

**MEMORANDUM OF UNDERSTANDING ON
FREQUENCY CO-ORDINATION
BETWEEN**

**IRELAND
AND
THE UNITED KINGDOM**

**IN THE FREQUENCY BANDS
890- 915 MHz and 935- 960 MHz
DESIGNATED FOR
THE GLOBAL SYSTEM FOR MOBILE
COMMUNICATION (GSM)**

1 - INTRODUCTION

1.1 – Frequencies in the bands 890-915 MHz (mobile transmit) and 935-960 MHz (base transmit) are designated for the pan-European public digital land mobile system "Global System for Mobile Communications" (GSM), consistent with CEPT Recommendation (T/R 75-02; Athens, 1990) and EC Directive (87/372/EEC).

1.2 - It is necessary to establish agreements for regulatory and technical procedures for frequency co-ordination, in order to minimise interference problems between systems operating in neighbouring countries. These agreements should be designed to reduce the administrative burden and permit a rapid deployment of GSM in the countries concerned.

1.3 - Within their respective territories, the administrations of Ireland and the United Kingdom have licensed analogue cellular mobile telephone systems in parts of the band specified above. Transition arrangements are necessary to ensure mutual protection between GSM and these existing analogue systems, until the analogue systems are withdrawn.

1.4 - This agreement is based on the principles established in CEPT Recommendation T/R 20-08 E (Lecce 1989).

2 - AGREEMENT

The Administrations of Ireland and the United Kingdom agree to operate the co-ordination procedure described below.

3 - ESTABLISHMENT OF BASE-STATIONS

3.1 - Preferred frequencies

The rules allowing establishment of base stations without co-ordination shall be based on the concepts outlined in sections 3.3 and 3.4. The bands 890 -915 MHz and 935-960 MHz shall be divided into groups of frequencies which shall be assigned equally between the networks of Ireland and the United Kingdom as "preferred frequencies".

3.2 - Field strength prediction

The field strength shall be predicted by the method of CEPT T/R 20-08. Annex A provides a summary of the method, together with some additional text to resolve ambiguities in the CEPT document. In special cases, multiple interference from analogue transmitters could fall within the bandwidth of a GSM channel. In such scenarios, field strength shall be calculated by power summation, taking account of the GSM receiver filter characteristic by using the "Analogue to GSM curve" of Table A2-1, given in CEPT Recommendation T/R 20-08 (Lecce 1989 (CR)).

3.3 - Use of the preferred bands

A base station may be established without co-ordination, in a preferred band allocated to a network, provided that the predicted field strength at all points along a line 15km inside the neighbouring country does not exceed 19dB μ V/m.

3.4 - Use of the non-preferred bands

A base station may be established without co-ordination, to operate at a frequency outside the preferred bands on condition that the predicted field strength, at all points on the border or the territory, does not exceed 19dB μ V/m. No base station may be established within 10km of the border in the non-preferred band without co-ordination (as detailed in paragraph 3.6) since the method of propagation prediction does not apply at distances of less than 10km.

3.5 - Exchange of information between operators

At the request of a mobile operator, operators from the neighbouring country shall make details of existing base stations available. Where interference is believed to arise between operators, they should exchange information, with a view to resolving the difficulty. A copy of the interference details shall also be sent to both administrations.

The Administrations of Ireland and the United Kingdom agree to facilitate this exchange of information between operators and to intervene should operators not be able to resolve cases of interference by mutual agreement.

3.6 - Co-ordination procedure

The Administration of Ireland and the United Kingdom are committed to ensuring that the operators of their GSM networks, covered by this Memorandum of Understanding, respect the limits for establishment of base stations without co-ordination, given in 3.3 and 3.4 above. However, there might be an occasional need to establish stations such that the field strength at the border will exceed these limits. In such cases, each administration may seek co-ordination according to the procedure described in Paragraph 4 of CEPT Recommendation T/R 20-08 (LECCE 1989 (CR)) and in line with the format given in CEPT T/R 25-08 (LECCE 1989 (CR)).

4 - PREFERRED BANDS

The preferred bands are shown at Annex B.

5 - EXISTING STATIONS

Existing stations will comply with the agreed limit values or be co-ordinated using the procedure given in Section 3.6 by June 1st 2001.

6 - TERMINATION OF THE PREVIOUS MEMORANDUM OF UNDERSTANDING

The Memorandum of Understanding between Ireland and the United Kingdom for frequency co-ordination in the 890 – 915 MHz and 935 – 960 MHz frequency bands designated for the GSM system which entered into force on 1st September 1999 shall be terminated on the date when this MoU comes into force.

7 - REVIEW ARRANGEMENTS

The terms of this Memorandum of Understanding may be modified by mutual agreement of both administrations.

8 - TERMINATION OF THE MEMORANDUM OF UNDERSTANDING

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

9 - DATE OF ENTRY INTO FORCE

This Memorandum of Understanding shall enter into force on 1st January 2001.

1 For the UNITED KINGDOM administration

Robert Cooper 22/11/00

R. COOPER

2 For IRELAND administration

J. H. Connolly 19 December 2000
J. CONNOLLY

Originals of this Memorandum of Understanding for Frequency Co-ordination will be laid down with the Radiocommunications Agency in London and the Office of the Director of Telecommunications Regulation in Dublin.

Annex A - Propagation Prediction Method

The method of field strength prediction shall be based upon the curves given in Annex 1 of CEPT Recommendation T/R 20-08 (Lecce 1989 (CR)), on pages 3 and 5 and the correction factors given on page 4. The following paragraphs fully define the method.

A.1 Correction Factors

The following correction factors are added to the values derived from the curves referred to above:

A general correction factor of -2dB for the 900MHz band

A correction factor to allow for the height of the mobile antenna of:

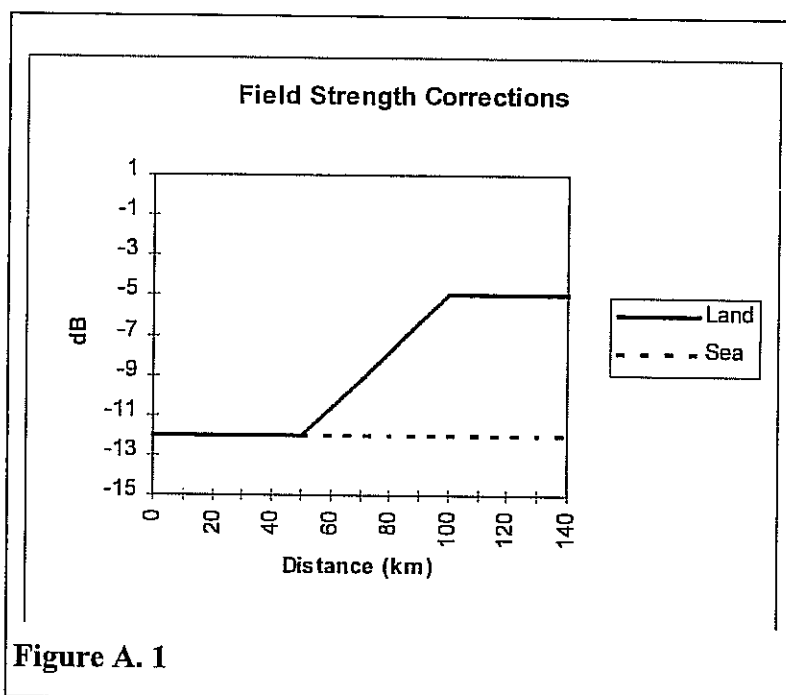
-10 dB over sea paths

-10 dB over land paths at distances of <50km

-3dB over land paths at distances >100km

Linear interpolation in dB used for distances between 50 and 100km

The overall effect of these correction factors is illustrated in figure A.1 below



A.1 - Effective Antenna Height

Following the principles from ITU-R P370 (on which the T/R 20-08 propagation curves are based) the effective antenna height shall be defined as: The antenna height above the average ground level between distances of 3km and 15km from the transmitter, in the direction of the receiver. For prediction at distances of less than 15km and more than 10km from the transmitter, the effective antenna height shall be defined as the antenna height above the

average ground level between the receiver location and a point 3km from the transmitter, in the direction of the receiver.

A.2 - Interpolation Between Curves for Different Antenna Heights

When the effective antenna height falls between the values for which curves are given, the field strength in dB μ V/m shall be found by linear interpolation between the appropriate pair of curves. If the effective antenna height falls outside the range of heights for which curves are given, the value from the nearest available curve shall be used.

A.3 - Interpolation for Mixed Land-Sea Paths

In the case of mixed land-sea paths, the field strength in dB μ V/m shall be found by linear interpolation between the values determined for land and sea paths, according to the relative proportions of land and sea along the path, as follows:

$$E = (d_{sea} / d_{total}) \times E(sea, d) + (d_{land} / d_{total}) \times E(land, d)$$

d_{sea} is the length of the sea path

d_{land} is the length of the land path

$d_{total} = d_{sea} + d_{land}$ is the total path length

$E(land, d)$ is the field strength value in dB μ V/m given by the curves of T/R 20-08 applicable to land propagation for a path length (d), plus the appropriate correction factor for a path length (d).

$E(sea, d)$ is the field strength value in dB μ V/m given by the curves of T/R 20-08 applicable to sea propagation for a path length (d), plus the appropriate correction factor.

A.4 - Use of Base Station Antenna Patterns

Calculation of predicted field strengths should take into account the radiation pattern of the base station antenna in azimuth and elevation. In the case of predictions to receiver locations along an obstructed path, the vertical angle to the visible horizon rather than to the receiver shall be used. Simplified calculations may be used which ignore the vertical radiation pattern of the antenna. In this case, the gain at the peak of the vertical pattern shall be used, in order to achieve a worst-case prediction.

Annex B - Preferred Bands

The preferred frequencies for the United Kingdom and Ireland are shown in the table below:

GSM Channel number	Preferred	Non-preferred
1 - 12	United Kingdom	Ireland
13 - 36	Ireland	United Kingdom
37 - 55	United Kingdom	Ireland
56 - 74	Ireland	United Kingdom
75 - 93	United Kingdom	Ireland
94 - 111	Ireland	United Kingdom
112 - 124	United Kingdom	Ireland

