313512	141964	34	313654	143764
8	316151	143055	17	314716	141499	26	313440	142121	35	313895	143871
9	315997	142701	18	314546	141457	27	313399	142289	36	314151	143944

Kingskerswell

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	287348	69183	10	288528	68157	19	287300	66981	28	285365	68225
2	287522	69157	11	288886	67871	20	287122	67152	29	285312	68582
3	287689	69109	12	289005	67535	21	286963	67245	30	285412	68924
4	287846	69039	13	288969	67191	22	286806	67326	31	285570	69244
5	287987	68936	14	288891	66814	23	286665	67429	32	285852	69471
6	288108	68811	15	288640	66552	24	286544	67554	33	286268	69495
7	288205	68664	16	288324	66370	25	286415	67679	34	286666	69376
8	288276	68507	17	287909	66479	26	286015	67732	35	286992	69157
9	288318	68339	18	287565	66642	27	285657	67929	36	287173	69164

Kinlochleven

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	217942	763990	10	218901	762946	19	217855	761988	28	216896	763033
2	218116	763972	11	219151	762712	20	217681	762007	29	216919	763210
3	218282	763909	12	219447	762354	21	217514	762058	30	216971	763375
4	218438	763835	13	219622	761889	22	217359	762143	31	217052	763528
5	218577	763729	14	219405	761609	23	217220	762250	32	217159	763668
6	218695	763601	15	219143	761375	24	217102	762377	33	217287	763785
7	218789	763452	16	218842	761176	25	217008	762526	34	217435	763879
8	218856	763293	17	218513	761045	26	216942	762685	35	217596	763939
9	218894	763124	18	218105	761431	27	216904	762854	36	217767	763987

Liverton

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	281290	75346	10	282248	73355	19	281223	72377	28	280242	73400
2	281629	75305	11	282229	73189	20	281049	72403	29	280262	73578
3	281920	75109	12	282180	73023	21	280882	72451	30	280311	73744
4	282094	74771	13	282102	72858	22	280724	72522	31	280388	73898
5	282178	74436	14	281999	72727	23	280583	72625	32	280492	74040
6	282146	74103	15	281872	72596	24	280463	72761	33	280515	74295
7	282125	73858	16	281727	72499	25	280366	72897	34	280558	74628
8	282196	73701	17	281567	72436	26	280296	73065	35	280724	74925
9	282237	73533	18	281397	72395	27	280254	73233	36	280981	75097

Llangeinor

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	290714	193131	10	292510	188575	19	290442	180564	28	289171	188647
2	291518	193135	11	293088	188129	20	289534	183176	29	288984	188940
3	292213	192709	12	294056	187285	21	289146	184842	30	288726	189347
4	292835	192262	13	295368	185745	22	289219	186321	31	288450	189920
5	292956	191280	14	296422	183543	23	289354	187174	32	288090	190818
6	292600	190197	15	298102	179325	24	289426	187662	33	287891	192002
7	292539	189665	16	296022	178789	25	289357	187920	34	288283	192850
8	292854	189369	17	294521	177151	26	289041	188082	35	288995	193368
9	292794	188947	18	292251	178033	27	288980	188362	36	289864	193483

Loch Feochan

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	186230	726683	10	187979	725514	19	186027	722668	28	183745	725727
2	186415	726651	11	188167	725147	20	185518	722738	29	183921	726120
3	186593	726598	12	188177	724757	21	185029	722897	30	184191	726441
4	186753	726501	13	188086	724371	22	184533	723067	31	184546	726657
5	186899	726382	14	188058	723859	23	185054	724401	32	185021	726677
6	187087	726294	15	187726	723564	24	184480	724330	33	185282	726787
7	187332	726193	16	187347	723326	25	183594	724285	34	185582	726760
8	187588	726035	17	186932	723158	26	183553	724801	35	185843	726680
9	187742	725804	18	186541	722687	27	183533	725281	36	186043	726659

Lochearnhead

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	259626	724321	10	260576	722697	19	259540	721728	28	258248	722774
2	259903	724289	11	260555	722519	20	259366	721745	29	258111	723035
3	260171	724214	12	260504	722354	21	259199	721795	30	258086	723325
4	260419	724083	13	260425	722200	22	259043	721878	31	258212	723566
5	260571	723833	14	260320	722059	23	258903	721983	32	258380	723794
6	260617	723542	15	260192	721941	24	258784	722110	33	258584	723988
7	260618	723286	16	260046	721845	25	258688	722258	34	258818	724136
8	260526	723032	17	259885	721773	26	258619	722416	35	259075	724250
9	260567	722864	18	259715	721734	27	258400	722557	36	259347	724308

Machen Upper

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	321225	190716	10	322212	189700	19	321165	186835	28	320207	189731
2	321399	190691	11	322194	189522	20	320690	187020	29	320224	189898
3	321567	190644	12	322147	189356	21	320360	187493	30	320272	190075
4	321724	190575	13	322512	188939	22	320115	187886	31	320349	190229
5	321866	190473	14	322696	188424	23	320150	188497	32	320452	190372
6	321988	190348	15	322733	187845	24	320374	189039	33	320577	190493
7	322086	190202	16	322451	187482	25	320333	189228	34	320722	190591
8	322157	190045	17	322169	186953	26	320262	189385	35	320881	190655
9	322200	189867	18	321666	186872	27	320219	189553	36	321051	190697

Mendip

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	357149	222094	19	426528	148187	37	355979	84374	55	271670	149493
2	363521	221432	20	425366	142187	38	350649	87557	56	329519	151185
3	369883	220778	21	422628	136580	39	345661	90020	57	329703	153551
4	375984	218865	22	420362	131133	40	340768	91853	58	329891	155951
5	381651	215916	23	416623	126382	41	335612	92781	59	284310	175694
6	387416	213507	24	416355	120332	42	328522	90115	60	290800	180034
7	392947	210604	25	414523	114721	43	320561	87895	61	296576	183973
8	398134	207152	26	412954	108668	44	311735	86301	62	300376	188714
9	402987	203271	27	409865	103357	45	306154	90158	63	304528	193051
10	407505	198793	28	406626	97970	46	301218	94554	64	308373	197863
11	411649	194119	29	402798	93029	47	296740	99602	65	312282	202488
12	415228	189045	30	398026	88758	48	292704	105001	66	316996	206280
13	417830	183404	31	392858	84904	49	289135	110738	67	321796	210096
14	420476	177853	32	387567	80989	50	286050	116723	68	327413	212537
15	422562	172123	33	380679	80821	51	283518	122976	69	332837	215510
16	424092	166225	34	373765	82308	52	281748	129480	70	338660	217648
17	425085	160235	35	368973	74717	53	280552	136083	71	344683	219269
18	426072	154257	36	361975	79845	54	278328	142621	72	350835	220684

Modbury

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	266159	52335	10	267136	51309	19	266109	50345	28	264532	51375
2	266333	52320	11	267117	51143	20	265935	50360	29	264564	51653
3	266501	52271	12	267067	50977	21	265767	50409	30	264643	51929
4	266657	52189	13	266990	50823	22	265611	50491	31	264767	52170
5	266798	52085	14	266886	50681	23	265401	50508	32	264933	52400
6	266919	51960	15	266759	50562	24	265085	50504	33	265135	52595
7	267014	51813	16	266613	50466	25	264827	50633	34	265420	52643
8	267085	51655	17	266453	50392	26	264615	50828	35	265712	52591
9	267126	51487	18	266283	50352	27	264550	51108	36	265968	52440

Monmouth

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	352739	215427	10	353949	212713	19	352694	210711	28	346535	212786
2	353101	214801	11	353955	212490	20	352213	210049	29	346279	213924
3	353212	214054	12	353887	212291	21	351499	209488	30	347441	214701
4	353352	213808	13	353797	212091	22	350690	209307	31	348207	215383
5	353519	213662	14	353675	211903	23	349713	209228	32	348289	216505
6	353688	213527	15	353501	211772	24	348001	208856	33	349107	217098
7	353804	213337	16	353324	211651	25	346840	209424	34	350614	216437
8	353899	213147	17	353134	211530	26	346490	210540	35	351301	216709
9	353939	212924	18	352948	211321	27	346581	211707	36	352112	216323

Mynydd Bach

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	317039	198648	10	320879	192512	19	316885	189295	28	309194	192709
2	318160	198874	11	320148	191957	20	316164	188573	29	309779	193956
3	319422	199043	12	319373	191646	21	315056	187668	30	309362	195476
4	319957	197600	13	319004	191341	22	313317	186552	31	309813	196836
5	321151	197414	14	318872	190898	23	312881	187905	32	311450	197330
6	321566	196317	15	318800	190287	24	310695	187520	33	312862	197584
7	321451	195073	16	318185	190342	25	310689	189111	34	313946	197943
8	321778	194245	17	317733	190282	26	310357	190308	35	314728	198953
9	321594	193313	18	317348	190022	27	309196	191352	36	315960	198699

Newton Ferrers

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	254642	49668	10	256749	47453	19	254556	46533	28	253132	47552
2	255017	49625	11	256678	47087	20	254373	46494	29	252960	47846
3	255379	49515	12	256067	46926	21	254178	46488	30	253046	48121
4	255717	49350	13	255694	46825	22	253964	46505	31	253170	48374
5	256021	49130	14	255430	46765	23	253917	46762	32	253176	48752
6	256281	48856	15	255221	46704	24	253797	46888	33	253406	48990
7	256467	48528	16	255043	46665	25	253700	47035	34	253614	49296
8	256649	48201	17	254880	46624	26	253547	47162	35	253893	49578
9	256727	47831	18	254721	46573	27	253336	47323	36	254264	49645

North Hessary Tor

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	257920	75147	10	260683	74072	19	257866	73146	28	256890	74174
2	258094	75121	11	260772	73558	20	257692	73162	29	256910	74340
3	258261	75071	12	260624	73072	21	257525	73211	30	256960	74506
4	258418	74989	13	260421	72599	22	257368	73293	31	257038	74671
5	258558	74885	14	259927	72345	23	257228	73397	32	257142	74801
6	258678	74760	15	259379	72271	24	257108	73523	33	257269	74920
7	259169	74836	16	258875	72329	25	257011	73670	34	257415	75017
8	259722	74754	17	258384	72676	26	256942	73828	35	257576	75090
9	260232	74485	18	258041	73153	27	256901	73996	36	257745	75130

Olivers Mount

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	504074	488850	10	504939	486911	19	504339	477168	28	495575	486706
2	504333	488266	11	505008	486756	20	502705	477688	29	495906	488149
3	504479	487946	12	505095	486558	21	501125	478065	30	492825	490724
4	504578	487726	13	505216	486294	22	499165	477867	31	493728	492579
5	504653	487550	14	510799	481538	23	496730	477704	32	494924	494250
6	504716	487406	15	513556	476184	24	494428	478413	33	494083	498296
7	504772	487285	16	508937	478989	25	491793	479428	34	497831	497217
8	504825	487164	17	507441	478386	26	491534	482016	35	498449	501404
9	504880	487043	18	505878	478105	27	494176	484919	36	503433	490294

Onich HP

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	201852	763406	10	203215	763118	19	204446	761678	28	203093	760370
2	202008	763510	11	203323	762980	20	204833	761393	29	202851	760404
3	202156	763492	12	203419	762841	21	205047	761071	30	202649	760436
4	202309	763473	13	203719	762805	22	205017	760782	31	202475	760455
5	202452	763422	14	203935	762694	23	204981	760472	32	202322	760485
6	202590	763348	15	204374	762618	24	204529	760370	33	202184	760502
7	202735	763297	16	204387	762372	25	204106	760312	34	202058	760519
8	202906	763267	17	204427	762147	26	203776	760271	35	201939	760536
9	203029	763161	18	204446	761912	27	203394	760323	36	201827	760553

Onich VP

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	201718	760569	10	200603	760745	19	196815	762041	28	199946	763820
2	201611	760585	11	200412	760776	20	196854	762474	29	200172	763909
3	201505	760601	12	200186	760809	21	197500	762778	30	201282	762585
4	201397	760618	13	200162	760977	22	198815	762759	31	201334	762661
5	201286	760634	14	194945	759022	23	200973	762143	32	201391	762747
6	201170	760651	15	194727	759623	24	199218	763152	33	201455	762834
7	201047	760679	16	195702	760490	25	199324	763381	34	201529	762942
8	200914	760696	17	195898	761060	26	199384	763657	35	201615	763071
9	200767	760714	18	195855	761575	27	199545	763861	36	201721	763222

Oxford

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	456231	262003	19	507978	211078	37	457388	159416	55	404416	209900
2	460738	261923	20	508067	206607	38	452932	159691	56	405168	214417
3	465227	261446	21	507767	202128	39	448596	160760	57	405904	218855
4	469676	260650	22	507017	197929	40	444053	160786	58	406901	223483
5	474168	259814	23	506274	193407	41	439617	161706	59	408262	227734
6	478433	258189	24	504078	189379	42	435491	163566	60	410045	231819
7	482513	256141	25	501928	185385	43	431586	165821	61	412176	235728
8	486364	253714	26	499344	181674	44	427913	168413	62	414534	239493
9	489676	250580	27	496458	178214	45	424801	171667	63	417214	243039
10	492702	247242	28	493561	174789	46	421609	174710	64	420195	246331
11	495069	243404	29	490330	171661	47	418702	178013	65	423454	249360
12	497474	239757	30	486764	168918	48	415349	181005	66	426968	252092
13	499465	235891	31	482946	166563	49	412647	184590	67	430741	254449
14	501505	232104	32	478948	164553	50	410423	188500	68	434675	256533
15	503205	228145	33	474801	162900	51	408601	192611	69	438778	258265
16	504932	224175	34	470425	162026	52	407143	196869	70	442985	259757
17	506240	220008	35	466113	161145	53	406066	200982	71	447329	260831
18	507132	215455	36	461830	159857	54	405239	205408	72	451744	261643

Pennsylvania

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	293580	96440	10	294549	94807	19	293513	93182	28	291665	94866
2	293824	96223	11	294531	94629	20	293232	93232	29	291700	95188
3	294032	96074	12	294482	94463	21	292917	93205	30	291797	95497
4	294148	95816	13	294405	94309	22	292594	93256	31	291958	95783
5	294229	95603	14	294302	94167	23	292319	93429	32	292129	96058
6	294328	95457	15	294190	94024	24	292080	93645	33	292385	96264
7	294425	95310	16	294109	93804	25	291897	93916	34	292648	96447
8	294496	95142	17	293958	93617	26	291765	94219	35	292984	96474
9	294538	94974	18	293764	93432	27	291686	94532	36	293279	96546

Penryn

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	178922	36679	10	180577	33314	19	178681	30898	28	177764	33431
2	179408	36224	11	181069	32893	20	178369	31501	29	177618	33648
3	179752	35731	12	181211	32397	21	178297	32206	30	177100	34082
4	179820	35016	13	181052	31958	22	178247	32542	31	176780	34652
5	179649	34332	14	180881	31475	23	178108	32648	32	176668	35314
6	179579	34001	15	180683	30927	24	177990	32775	33	176909	35816
7	179674	33852	16	180428	30258	25	177879	32914	34	177185	36439
8	179741	33694	17	180072	29349	26	177811	33084	35	177739	36672
9	179966	33551	18	179161	30578	27	177772	33252	36	178323	36826

Peterhead

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	411228	852809	10	414105	845303	19	411269	837969	28	407609	845286
2	412061	849950	11	414321	844769	20	410101	838690	29	407673	845921
3	412514	848782	12	414156	844246	21	409199	839623	30	407984	846478
4	412845	848060	13	413989	843722	22	408511	840534	31	408306	846979
5	413100	847504	14	413809	843153	23	408095	841524	32	408261	847781
6	413316	847026	15	413600	842507	24	408161	842693	33	408409	848661
7	413511	846604	16	413340	841682	25	408330	843606	34	408656	849752
8	413699	846192	17	412983	840568	26	408080	844140	35	409191	850889
9	413893	845770	18	412327	839286	27	407856	844696	36	410086	851782

Plympton

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	253393	63767	10	257862	55344	19	252968	48491	28	239826	55860
2	254444	61702	11	257075	54676	20	251665	48182	29	239657	58247
3	255324	60921	12	256664	54086	21	250659	49156	30	242047	59866
4	256012	60090	13	256165	53632	22	249794	49993	31	242385	62093
5	256546	59274	14	255974	52981	23	249118	50914	32	244008	63580
6	257463	58871	15	255540	52481	24	248491	51766	33	246412	63966
7	258102	58142	16	255149	51802	25	247871	52618	34	248610	63869
8	258216	57148	17	254701	50857	26	247219	53505	35	250417	63695
9	257939	56177	18	254031	49607	27	237556	53192	36	251916	63875

Pontardawe

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	273450	207521	10	275435	203688	19	273224	198535	28	268307	203869
2	274088	207349	11	275254	203347	20	272333	198702	29	268623	204695
3	274562	206803	12	275292	202979	21	271205	198275	30	268949	205466
4	274892	206238	13	275546	202394	22	270400	198919	31	269235	206249
5	275047	205645	14	275564	201793	23	269379	199245	32	269806	206857
6	274982	205023	15	275459	201106	24	268956	200236	33	270404	207431
7	275056	204654	16	275241	200277	25	268274	200977	34	271237	207621
8	275327	204391	17	274604	200025	26	268056	201962	35	272002	207758
9	275724	204092	18	274116	198702	27	268038	202941	36	272756	207694

Port Isaac

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	199971	80532	10	203336	80315	19	199898	78642	28	199353	80466
2	199987	80531	11	203160	79754	20	199587	78687	29	199689	80498
3	200006	80542	12	202992	79215	21	199245	78678	30	199792	80516
4	200028	80541	13	202562	78819	22	198816	78617	31	199844	80514
5	200058	80540	14	202009	78595	23	198327	78635	32	199877	80524
6	200103	80549	15	201464	78516	24	197832	78788	33	199902	80523
7	200183	80557	16	200976	78534	25	197246	79011	34	199921	80523
8	200394	80583	17	200552	78628	26	196844	79439	35	199939	80533
9	203387	80915	18	200208	78686	27	197861	80156	36	199955	80532

Portishead

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	345977	176755	10	346409	176783	19	348778	176336	28	347943	174354
2	346011	176754	11	346503	176794	20	348802	176080	29	347760	174189
3	346047	176754	12	346625	176803	21	348728	175848	30	347564	174046
4	346084	176765	13	346792	176824	22	348716	175603	31	347355	173915
5	346124	176764	14	347037	176844	23	348617	175370	32	347136	173806
6	346168	176764	15	347444	176884	24	348518	175149	33	346908	173708
7	346216	176774	16	348271	176953	25	348397	174928	34	346672	173644
8	346271	176774	17	348760	176826	26	348263	174729	35	346434	173580
9	346334	176784	18	348762	176581	27	348111	174530	36	346189	173549

Praa Sands

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	157339	29801	10	161341	28150	19	157264	28144	28	156692	28360
2	157593	29767	11	161431	27411	20	157232	28157	29	156049	28612
3	157837	29689	12	162144	26321	21	157202	28170	30	155881	28920
4	157969	29427	13	158040	27853	22	157172	28182	31	156066	29113
5	158416	29574	14	157638	28005	23	157139	28195	32	156162	29353
6	159029	29679	15	157485	28056	24	157102	28208	33	156402	29476
7	159760	29624	16	157400	28094	25	157055	28221	34	156578	29668
8	160461	29336	17	157343	28119	26	156991	28246	35	156823	29768
9	160785	28798	18	157300	28132	27	156890	28284	36	157083	29790

Preston

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	370806	85248	10	371797	83241	19	370784	81301	28	368445	83260
2	371095	84891	11	371782	83063	20	370392	81036	29	368483	83661
3	371252	84479	12	371736	82897	21	368086	75946	30	368591	84060
4	371301	84111	13	371660	82742	22	366782	76399	31	368766	84426
5	371444	84010	14	371559	82598	23	366982	78766	32	369003	84758
6	371566	83876	15	371435	82476	24	366959	80067	33	369294	85046
7	371666	83742	16	371291	82377	25	367467	81354	34	369631	85277
8	371739	83575	17	371133	82300	26	367963	82229	35	370039	85353
9	371784	83408	18	370963	82256	27	368211	82806	36	370441	85306

Rosneath HP

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	226119	686136	10	231890	680948	19	225871	679995	28	223451	681286
2	227010	686178	11	226148	681143	20	225573	679606	29	222450	681951
3	227947	686118	12	226169	681086	21	225339	679783	30	221437	683030
4	228614	685445	13	226156	681042	22	225126	679936	31	221914	683723
5	229768	685411	14	226141	680987	23	224944	680122	32	222290	684488
6	231311	685350	15	226124	680921	24	224860	680371	33	223022	684937
7	232093	684428	16	226102	680844	25	224867	680638	34	223614	685570
8	232831	683396	17	226069	680723	26	224835	680851	35	225601	682179
9	233273	682187	18	226012	680513	27	224774	681031	36	225004	687953

Rosneath VP

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	226216	688539	10	246946	680387	19	225508	671018	28	208102	681943
2	227497	688410	11	248285	676374	20	223361	669489	29	216468	683261
3	228873	688377	12	249656	671536	21	219372	665274	30	216976	684866
4	230133	687836	13	250365	665830	22	210132	656308	31	221370	684069
5	232321	688207	14	244405	664436	23	205425	658768	32	221284	685398
6	238772	691113	15	239733	663370	24	202904	663496	33	221291	687170
7	244662	691041	16	234695	664517	25	202314	668896	34	222714	687289
8	247152	687999	17	230107	668093	26	202204	673705	35	222635	691472
9	245745	683905	18	227373	670441	27	203246	678194	36	224527	691483

Rumster Forest

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	320542	971577	19	330988	938257	37	318366	864407	55	277652	939654
2	323831	975064	20	330368	937344	38	311789	863832	56	277120	943414
3	326942	974225	21	329540	936579	39	304745	862065	57	276933	947263
4	330346	974541	22	328389	936021	40	317328	929677	58	277699	951005
5	335301	978297	23	327439	935559	41	315327	926690	59	278838	954647
6	336760	972828	24	326629	935162	42	311127	920657	60	279925	958368
7	339537	970924	25	325922	934830	43	307014	917232	61	281111	962164
8	334900	958971	26	325293	934519	44	301960	914056	62	282808	965790
9	334748	955454	27	324697	934263	45	290667	905328	63	288973	965643
10	335826	953777	28	324129	934040	46	288065	908208	64	293931	965572
11	336861	952157	29	323601	933839	47	285743	911282	65	297308	966540
12	337005	949894	30	323114	933659	48	283518	914399	66	299612	968696
13	336304	947477	31	360394	865335	49	281615	917719	67	302468	970050
14	335561	945374	32	352430	865165	50	280013	921187	68	305501	970933
15	334354	943400	33	345372	864063	51	278721	924769	69	309156	969788
16	333367	941780	34	338920	861438	52	278213	928540	70	312176	969585
17	332479	940425	35	331857	861662	53	278095	932309	71	314975	969823
18	331683	939270	36	324882	864035	54	277688	935965	72	317703	970611

Salisbury

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	413702	142521	10	430337	128535	19	413761	120313	28	406684	128450
2	416068	141849	11	429337	125793	20	412632	122112	29	404401	130094
3	418046	140366	12	427844	123405	21	411717	122877	30	403139	132295
4	421289	141590	13	427932	120359	22	411018	123743	31	405374	133264
5	422649	139127	14	425960	118313	23	410320	124386	32	404474	136188
6	421750	135209	15	422997	117532	24	409436	124852	33	405551	138157
7	424411	134664	16	420220	117343	25	408853	125640	34	407989	138339
8	424860	132554	17	418138	116512	26	407613	126228	35	409614	139676
9	428057	131046	18	415584	118194	27	407523	127362	36	411097	143193

Scalloway

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	439936	1140323	10	440074	1139802	19	439975	1136771	28	438939	1139789
2	439993	1140101	11	440081	1139768	20	439012	1134177	29	438952	1139957
3	440018	1140013	12	440088	1139746	21	438984	1137072	30	438996	1140124
4	440033	1139957	13	440098	1139713	22	439014	1138153	31	439068	1140292
5	440043	1139924	14	440112	1139657	23	438841	1138452	32	439166	1140427
6	440050	1139890	15	440134	1139568	24	439093	1139067	33	439289	1140562
7	440057	1139868	16	440182	1139391	25	439078	1139290	34	439364	1140774
8	440063	1139846	17	440386	1138613	26	439003	1139445	35	439444	1141120
9	440069	1139824	18	440431	1137188	27	438956	1139611	36	439607	1141579

Scoval HP

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	118312	852965	10	119722	851348	19	118104	849964	28	116148	851596
2	118574	852925	11	119681	851094	20	117840	849982	29	115739	852072
3	118823	852840	12	119598	850843	21	117585	850055	30	115916	852473
4	119049	852702	13	119461	850618	22	117365	850205	31	116118	852861
5	119267	852553	14	119303	850406	23	117156	850365	32	116619	852994
6	119449	852361	15	119099	850230	24	116971	850556	33	117306	852700
7	119617	852149	16	118880	850089	25	116858	850799	34	117545	852806
8	119651	851867	17	118627	850006	26	116745	851041	35	117789	852912
9	119709	851617	18	118369	849934	27	116696	851301	36	118049	852961

Scoval VP

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	118518	855933	10	125051	850985	19	117839	846139	28	115698	851628
2	119049	854824	11	125605	849629	20	117025	846710	29	116039	851995
3	122937	862074	12	125472	848242	21	116103	846729	30	116516	852208
4	124766	861167	13	125881	846305	22	115280	847111	31	117072	852225
5	126679	860222	14	124686	845224	23	115414	848554	32	117210	852416
6	126886	857763	15	121886	846420	24	115500	849486	33	117272	852747
7	124239	854401	16	120139	847511	25	115562	850163	34	117274	853361
8	123549	852996	17	119453	847134	26	115614	850718	35	117449	854097
9	124787	852153	18	118690	846907	27	115657	851184	36	117860	854739

Selkirk

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	350654	673252	19	400518	628830	37	349646	584868	55	308853	630069
2	354558	673821	20	399857	624779	38	345808	585581	56	310816	633469
3	358686	674681	21	398424	620606	39	342092	586641	57	313166	636505
4	362584	673688	22	398467	616166	40	338452	587748	58	315061	639362
5	366373	672377	23	398075	611647	41	335194	589820	59	317867	641668
6	370230	671158	24	395618	607854	42	331876	591461	60	315246	646272
7	373968	669564	25	393187	604174	43	328730	593380	61	314089	650892
8	378106	668373	26	390582	600662	44	326172	596105	62	314405	655150
9	381711	666186	27	387417	597643	45	324403	599552	63	315264	659452
10	384679	663213	28	384850	594123	46	321967	601998	64	319079	661238
11	387365	659999	29	381723	591097	47	319760	604643	65	322530	663123
12	388616	655800	30	377573	589458	48	315460	605881	66	326908	663415
13	390010	651946	31	373738	587621	49	311328	607787	67	331232	663032
14	392747	648846	32	369976	585742	50	309738	611337	68	332508	668355
15	395857	645659	33	366070	584212	51	308470	614993	69	334747	673219
16	398799	642085	34	361878	583689	52	308085	618875	70	339115	672487
17	401398	637822	35	357721	583549	53	308789	622801	71	343193	671596
18	401136	633271	36	353641	583656	54	308658	626455	72	346850	672763

South Maesteg

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	286119	191118	10	287089	189628	19	286063	188649	28	285083	189673
2	286411	191278	11	287070	189461	20	285889	188675	29	285102	189850
3	286688	191194	12	287020	189284	21	285722	188724	30	285151	190016
4	286947	191066	13	286943	189130	22	285565	188794	31	285229	190170
5	287107	190818	14	286840	188988	23	285424	188897	32	285332	190312
6	287159	190516	15	286713	188868	24	285303	189022	33	285458	190432
7	287079	190195	16	286568	188771	25	285206	189169	34	285604	190529
8	287036	189974	17	286408	188708	26	285135	189327	35	285722	190726
9	287078	189806	18	286238	188668	27	285094	189506	36	285878	191012

Southway

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	247944	61306	10	248904	59832	19	247873	58860	28	246837	59892
2	248159	61111	11	248884	59655	20	247699	58877	29	246554	60134
3	248344	60972	12	248834	59489	21	247532	58926	30	246459	60437
4	248531	60878	13	248756	59336	22	247376	59008	31	246402	60784
5	248651	60696	14	248652	59194	23	247235	59113	32	246577	61034
6	248786	60559	15	248524	59075	24	247115	59238	33	246826	61216
7	248819	60358	16	248378	58979	25	247019	59386	34	247073	61387
8	248854	60179	17	248217	58906	26	246950	59544	35	247351	61513
9	248895	60011	18	248048	58867	27	246909	59712	36	247661	61493

St Austell

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	201221	62616	10	219047	52847	19	200443	41961	28	195052	53723
2	203202	64267	11	214909	50497	20	198246	41309	29	195285	54705
3	204757	63007	12	206087	51381	21	196664	43184	30	196168	55416
4	206208	61963	13	205492	50601	22	196475	46520	31	196874	56013
5	209081	62537	14	204916	49832	23	196225	48378	32	197386	56650
6	211198	61503	15	204322	49052	24	196419	50052	33	197818	57424
7	213689	60257	16	203672	48197	25	196218	51050	34	198268	58431
8	217153	58745	17	203021	46830	26	195888	51898	35	198934	59519
9	217778	55851	18	202287	43261	27	195939	52820	36	199856	60886

Stanton Moor

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	424558	383632	10	440657	363794	19	424700	355887	28	418925	363659
2	427269	378907	11	441547	360843	20	423621	357628	29	418172	364802
3	429985	378523	12	440833	357944	21	422856	358670	30	416743	366521
4	432381	377193	13	442089	353805	22	422004	359045	31	417746	367626
5	433540	374364	14	438301	352405	23	421384	359754	32	417274	369816
6	435306	372708	15	437534	348561	24	420399	360083	33	414844	375248
7	438340	371685	16	431023	352831	25	420309	361151	34	417331	376213
8	438387	368771	17	428899	352262	26	419755	361883	35	419370	377968
9	439667	366434	18	426265	354872	27	419551	362772	36	421895	378880

Swinster

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	444081	1176159	10	445720	1172771	19	444175	1168452	28	441092	1172715
2	446036	1184404	11	445526	1172523	20	443472	1168789	29	438823	1173615
3	445048	1175380	12	445367	1172309	21	443119	1169887	30	434961	1175959
4	445343	1174916	13	449609	1169680	22	442658	1170149	31	434585	1178105
5	450216	1180182	14	448376	1169274	23	441579	1169647	32	433982	1181051
6	445804	1174186	15	448771	1167352	24	441664	1170639	33	434245	1184228
7	446010	1173866	16	447677	1166770	25	441902	1171432	34	434409	1189097
8	446217	1173534	17	446109	1167496	26	441960	1171934	35	436869	1191917
9	445977	1173097	18	445162	1167261	27	441818	1172311	36	443456	1176251

Tacolneston

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	611112	342820	19	654966	297439	37	615466	242771	55	559761	293362
2	615228	342445	20	655417	293784	38	610831	242695	56	559991	298001
3	619282	341881	21	654461	290189	39	606200	243036	57	560610	302586
4	623216	340791	22	653979	286586	40	601675	244065	58	562003	306996
5	626912	339080	23	653204	283024	41	597409	245921	59	563313	311605
6	630308	336890	24	652163	279492	42	593118	247490	60	564803	315897
7	633409	334420	25	651093	276094	43	588980	249435	61	566667	320035
8	636516	332208	26	649516	272659	44	584984	251679	62	568515	324252
9	639598	330041	27	648181	268947	45	581239	254313	63	571105	328051
10	642605	327761	28	647768	264111	46	577333	256833	64	573858	331757
11	645689	325476	29	647693	258167	47	573952	260020	65	576999	335178
12	648247	322630	30	645887	253218	48	570853	263508	66	580489	338269
13	650161	319306	31	641763	250954	49	568124	267289	67	584287	340985
14	651543	315542	32	637740	248610	50	565730	271294	68	588349	343303
15	652760	311971	33	633529	246638	51	563683	275245	69	593020	344245
16	653551	308312	34	629163	245043	52	562054	279611	70	597765	344426
17	653903	304618	35	624676	243835	53	560849	284113	71	602159	345232
18	654065	300981	36	620091	243096	54	560071	288719	72	606802	343937

Taffs Wells

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	312500	187211	10	313461	184780	19	312405	181684	28	309749	184845
2	312829	186705	11	313443	184614	20	311747	181150	29	309932	185287
3	313031	186290	12	313395	184448	21	311147	181394	30	309929	185776
4	313085	185844	13	313318	184282	22	310558	181649	31	309787	186402
5	313154	185598	14	313370	184014	23	310388	182431	32	309756	187148
6	313245	185440	15	313460	183568	24	310343	183099	33	310258	187517
7	313336	185283	16	313399	183113	25	310218	183569	34	310763	187853
8	313407	185126	17	313244	182526	26	309860	183909	35	311444	187741
9	313449	184959	18	312884	182120	27	309763	184378	36	312034	187475

Ton Pentre

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	296170	197644	10	298836	195487	19	296098	194163	28	291058	195649
2	296482	197337	11	298986	194983	20	295859	194190	29	291242	196513
3	296781	197231	12	298855	194485	21	295512	193964	30	291670	197271
4	296837	196718	13	298653	194022	22	295203	194026	31	291782	198170
5	297012	196547	14	298210	193730	23	294746	193968	32	292548	198665
6	297270	196464	15	297536	193800	24	294021	193850	33	293359	198971
7	297610	196357	16	297063	193843	25	293364	194031	34	294288	198873
8	297953	196161	17	296672	193951	26	292780	194410	35	295104	198534
9	298328	195886	18	296350	194113	27	292013	194905	36	295703	198265

Tonypandy

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	298797	193441	10	299780	192420	19	298757	191439	28	297140	192473
2	298971	193426	11	299761	192253	20	298583	191465	29	296939	192799
3	299139	193378	12	299713	192087	21	298415	191512	30	296898	193167
4	299296	193297	13	299636	191922	22	298258	191582	31	296922	193567
5	299437	193194	14	299532	191779	23	298117	191685	32	297259	193761
6	299558	193069	15	299406	191659	24	297996	191810	33	297602	193899
7	299656	192923	16	299261	191562	25	297899	191957	34	297987	193868
8	299727	192766	17	299102	191499	26	297759	192093	35	298316	193795
9	299768	192598	18	298932	191458	27	297367	192223	36	298612	193500

Tonyrefail

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	301049	188512	10	302072	187391	19	300991	185532	28	300025	187431
2	301240	188486	11	302451	187139	20	300764	186081	29	300044	187608
3	301424	188438	12	302592	186813	21	300666	186484	30	300092	187774
4	301546	188269	13	302787	186353	22	300509	186553	31	300168	187929
5	301687	188166	14	302678	185977	23	300368	186656	32	300272	188071
6	301808	188041	15	302558	185524	24	300246	186781	33	300397	188191
7	301905	187895	16	302224	185252	25	300149	186928	34	300543	188288
8	301976	187737	17	301821	185104	26	300078	187085	35	300703	188363
9	302018	187570	18	301387	185123	27	300037	187264	36	300857	188494

Truro

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	183708	45434	10	184658	44104	19	183615	43144	28	181564	44230
2	183869	45116	11	184635	43926	20	183441	43162	29	181456	44624
3	184036	45064	12	184584	43761	21	183274	43214	30	181310	45098
4	184192	44980	13	184503	43609	22	183119	43298	31	181512	45491
5	184330	44874	14	184397	43468	23	182980	43404	32	181781	45847
6	184449	44747	15	184268	43351	24	182861	43531	33	182202	46019
7	184544	44609	16	184121	43257	25	182505	43534	34	182684	45988
8	184611	44440	17	183960	43186	26	182226	43691	35	183092	45904
9	184649	44271	18	183789	43148	27	181817	43897	36	183442	45712

Tullich

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	338007	799469	10	340418	798375	19	337955	795962	28	335175	798454
2	338189	799444	11	340790	797880	20	337460	795647	29	335888	798811
3	338368	799396	12	340623	797415	21	336907	795577	30	336463	798991
4	338528	799305	13	340416	796962	22	335990	795068	31	336865	799085
5	338677	799203	14	339735	796905	23	335161	795148	32	337134	799148
6	338869	799122	15	339074	797081	24	334505	795581	33	337315	799245
7	339228	799105	16	338768	797019	25	333894	796137	34	337470	799343
8	339622	798977	17	338596	796676	26	334121	797079	35	337640	799418
9	340099	798747	18	338354	796157	27	334768	797893	36	337821	799471

Tynewyd

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	293280	201331	10	294240	199264	19	293216	198284	28	291672	199318
2	293580	201013	11	294220	199086	20	293042	198299	29	291502	199622
3	293725	200543	12	294172	198920	21	292839	198259	30	291322	200027
4	293756	200142	13	294094	198766	22	292625	198274	31	291397	200392
5	293897	200039	14	293991	198624	23	292412	198345	32	291364	200916
6	294018	199914	15	293865	198504	24	292185	198439	33	291678	201221
7	294115	199767	16	293720	198407	25	292054	198631	34	292038	201458
8	294186	199610	17	293560	198332	26	291864	198813	35	292435	201638
9	294228	199442	18	293390	198291	27	291804	199059	36	292883	201562

Waltham

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	480053	382561	19	537962	324245	37	481975	267502	55	425133	322360
2	485242	382518	20	537830	319287	38	477058	267089	56	424065	327316
3	490414	382023	21	537264	314374	39	472154	267605	57	423552	332431
4	495441	380742	22	536304	309505	40	467249	268314	58	424367	337441
5	500297	378983	23	534930	304737	41	462416	269508	59	425268	342507
6	504744	376352	24	533066	300133	42	457705	271175	60	426791	347466
7	508853	373339	25	530776	295998	43	453165	273304	61	428737	352283
8	513084	370722	26	528138	291777	44	448790	275784	62	431363	357027
9	517034	367711	27	525147	287804	45	444344	278301	63	434409	361242
10	520663	364329	28	522038	283909	46	440410	281560	64	437947	365063
11	523970	360662	29	518554	280318	47	436415	284866	65	441802	368555
12	527173	356906	30	514729	277078	48	432984	288768	66	445892	371763
13	529998	352841	31	510627	274180	49	429948	292720	67	450249	374599
14	532333	348230	32	506194	271813	50	427499	297300	68	454880	376975
15	534267	343653	33	501578	269847	51	425485	302061	69	459712	378903
16	535860	338945	34	496747	268526	52	424915	307286	70	464673	380436
17	534966	333699	35	491843	267642	53	424869	312447	71	469752	381498
18	537695	329201	36	486918	267108	54	424524	317407	72	474879	382254

Washford

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	305906	141942	10	308691	140891	19	305866	139707	28	302744	141000
2	306080	141917	11	307481	140623	20	305528	139101	29	303322	141434
3	306248	141869	12	306824	140579	21	304949	138500	30	304003	141666
4	306405	141799	13	306748	140425	22	304266	138257	31	304744	141630
5	306547	141697	14	306644	140282	23	303726	138467	32	305132	141600
6	306668	141572	15	306519	140162	24	303144	138723	33	305258	141720
7	306766	141426	16	306374	140065	25	302765	139220	34	305403	141818
8	307441	141469	17	306214	139990	26	302551	139802	35	305562	141882
9	308855	141411	18	306044	139948	27	302482	140404	36	305732	141923

Weisdale

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	438034	1155919	10	443305	1151400	19	438086	1150896	28	435652	1151317
2	438841	1155916	11	443325	1150475	20	438004	1150873	29	435157	1151825
3	439748	1156060	12	442467	1149797	21	437908	1150850	30	435065	1152403
4	440440	1155510	13	441885	1149200	22	437787	1150815	31	434980	1153082
5	441081	1154983	14	441068	1148890	23	437618	1150769	32	434999	1153873
6	441700	1154433	15	440355	1148693	24	437342	1150699	33	435517	1154323
7	442210	1153782	16	439534	1148884	25	436766	1150560	34	435778	1155228
8	442729	1153086	17	438236	1150931	26	436316	1150678	35	436306	1156057
9	443183	1152289	18	438162	1150908	27	435998	1150953	36	437172	1156188

Winter Hill

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	366688	489530	19	443075	413881	37	365557	332675	55	330840	414461
2	373237	489098	20	443020	407172	38	358414	333010	56	332814	417348
3	379714	488108	21	442362	400457	39	351325	333988	57	334223	420043
4	385996	486304	22	441635	393675	40	344343	335577	58	335436	422630
5	391848	483408	23	439738	387105	41	337532	337808	59	336279	425256
6	397661	480709	24	437957	380393	42	330927	340601	60	331161	430736
7	403174	477504	25	435050	374074	43	324600	344001	61	330413	435076
8	407619	472803	26	431935	367767	44	318624	347982	62	330726	439266
9	411470	467760	27	427778	362089	45	313022	352175	63	331076	443924
10	416137	463857	28	422313	357566	46	307848	357101	64	333038	447645
11	420439	459234	29	416938	353128	47	303152	362457	65	318550	471725
12	425045	454962	30	411342	349263	48	298278	367744	66	320284	481021
13	429322	450202	31	405397	345637	49	294383	373782	67	325761	485581
14	432289	444625	32	399338	342186	50	282845	376412	68	333752	485192
15	434739	438790	33	392971	339310	51	276760	382709	69	340205	487251
16	437250	432891	34	386510	336420	52	328150	404320	70	346889	488304
17	439791	426848	35	379647	334720	53	327577	407701	71	353378	489869
18	442046	420503	36	372690	333086	54	328826	411209	72	360047	490273

Woodcombe

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	295229	147833	10	297784	145702	19	295166	144753	28	294184	145775
2	295591	147793	11	297743	145246	20	294992	144768	29	294203	145941
3	295940	147685	12	297613	144815	21	294825	144816	30	294251	146107
4	296267	147534	13	297310	144465	22	294668	144897	31	294328	146261
5	296561	147317	14	296839	144308	23	294527	145000	32	294432	146404
6	297090	147273	15	296340	144318	24	294406	145125	33	294493	146614
7	297227	146870	16	295790	144651	25	294308	145271	34	294498	146992
8	297545	146552	17	295510	144802	26	294238	145429	35	294662	147278
9	297649	146127	18	295341	144761	27	294196	145596	36	294908	147540

Ynysowen

#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y	#	NGR X	NGR Y
1	308343	202214	10	309291	199215	19	308270	198232	28	306212	199271
2	308797	201838	11	309272	199038	20	308096	198247	29	305992	199676
3	309135	201432	12	309224	198872	21	307928	198294	30	305789	200192
4	309288	200895	13	309148	198717	22	307771	198375	31	305723	200771
5	309259	200350	14	309045	198574	23	307629	198478	32	305894	201313
6	309229	199995	15	308919	198454	24	307508	198602	33	306167	201853
7	309166	199718	16	308774	198357	25	307411	198749	34	306505	202448
8	309237	199561	17	308614	198282	26	307140	198843	35	307138	202570
9	309279	199393	18	308445	198240	27	306724	198984	36	307788	202402

Annex 7

UK/Republic of Ireland Memorandum of Understanding: 800 MHz

Commission for Communications Regulation

Ofcom
OFFICE OF COMMUNICATIONS

MEMORANDUM OF UNDERSTANDING ON FREQUENCY COORDINATION BETWEEN THE REPUBLIC OF IRELAND AND THE UNITED KINGDOM IN THE FREQUENCY BAND 790 – 862 MHz

1. INTRODUCTION

1.1. This Memorandum of Understanding (MoU) describes the procedures for the coordination of radio services, other than broadcasting, between the Republic of Ireland (RoI) and the United Kingdom (UK) in the frequency band 790 – 862 MHz.

1.2. In order to facilitate the deployment of systems operating in neighbouring countries, it is necessary to establish, by agreement, regulatory and technical procedures for frequency co-ordination. Moreover, this agreement is designed to reduce the administrative procedures in the frequency bands in the countries concerned.

1.3. In the UK, the frequency band 790 – 862 MHz is expected to be awarded on a service and technology neutral basis, in accordance with decisions to be made by Ofcom, following a consultation process.

1.4. In the RoI, it is intended that the 790 – 862 MHz band will become available as part of the Digital Dividend post analogue TV switch off ("ASO") in Ireland.In Ireland and the UK, use of the 790 – 862 MHz band will be in conformance with the European harmonised technical conditions of use as set out in European Commission Decision 2010/267/EU[1].

1.5. The preferred harmonised CEPT channelling arrangement for the 790 – 862 MHz band is as follows:

790-791	791-796	796-801	801-806	806-811	811-816	816-821	821 – 832	832-837	837-842	842-847	847-852	852-857	857-862
Guard band	Downlink						Duplex gap	Uplink					
1MHz	30 MHz (6 blocks of 5 MHz)						11 MHz	30 MHz (6 blocks of 5 MHz)					

1.6. Ofcom is the Administration of the United Kingdom responsible for all relations with the RoI concerning this MoU.

1.7. The Commission for Communications Regulation (ComReg) is the Administration of the RoI responsible for all relations with the UK concerning this MoU.

1.8. Accordingly, the Administrations of the UK and the RoI have agreed the co-ordination procedures in this MoU.

1.9. This MoU applies in the territories of The Republic of Ireland and the United Kingdom.

1.10. The co-ordination procedure is based on the principle of equitable access to the spectrum resource.

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1 Commission Decision of 6 May 2010 (2010/267/EU), on harmonised technical conditions of use in the 790 -862 MHz frequency band for terrestrial systems capable of providing electronic communications services in the European Union: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=CELEX:32010D0267:EN:HTML

1.11. Coordination of FDD services in the 790 – 862 MHz band is based on the protection requirements for non preferential frequency blocks given in Annex 1 of ECC Recommendation (11)04[2].

2. COMMITMENT OF THE ADMINISTRATIONS

2.1. The Administrations of the RoI and the UK are committed to ensuring that the radio communication stations operating in the band 790-862 MHz, respect the limits given at paragraph 3, unless the stations are specifically exempt from the coordination procedure in accordance with paragraph 4.

3. CRITERIA FOR COORDINATION

3.1. Suitable coordination arrangements, outlined in paragraphs 3.2 and 3.3, are derived from Annex 1 of ECC Recommendation (11)04.

3.2. Within the frequency band 791-832 MHz, stations of FDD Systems may be operated, established or modified in a country, without co-ordination with the neighbour country, provided that the predicted field strength produced by a cell (all transmitters within the sector) does not exceed the threshold of **55 dBµV/m in a bandwidth of 5 MHz at a height of 3 m above ground level at the coast or border line of the neighbouring country,** and **29 dBµV/m in a bandwidth of 5 MHz at a height of 3m above ground at a distance of 9 km** inside the neighbouring country.

In the case that LTE is deployed on both sides of the border, the field strength levels may be increased to **59 dBµV/m in a bandwidth of 5 MHz,** and **41 dBµV/m in a bandwidth of 5 MHz at 6 km**

3.3. Within the frequency bands 791- 821 MHz and 832 – 862 MHz, stations of TDD Systems may be operated, established or modified in a country, without co-ordination with the neighbour country, provided that the predicted mean field strength produced by a cell (all transmitters within the sector) does not exceed the threshold of **15 dBµV/m in a bandwidth of 5 MHz at 10% time, 50% of locations at a height of 3 m above ground level at the coast or border line of the neighbouring country**.

3.4. Base stations, for which the predicted field strength exceeds the values given in 3.2 or 3.3, must be co-ordinated in accordance with paragraph 7, except where stations are listed in paragraph 6 or an arrangement exists between operators as described in paragraph 4.

3.5. To establish the predicted field strength produced by a station, the methodology set out at paragraph 5 shall be employed.

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2 ECC Recommendation (11)04: Frequency planning and frequency coordination for terrestrial systems for mobile/fixed communication networks (MCFN) capable of providing electronic communications services in the frequency band 790-862 MHz..

3.6. In the case of time division duplex technology the interference power shall be the power, during the active part of the signal, in the stated bandwidth.

3.7. Systems operating in border areas are required to co-ordinate physical-layer cell identities in accordance with Annex 5 of ECC Recommendation (11)04.

4. ARRANGEMENTS BETWEEN OPERATORS

4.1. An Agreement 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 brought into force on 01 May 2005[3]. The administrations of the Republic of Ireland and the United Kingdom agree to extend the applicability of this Agreement to all operators of systems in the frequency bands 791 - 832 MHz.

4.2. To facilitate reasonable and timely development of their systems, licensees are encouraged to develop arrangements in accordance with the Agreement of 01 May 2005.

4.3. 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.

4.4. 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.

5. PREDICTION OF PROPAGATION

The field prediction method shall be according to the latest version of Recommendation ITU-R P. 1546 [4], With parameters:

- 10% of the time
- 50% of locations
- Height of the receiver antenna 3m

Taking account of:

- Terrain profile (effective height) for the base station in all main directions

3 Agreement between the administrations of the Republic of Ireland and the United Kingdom concerning the approval of planning arrangements between mobile radio communications network operators. [date]

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

- 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: DeltaN = 40 (N0m-N1000m)

6. CO-ORDINATED 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 co-ordination for the corresponding station or stations.

	Name	Individual Channel bandwidth	Modulation	Centre Frequency	Lat	Long	East	North	Ground H AMSL (m)	H AGL (m)	EIRP dBm	Antenna Manufacturer reference	Pol	3dB BW Degs	Az Degs E of N.

7. CO-ORDINATION PROCEDURE

7.1. Exchanges of information for co-ordination/notification purposes shall be in the format set out in Annex 2A of the HCM agreement (revised at Vilnius 2005) [5].

7.2. A co-ordination request must be sent by the licensee through the Administration responsible for its authorisation.

7.3. The co-ordination procedure shall follow the one described in the HCM Agreement.

7.4. In the event of interference between authorised users of the band 790-862 MHz 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.

8. REVIEW OF MoU

8.1. The co-ordination threshold and prediction methods defined in this MoU may be reviewed in the light of experience of operation of networks in both countries and future prediction developments.

8.2. This MoU may be updated following the adoption of any international decisions, directives or recommendations relevant to the band 790 - 862 MHz, or the results of awards of licences to use the frequency band 790 - 862 MHz

9. TERMINATION OF THE MEMORANDUM OF UNDERSTANDING

Either Administration may withdraw from this Memorandum of Understanding subject to 6 months' notice.

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[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 http://hcm.bundesnetzagentur.de/http/englisch/verwaltung/index_europakarte.htm

10. DATE OF ENTRY INTO FORCE

This Memorandum of understanding shall enter into force on 01 March 2012

For the administration of the REPUBLIC OF IRELAND

Jim Connolly

Signed at Dublin on 28 February 2012

For the administration of the UNITED KINGDOM

Martin Fenton

Signed at London on 29 February 2012.

Annex 8

UK/France Memorandum of Understanding: 2.6 GHz

Agence Nationale des Fréquences

Ofcom
OFFICE OF COMMUNICATIONS

MEMORANDUM OF UNDERSTANDING ON FREQUENCY CO-ORDINATION BETWEEN FRANCE AND THE UNITED KINGDOM IN THE FREQUENCY BANDS 2500 - 2690 MHz

1. INTRODUCTION

1.1. This Memorandum of Understanding (MoU) describes the procedures for the coordination of radio services between France and the United Kingdom (UK) in the frequency band 2500 to 2690 MHz.

1.2. In order to facilitate the deployment of systems operating in neighbouring countries, it is necessary to establish, by agreement, regulatory and technical procedures for frequency co-ordination. Moreover, this agreement is designed to reduce the administrative procedures in the frequency bands in the countries concerned.

1.3. This MoU does not apply to the Channel Islands.

1.4. This MoU does not apply to the Channel tunnel.

1.5. In the UK the frequency band 2500-2690 MHz is expected to be awarded on a technology neutral basis, in accordance with decisions to be made by Ofcom following a consultation process.[1]

1.6. In France the frequency band 2500 to 2690MHz is currently used for military radiolocation services, tactical and infrastructure relay links. It will be made progressively available for electronic communication mobile services. The military systems will be switched off at a date T0 which is not defined at the date of signature of this MoU. T0 is subject to negotiations between ARCEP and the French Ministry of Defence, and will also depend on the market demand in France. The radiolocation services are planned to be switched off by summer 2012 at the latest. If the date T0 is earlier than summer 2012, then the radiolocation service will also be switched off at T0.

1.7. The frequency band 2500-2690 MHz is currently under discussion within EC and CEPT in the context of WAPECS [2] which may change coordination requirements in this frequency band.

1.8. Accordingly, the Administrations of the UK and France have agreed the co-ordination procedures in this MoU.

1.9. The co-ordination procedure is based on the principle of equitable access to the spectrum resource.

1.10. Ofcom is the Administration of the United Kingdom responsible for all relations with France concerning this MoU.

1.11. The Agence Nationale des Fréquences (ANFR) is the Administration of France responsible for all relations with the UK concerning this MoU.

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[1] Ofcom's consultation proposals are set out in a consultation document published on 11 December 2006 (http://www.ofcom.org.uk/consult/condocs/2ghzawards/), a discussion document published on 1 August 2007 (http://www.ofcom.org.uk/consult/condocs/2ghzdiscuss/) and a consultation document published on 19 December 2007 (http://www.ofcom.org.uk/consult/condocs/2ghzrules/).

[2] EC Mandate to CEPT to develop least restrictive technical conditions for frequency bands addressed in the context of WAPECS', 5 July 2006.

2. COMMITMENT OF THE ADMINISTRATIONS

2.1. The Administration of France and the UK are committed to ensuring that the radio-communication stations operating in the band 2500-2690 MHz, respect the limits for establishment of base stations without co-ordination given at paragraph 3.1, unless the stations are specifically exempt from the coordination procedure in accordance with paragraph 4.

2.2. The Administration of France and the UK are committed to take into account the future EC decision on the band 2500-2690 MHz as well as anyEC derogation on a transitional period in France.

3. CRITERIA FOR COORDINATION

3.1. Within the frequency band 2500-2690 MHz, a radio-communication station may be operated, established or modified in a country, without co-ordination with the neighbour country, provided that the predicted field strength of each carrier produced by that station does not exceed the threshold of 21 dBµV/m in a bandwidth of 5 MHz at and beyond the coast line of the neighbouring country at a height of 3 m above ground level.

3.2. Radio-communication stations for which the predicted field strength exceeds the values given in 3.1 must be co-ordinated in accordance with paragraph 6, except where an arrangement exists between operators as described in paragraph 4.

3.3. To establish the predicted field strength produced by a station, the methodology set out at paragraph 5 shall be employed.

3.4. In the case of time division duplex technology the interference power shall be the power, during the active part of the signal, in the stated bandwidth.

4. ARRANGEMENTS BETWEEN OPERATORS

4.1. A “Framework” MoU between the administrations of France and the United Kingdom, which enables planning arrangements between mobile operators, subject to agreement of the Administrations, was signed on 13 October 1999[3]. The administrations of France and the United Kingdom agree to extend the applicability of this MoU to all operators of systems in the frequency bands 2500-2690 MHz subject of the present MoU.

4.2. To facilitate reasonable and timely development of their systems, licensees are encouraged to develop Arrangements in accordance with the Framework MoU of 13 October 1999.

4.3. 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

[3] Agreement between the administrations of France and the United Kingdom concerning the approval of planning arrangements between mobile radio communications network operators. 13 October 1999

impairment of the authorised use of radio frequencies by third parties not involved in the Arrangements.

4.4. 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.

5. PREDICTION OF PROPAGATION

The field prediction method shall be according to the latest version of Recommendation ITU-R P. 1546 [4]

With parameters:

- 10% of the time
- 50% of locations
- Height of the receiver antenna 3m

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:

- DeltaN = 40 (N0m-N1000m)

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

6. CO-ORDINATION PROCEDURE

6.1. 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].

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

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

6.4. In the event of interference between authorised users of the band 2500-2690 MHz in France 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. The Administrations of France and the UK agree to facilitate the exchange of information between authorised users of the band.

7. OTHER RADIO-COMMUNICATION IN FRANCE ALREADY IN SERVICE

7.1. Military infrastructure (point to point) relay links may be used over France. These relay links will gradually cease operating in the frequency range 2500-2690MHz until complete closure at T0, as indicated in § 1.6.

7.2. Using the prediction parameters as set out in § 5 above, the 21 dBµV/m threshold is not reached or exceeded at the UK coastline or beyond, for the point to point services as they exist at the time of agreement of this MoU.

7.3. Radars are currently operating on northern France with field strengths which may exceed 21dBµv/m in the UK. These radars operate in frequencies below 2500 MHz. However the band 2500-2520 MHz may also be used in case of national emergency. These radars operate continuously with a 360 ° sweep. As indicated in § 1.6, all radars operating in this frequency band are planned to be switched off by summer 2012 at the latest.

7.4. Other radars which operate in the frequency band 2500 to 2520MHz will not be used at any location in France such that their field strength at the UK coast line or beyond is greater than or equal to 21 dBµV/m, except in cases of national emergency

7.5. The nominal emission mask of the radar is given in Figure 1, in line with Annex 8 of ITU R Recommendation SM 1541[6].

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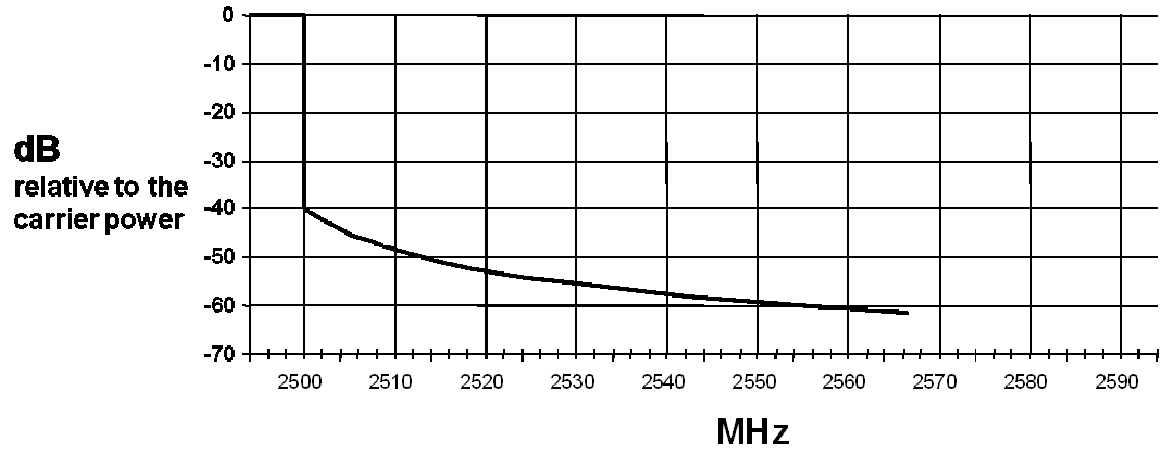
[5] Agreement between the Administrations of … on the Coordination of frequencies between 29.7 MHz and 39.5 GHz for fixed service and land mobile service (HCM Agreement) Vilnius, 2005 http://hcm.bundesnetzagentur.de/http/englisch/verwaltung/index_europakarte.htm

[6] Rec. ITU-R SM.1541-2 1Recommendation ITU-R SM.1541-2, Unwanted emissions in the out-of-band domain

Figure 1 Nominal radar emission mask



7.6. Coverage plots for radars in France referred to par 7.3 are given in figures 2, 3, and 4, which would apply in the frequency range 2500-2520MHz in cases of national emergency as described in § 7.3, with modelling parameters according to par 5 .

Figure 2 Estimated on axis field strength of French radio location services on UK
Field strength = 21dbμV/M in a bandwidth of 5MHz
At a height of 3m

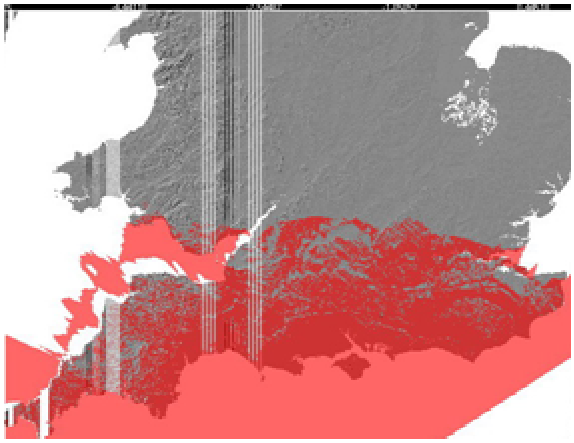


Figure 3 Estimated off axis field strength of French radio location services on UK

Field strength = 21dbμV/M in a bandwidth of 5MHz
At a height of 3m

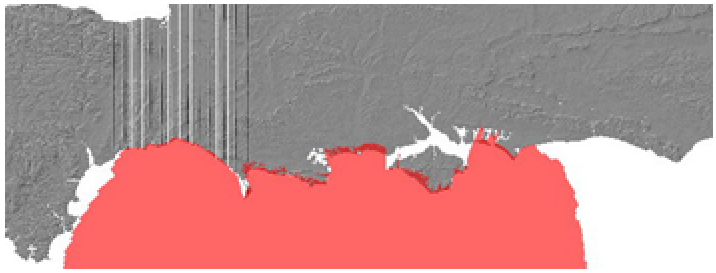
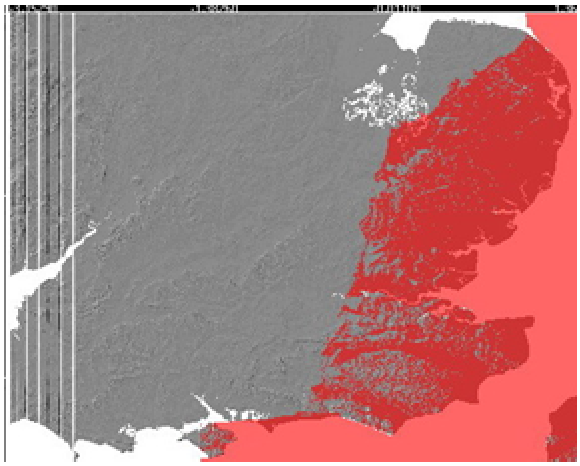


Figure 4 Estimated on axis field strength of French radio location services on UK

Field strength = 21dbμV/M in a bandwidth of 5MHz
At a height of 3m



7.7. Using the prediction parameters as set out in § 5 above, the 21 dBμV/m threshold is not reached or exceeded at any point at the UK coastline or beyond, for the off axis beam of French radio location services identified in Fig 4.

8. REVIEW OF MoU

8.1. The coordination threshold and prediction methods defined in this MoU may be reviewed in the light of experience of operation of networks in both countries and future prediction developments.

8.2. This MoU may be updated following the adoption of an EC decision relevant to the band 2500-2690MHz and any related derogation requested by France, the results of the French consultation anticipated in 2008 on electronic communications in the frequency band 2500-2690MHz or the award of licences to use the frequency band 2500-2690MHz in the UK.

9. TERMINATION OF THE MEMORANDUM OF UNDERSTANDING

Either Administration may withdraw from this Memorandum of Understanding subject to 6 months notice.

10. DATE OF ENTRY INTO FORCE

This Memorandum of Understanding shall enter into force on 1 March 2008.

For the administration of FRANCE

A RIGOLE

Signed at Paris on 2008.

For the UNITED KINGDOM administration

P BURY

Signed at London on 2008.

Annex 9

UK/Republic of Ireland Memorandum of Understanding: 2.6 GHz

MEMORANDUM OF UNDERSTANDING ON FREQUENCY CO-ORDINATION BETWEEN THE REPUBLIC OF IRELAND AND THE UNITED KINGDOM IN THE FREQUENCY BANDS 2500 - 2690 MHz

1. INTRODUCTION

1.1. This Memorandum of Understanding (MoU) describes the procedures for the coordination of radio services between the Republic of Ireland (RoI) and the United Kingdom (UK) in the frequency band 2500 to 2690 MHz.

1.2. In the UK the frequency band 2500-2690 MHz is expected to be awarded on a technology neutral basis, in accordance with decisions to be made by Ofcom following a consultation process.[1]

1.3. In the RoI the frequency band 2500 – 2686 MHz is currently licensed for Multipoint Microwave Distribution System (MMDS) according to the relevant Statutory Instrument [2].

1.4. Ofcom is the Administration of the United Kingdom responsible for all relations with the RoI concerning this MoU.

1.5. The Commission for Communications Regulation (ComReg) is the Administration of the RoI responsible for all relations with the UK concerning this MoU.

1.6. Accordingly, the Administrations of the UK and the RoI have agreed the co-ordination procedures in this MoU.

1.7. The co-ordination procedure is based on the principle of equitable access to the spectrum resource.

2. COMMITMENT OF THE ADMINISTRATIONS

2.1. The Administration of the ROI and the UK are committed to ensuring that the radio-communication stations operating in the band 2500-2690 MHz, respect the limits for establishment of base stations without co-ordination given at paragraph 3.1, unless the stations are specifically exempt from the coordination procedure in accordance with paragraph 4.

[1] Ofcom's consultation proposals are set out in a consultation document published on 11 December 2006 (http://www.ofcom.org.uk/consult/condocs/2ghzawards/) and a discussion document published on 1 August 2007 (http://www.ofcom.org.uk/consult/condocs/2ghzdiscuss/).

[2] Statutory Instrument No. 529 of 2003, Wireless Telegraphy (Multipoint Microwave Distribution System) Regulations 2003. Published by the Stationery Office, Dublin.

3. CRITERIA FOR COORDINATION

3.1. Within the frequency bands 2500-2690 MHz, a radio-communication station may be operated, established or modified in a country, without co-ordination with the neighbour country, provided that the predicted field strength of each carrier produced by that station does not exceed the threshold of 21 dBµV/m in a bandwidth of 5 MHz at and beyond the coast line of the neighbouring country at a height of 3 m above ground level.

3.2. Radio-communication stations for which the predicted field strength exceeds the values given in 3.1 must be co-ordinated in accordance with paragraph 7, except where stations are listed in paragraph 6 or an arrangement exists between operators as described in paragraph 4.

3.3. To establish the predicted field strength produced by a station, the methodology set out at paragraph 5 shall be employed**.**

3.4. In the case of time division duplex technology the interference power shall be the power, during the active part of the signal, in the stated bandwidth.

3.5. For systems with a working bandwidth other than 5 MHz the trigger level, expressed in dBµV/m, may be revised to $21+10\bullet\log\left(\frac{Bandwidth}{5\times10^{6}}\right)$ where bandwidth is the channel width measured in MHz.

4. ARRANGEMENTS BETWEEN OPERATORS

4.1. To facilitate reasonable and timely development of their systems, licensees are encouraged to develop Bilateral Arrangements.

4.2. 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 set out at paragraph 3.1.

4.3. Where licensees have reached such a mutual agreement, coordination of the corresponding station in accordance with paragraph 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 neighbour country authorised to use frequencies at which the predicted field strength may exceed the thresholds set out at paragraph 3.1.

4.4. In order to facilitate operator co-ordination, each Administration will provide names and point of contact information for the relevant licensees, subject to the agreement of the licencees.

5. PREDICTION OF PROPAGATION

The field prediction method shall be according to the latest version of Recommendation ITU-R P. 1546[3]:

- 10% of the time
- 50% of locations
- Height of the receiver antenna 3m

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:

- DeltaN = 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

6. CO-ORDINATED STATIONS

6.1. 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 co-ordination for the corresponding station or 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	BALLYGUILE	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			
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-	Dig/Anl	8 MHz	52 33 28	07 01 23	266,250	145,601	344	15	54	Card	V	180	320	HMD16VC-W-05

		2690														
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			

7. CO-ORDINATION PROCEDURE

7.1. Exchanges of information for coordination/notification purposes shall be in the format set out in the HCM agreement Annex 2A (revised at Vilnius 2005) [4]

7.2. In the event of interference between authorised users of the band 2500-2690 MHz 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. The Administrations of the ROI and the UK agree to facilitate the exchange of information between authorised users of the band.

7.3. Coordination request should be sent by licensee through the administration responsible for its authorisation.

8. REVIEW OF MoU

8.1. The coordination threshold and prediction methods defined in this MoU may be reviewed in the light of experience of operation of networks in both countries and future prediction developments.

9. TERMINATION OF THE MEMORANDUM OF UNDERSTANDING

Either Administration may withdraw from this Memorandum of Understanding subject to 6 months notice.

[4] 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 http://hcm.bundesnetzagentur.de/http/englisch/verwaltung/index_europakarte.htm

10. DATE OF ENTRY INTO FORCE

This Memorandum of Understanding shall enter into force on 1st March 2008.

Signed on 30 January 2008.

J CONNOLLY

For the administration of The Republic of Ireland

P BURY

For the UNITED KINGDOM administration

Annex 10

Glossary

1800 MHz band
The frequency band from 1710 to 1781.7 MHz paired with 1805 to 1867.7 MHz

2.6 GHz band
The frequency band from 2500 MHz to 2690 MHz

2G
Second-generation mobile phone standards and technology.

3G
Third-generation mobile phone standards and technology.

4G
Fourth-generation mobile phone standards and technology

800 MHz band
The frequency band from 790 MHz to 862 MHz

Area Defined Business Radio licence
A licence giving exclusive use of a frequency across either a 50 km^2 grid square, a county, or the whole of the UK.

ATC
Air traffic control

Auction
The procedure set out in Part [5] of the Regulations for the award of Licences.

Award Process
The procedures set out in the Regulations for the award and issue of the Licences

Business Day
A day (other than a Saturday or Sunday) on which banks are generally open in London for normal business.

CAA
Civil Aviation Authority.

CENELEC
European Committee for Electrotechnical Standardisation.

CEPT
European Conference of Postal and Telecommunications Administrations.

Commitments
The commitments provided by France Télécom and Deutsche Telekom to the European Commission and given effect to by the European Commission's Decision in *Case No. COMP/M.5650 T-Mobile/Orange* dated 1 March 2010

DCLG
Department for Communities and Local Government

DTT
Digital Terrestrial Television.

EE
Everything Everywhere

EIRP
Equivalent Isotropically Radiated Power

ERP
Effective Radiated Power

ETSI
European Telecommunications Standards Institute.

EU
European Union

FDD
Frequency Division Duplex

FRS
Fire and Rescue Services

GHz
Gigahertz: a unit of frequency equal to 1000 million (1 x 10^9) Hz or cycles per second.

GSM
Global System for Mobile Communications.

HO
Home Office.

HOS
Home Office System

IMT
International Mobile Telecommunications

IR or **Interface Requirement**
UK Radio Interface Requirement

ITU
International Telecommunication Union: an international organisation within the United Nations system where governments and the private sector coordinate, discuss and agree the logistics of global telecommunications networks and services.

JFMG
JFMG is the dedicated band manager for programme-making and special events.

kHz
Kilohertz: a unit of frequency, equal to 1000 (1x$10^{3)}$ Hz or cycles per second.

KPI
Key performance indicator.

Licence
A wireless telegraphy licence to be granted pursuant to the Regulations to establish or use a wireless telegraphy station or install or use wireless telegraphy apparatus in the United Kingdom at frequencies to be determined in accordance with the Award Process.

Licensee
A holder of a Licence.

Licence Fee
The fee payable for a Licence, in accordance with Regulations.

LTE
Long Term Evolution.

LTE User Equipment or LTE UE
LTE end user equipment (e.g. handsets, tablet computers, dongles etc.)

MCA
The Maritime and Coastguard Agency.

Member State(s)
EU Member State(s)

Memorandum
This Information Memorandum

MHz
Megahertz: a unit of frequency equal to 1,000,000 (1 x 10^6) Hz or cycles per second.

MMDS
Multichannel Multipoint Distribution Service.

MNO
Mobile network operator.

MOD
Ministry of Defence.

OB
Oversight Board

Ofcom
Office of Communications.

OOB
Out-of-band

PMSE
Programme-making and special events.

PSB
Public service broadcaster.

Regulations
The Wireless Telegraphy (Licence Award) Regulations 2012.

Reserve Price
The prices specified in Table [X].

RF
Radio Frequency

RSA
Recognised Spectrum Access is a spectrum management instrument that formally recognises spectrum use that is not licensable

S-band
The frequency band from 2700 to 3100 MHz

SFR
Spectrum Framework Review

SFR:IP
Spectrum Framework Review: Implementation Plan

SMP
Significant Marked Power as defined in Article 14 of the Framework Directive 2002//21/EC

SRD
Short Range Device

Suppliers Light Business Radio licence
This is a specialist licence for radio suppliers

TDD
Time Division Duplex

TWT
Travelling Wave Tube

UHF
Ultra high frequency.

UK
United Kingdom

UKFAT
United Kingdom Frequency Allocation Table 2010.

UMTS
Universal Mobile Telecommunications System.

VAT
Value Added Tax

WiMAX
WiMAX is a colloquial name given to wireless metropolitan area network (WYMAN) technology, specifically that conforming to the IEEE 802.16 family of standards.

WLAN
Wireless Local Area Network

WRC
World Radio Conference: an ITU convened conference, held every two or three years, which updates the International Radio Regulations (and, by way of example, WRC-12 is a reference to the WRC in 2012)

WT Act
Wireless Telegraphy Act 2006.