



Commission for
Communications Regulation

Guidelines

Applications for Broadband Wireless Access Local Area (BWALA) Licences

Guidelines

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1 Introduction

1. In July 2010, ComReg conducted a consultation on the Implementation of EC Decision 2008/411/EC¹ (“EC Decision”) and the introduction of mobility to the 3400 – 3800 MHz band (the 3.6 GHz band)². In its Response to Consultation document³ ComReg set out its intention to establish the Broadband Wireless Access Local Area (BWALA) licensing scheme and exempt 3.6 GHz mobile terminals from individual licensing. The Wireless Telegraphy (Broadband Wireless Access Local Area Licence) Regulations 2013 (“the Regulations”) establish the BWALA licensing scheme. This document sets out the licensing process for applicants wishing to apply for a BWALA licence.
2. Licences granted under the BWALA licensing scheme are primarily intended for use in the provision of broadband services to end users. However, ComReg may grant a BWALA licence for the provision of radio access services in a network, where this facilitates the rapid connection of broadband services to end users. This reflects the general policy of ComReg to encourage the roll out of broadband services on multiple platforms.
3. In April 2010 ComReg published an Information Notice⁴ announcing that the current FWALA licensing scheme in the 3.6 GHz band would be terminated by 31 July 2017, allowing all existing 3.6 GHz licences to run for their full 7-year duration. The introduction of mobility to the band under the BWALA scheme is recognised as having limited scope for facilitating deployment of mobile services, particularly on a national basis, which is anticipated to be a major driver of demand for wireless broadband services in the future. It is also expected that demand for fixed and nomadic services is likely to continue. Given the above ComReg has also set the termination date for the BWALA licensing scheme as 31 July 2017. As such, as set out in Regulation 11(a) of the Regulations, any licence that has not expired prior to midnight on 31 July 2017 will expire fully on that date and will not be renewed from that date.

¹ Commission Decision of 21 May 2008 on the harmonisation of the 3400 – 3800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community.

² ComReg Consultation 10/55 “The implementation of EC Decision 2008/411/EC and Introduction of Mobility to the 3400 – 3800 MHz band”

³ ComReg Response to Consultation 11/03 “The implementation of EC Decision 2008/411/EC and Introduction of Mobility to the 3400 – 3800 MHz band”

⁴ ComReg 10/29 – Fixed Wireless Access Local Area Licensing: End date of the FWALA licensing scheme in the 3.6 GHz band – 8 April 2010. http://www.comreg.ie/_fileupload/publications/ComReg1029.pdf

4. As with FWALA licence applications, in considering applications for BWALA licences ComReg's policy is to optimise the use of the radio spectrum by ensuring that, as far as practicable, the assigned bandwidth is the minimum consistent with the service requirement.
5. As the FWALA and BWALA licensing processes will run in parallel, the BWALA licensing process retains, for the most part, the same parameters as the existing FWALA licensing scheme with some adjustments to accommodate the mobility aspect.

2 The Statutory Regulations

6. A Wireless Telegraphy Licence is required under Section 3 of the Wireless Telegraphy Acts 1926 to 2009 to keep and operate *apparatus for wireless telegraphy*. The specific regulations governing the granting of BWALA licences are contained in the Wireless Telegraphy (Broadband Access Local Area Licence) Regulations, 2013 (S.I. 214 of 2013) (“the Regulations”).
7. The applicant should be aware that any BWALA licence granted by ComReg is for the keeping and operating of the apparatus for wireless telegraphy that is specified in the licence. Any licence granted by ComReg does not absolve the licensee from complying with any other statutory obligations (e.g. planning permission).
8. BWALA operators must also comply with ComReg’s General Authorisation scheme governed by the European Communities (Electronic Communications Networks and Services) (Authorisation) Regulations, 2011 (S.I. 335 of 2011).

3 The BWALA licensing scheme

9. This section outlines the frequency spectrum available for the scheme, the definitions and technical parameters in relation to the service area and general equipment requirements.

3.1 Frequency Spectrum

10. The channels identified for BWALA licensing in the 3.4 GHz – 3.8 GHz band are shown in Figure 1 below:

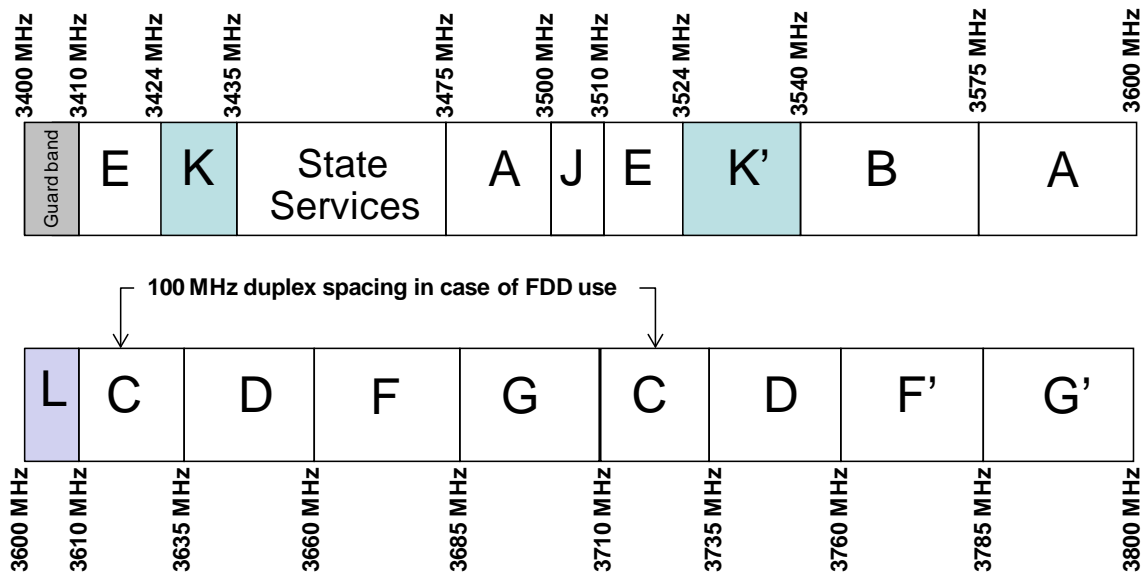


Figure 1: BWALA channel arrangements in the 3.4 GHz – 3.8 GHz band

11. The licensing process for Channels A through to L is set out in this document and details of these channels are set out in Table 1 below:

3.4 GHz – 3.8 GHz band Channels	Channel Bandwidth	Mode of Operation	Transmit centre frequency (MHz)	
			Base Station	CPE
A	2 x 25 MHz	FDD or TDD	3587.5	3487.5
B	1 x 35 MHz	TDD	3557.5	
C	2 x 25 MHz	FDD or TDD	3722.5	3622.5
D	2 x 25 MHz	FDD or TDD	3747.5	3647.5
E	2 x 14 MHz	FDD or TDD	3517	3417
F	2 x 25 MHz	FDD or TDD	3672.5	3772.5
G	1 x 25 MHz and 1 x 15 MHz	FDD or TDD	3697.5	3792.5
J	1 x 10 MHz	TDD	3505	
K	1 x 11 MHz and 1 x 16 MHz	FDD and TDD		
L	1 x 10 MHz	TDD	3605	

Table 1: 3.4 – 3.8 GHz channel plan details

12. While the 3.4 – 3.8 GHz spectrum band has been identified for BWALA licensing, this does not imply that ComReg is always in a position to offer a BWALA licence to an applicant as issues such as availability of spectrum in a particular area need to be considered for each application.

13. Changes in the spectrum identified for BWALA licensing may arise for a number of reasons, these include:

- Changes in spectrum allocations in accordance with the requirements of international treaties or regionally negotiated agreements;
- Changes necessitated by EU legislation;
- Changes in order to meet national requirements; and
- In the interest of the efficient use of the radio spectrum it is the policy of ComReg to review the use of the spectrum on an ongoing basis in order to reflect the changes outlined above and changes in the market place.

3.2 BWALA Spectrum Assignment Issues

14. There is limited spectrum available for BWALA licences and in order to maximise use of this spectrum, it is ComReg's policy to manage the spectrum in an efficient and orderly manner.
15. While ComReg will endeavour to minimise the potential for interference between users and services, no liability shall accrue to ComReg arising from interference. Licensed operators should initially liaise with other licensed operators regarding interference issues. If a resolution is not reached, the interference may be reported to ComReg's Spectrum Compliance section, who will investigate as appropriate.
16. Licensees should note that guard bands may be required between adjacent channel frequency assignments and in these cases BWALA licensees will be required to accommodate these guard bands within their licensed frequency channel. Where two different technologies are operating in adjacent channels, substantial guard bands may be required to avoid mutual interference.

Services operating above 3800 MHz

17. As detailed in ComReg documents 10/55 and 11/03 there are two licensed C-band FSS Earth Stations in Ireland and both operate in spectrum above 3900 MHz. These Earth Stations are to be protected by a guard band of at least 100 MHz from any BWALA systems in the 3.6 GHz band.
18. In assessing the compatibility of the two licensed Earth Stations with the BWALA services in the 3.6 GHz band, ComReg has assumed the worst case scenario contemplated in ECC Report 100⁵, i.e. where a BWA Central Station is radiating +59 dBm (i.e. 6dB above the maximum power level permitted under the EC Decision) and the mitigating effect of terrain and clutter⁶ has been excluded. Under this scenario, the worst case zones within which co-ordination may be required between BWALA licensees and FSS Earth Stations are depicted on the map shown in Figure 2 below:

⁵ ECC Report 100 "Compatibility between BWA in the band 3400 - 3800 MHz and other services"
<http://www.erodocdb.dk/Docs/doc98/official/pdf/ECCREP100.PDF>

⁶ Clutter is the term used to describe non-topographical objects located in the propagation path which scatter and attenuate a signal. Typical examples of clutter are vegetation, buildings and other man-made structures.

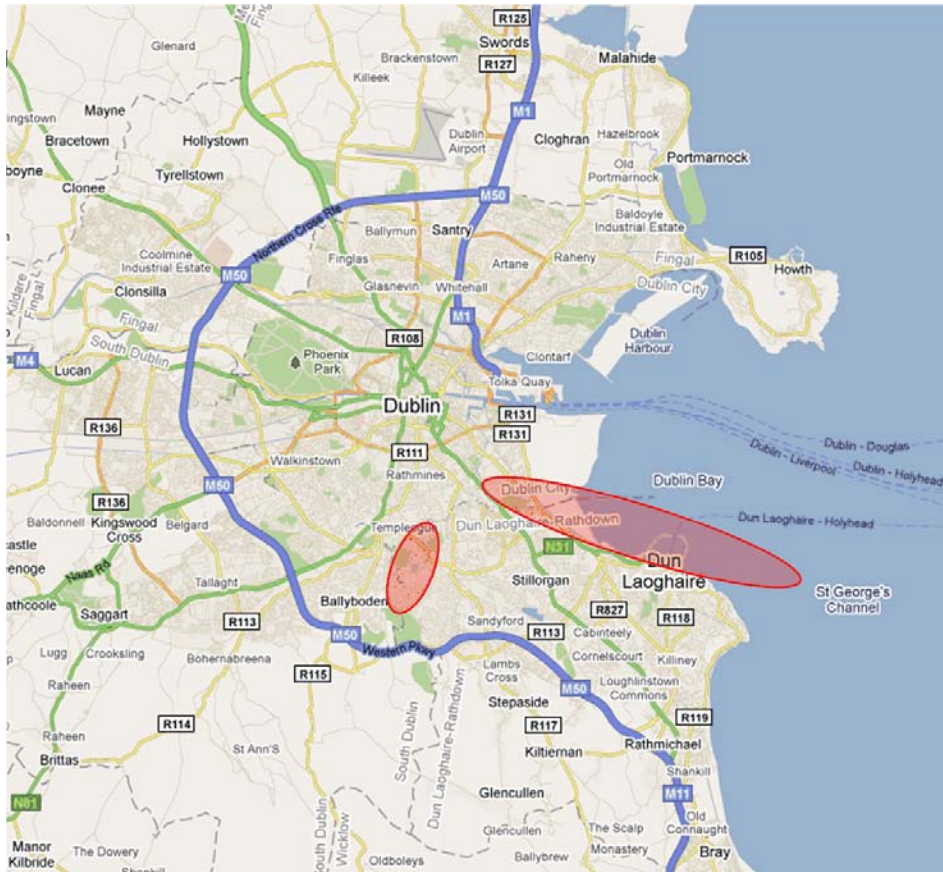


Figure 2: The worst case zones within which coordination between BWA and existing FSS Earth Stations may be required.

19. In a realistic scenario, the limits on Central Station transmit power levels imposed by the EC Decision, combined with the mitigating effect of urban clutter mean that BWALA systems should be capable of operating within these zones without affecting the two licensed FSS Earth Stations. ECC Report 100 also notes that in the unlikely case of Earth Station LNB saturation, the effect may also be further mitigated by fitting filters to affected Earth Stations.
20. ComReg notes, however, that the deployment of BWALA within the zones indicated in Figure 2 may require co-ordination with the two FSS Earth Stations, and accordingly BWALA licensees are required to notify ComReg before putting any Central Stations into service within these areas. Should a co-existence issue arise between a BWALA system and either of these two licensed FSS Earth Stations, ComReg will investigate the issue and the onus to provide any required mitigation measures will lie with the BWALA licensee concerned.

21. In relation to international co-ordination and protecting non-Irish FSS Earth Stations, ComReg will act in accordance with the ITU Radio Regulations.

3.3 BWALA Definitions and Technical Parameters

22. The following definitions and technical parameters are applicable to the BWALA licensing scheme:

- BWALA Service Area
- Interference Contour
- Field Strength Limits
- Geographical Service Area (GSA)

BWALA Service Area

23. The BWALA service area is defined as the geographic area within which an operator may offer telecommunications services by means of a local area broadband wireless access network. The service area for a licence is defined by a centre point and a maximum permitted radius from that point. The centre point is normally the geographic location of the base station. The service area of a BWALA licence is defined by a circle, with 20km radius from nominated centre point.

24. It is intended that Customer Premises Equipment (CPE) and outlying base stations⁷ may only be deployed within the service area of a BWALA licence, may only operate on the frequency range covered by the BWALA licence and must not cause the field strength limit specified in Table A1 below to be exceeded.

Interference Contour

25. The interference contour is defined by means of a circle around the centre point of the service area. The interference contour is set at 30km. See Annex 1 below for details of the technical parameters and limits applicable to the interference contour. An application will be rejected if its interference contour overlaps with the interference contour of another applicant/licensee on the same channel.

⁷ "Outlying base stations" are those base stations that are **not** located at the centre of the BWALA service area

Field Strength Limits

26. The field strength applied at the interference contour is intended to ensure that any interference to a BWALA receiver in a service area beyond this contour is at least 6dB below the thermal noise floor. The field strength is dependent on the station type employed, as set out in Table A1 below.
27. The BWALA licence states that the field strength must not be exceeded by the BWALA licensee at the interference contour. It is expected that the applicant will employ a propagation tool when planning their network to ensure that the field strength limits at the interference contour is not exceeded.

Power Spectral Density Limits and Block Edge Mask (BEM)

28. The EC Decision requires Member States to ensure that other existing and future systems in the 3.6 GHz band can co-exist with new Broadband Wireless Access systems. Where appropriate, ComReg intends to continue to protect and coordinate with the other services in the 3.6 GHz band, to ensure that they are afforded the appropriate level of protection.
29. As set out in Consultation document 10/55, ComReg is of the view that application of the power spectral density limits and BEM set out in the EC Decision will not negatively impact on other users of the 3.6 GHz band. Therefore the limits at set out in Annex 1 to this document shall apply to all BWALA licences granted by ComReg.

Geographical Service Area (GSA)

30. When two or more BWALA Licences overlap, a Geographic Service Area may be formed provided that the criteria as set out below are met. BWALA licences may be considered as overlapping if their interference contours overlap.
31. Once a GSA is designated, the Licensee will be allowed to deploy BWA apparatus⁸ and provide BWALA services throughout the GSA.
32. The maximum area that can be applied for in respect of a GSA is dependent upon:
 - maintenance of the existing 10km Interference Buffer Zone to the edge of their BWALA licences, as specified under the BWALA licensing scheme; and

⁸ Outlying Stations or Customer Premises Equipment.

- compliance with the interference field strength limits at the edge of the buffer zone as specified under the BWALA licensing scheme.

Frequency Band (GHz)	Maximum Service Area Radius (km)	Interference Contour Radius (km)	Field Strength (dB μ V/m)
3.5	20	30	33

Table 2: BWALA Parameter Limits

3.4 BWALA Code of Practice for the 3.4 – 3.8 GHz band

33. While every effort has been made by ComReg to minimise the possibility of interference between licensed operators in licensing BWALA systems, it is possible that situations will arise from time to time where it is necessary to coordinate the usage of frequencies between different BWALA networks in order to facilitate the operation of these networks. It is ComReg’s view that the most appropriate way to deal with such instances is by means of a Code of Practice on Domestic Frequency Coordination (see ComReg 07/74R1, which is being published alongside this document).

3.5 Cross-border frequency considerations

34. ComReg’s jurisdiction ends at the national border. There is currently a Memorandum of Understanding (MoU) in place between ComReg and its UK counterpart Ofcom, to facilitate operation of BWALA stations as close to the border as possible. The criteria for co-ordination are as follows:

35. A station may be established without co-ordination, provided that the predicted power spectral density (PSD) produced by the station, at a height of 10m above ground at 15km from the border of the border or coast line of the neighbouring country does not exceed 24 dB μ V/m in a bandwidth of 1MHz (equivalent to an aperture power of -122 dBW/MHz/m²).

36. 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.

37. This MoU is bilateral in nature and all licensees are required to meet the terms of the agreement. The full text of the MoU can be found in Annex 2 of this document.

3.6 Equipment Compliance

38. In common with other licensed radio services, all radio equipment used to deliver BWALA services must comply with the Radio and Telecommunications Terminal Equipment Directive 1999/5/EC (the R&TTE Directive)⁹, which was enacted into Irish law on 5 June 2001 by Statutory Instrument 240 of 2001¹⁰. Information on the R&TTE Directive may be found in ComReg documents 00/61 and 00/62R - please note that these documents are subject to revision and updates¹¹.

⁹ OJEC reference L 91, 7.4.1999, p.10 (available from http://europa.eu.int/eur-lex/en/search/search_oj.html)

¹⁰ S.I. No. 240/2001 - European Communities (Radio Equipment and Telecommunications Terminal Equipment) Regulations, 2001

¹¹ Further information on the R&TTE Directive can be found at <http://europa.eu.int/comm/enterprise/rtte/>

4 The Application Process

4.1 Terms for Submission of an Application

39. All applications for a BWALA licence must be made on the appropriate application form - ComReg document 13/92a.

40. The minimum requirements for a BWALA Application are that:

- the application form must be completed correctly in accordance with these guidelines and with the information requested in the application form (ComReg document 13/92a);
- the full licence fee is to be submitted with the application;
- a separate application is required in respect of each BWALA system (i.e. centre point of BWALA service area);
- a person who applies for adjacent areas should, where feasible, request the same frequency channel in all service areas;
- where a Licensee has an existing channel and is making an application for a channel in another service area, the licensee should request the existing channel, where available, in its application; and
- in the interest of spectrum efficiency applications will only be accepted where the applicant applies for the full channel bandwidth of the BWALA channel. See Tables 1 of this document for the channel plans for the 3.5 GHz band.

4.2 Comparative Evaluation Process

41. When a comparative evaluation process is required (e.g. where there is excess demand for: (a) a particular unassigned frequency band location; or for (b) the amount of licensable, but as yet unassigned, spectrum available) ComReg will notify the affected applicants that their application will be evaluated comparatively rather than using a First Come First Served method. Guidance on the comparative evaluation process is set out in the revised FWALA Guidelines document ComReg 06/17R7.

4.3 Geographical Service Area (GSA)

42. A licensee will be eligible to apply to ComReg to form a GSA based around its individual BWALA licences when certain criteria are met. The criteria are the same as those required for a FWALA GSA licence (see ComReg 06/17R7).

4.4 Provision of Further Information

43. ComReg reserves the right to request an applicant to submit further material and documents in addition to the information already provided within such time and within such format as ComReg may stipulate. Only the applications and written material requested by ComReg will be taken into account during the evaluation process.

4.5 Application Conditions

44. By participating in the application process, the applicant undertakes to accept the terms of the application, to abide by the rules of the process and that its application is an irrevocable and unconditional offer that will remain valid and binding on the applicant for the period of the licence award process or until such time as the applicant has been awarded or declined a licence, or ComReg has otherwise terminated the licence award process. All expenses incurred by applicants or potential applicants shall be borne by themselves exclusively.

45. ComReg reserves the right to alter any of the deadlines or conditions during the licensing process. Although every care has been taken in preparing this document and conducting this process, no representation, warranty or undertaking, expressed or implied, in respect of any error or misstatement is or will be made or given, and no responsibility or liability will be accepted by ComReg or by any of its officers, employees, servants, agents or advisers as to the accuracy or completeness of this document or any other written or oral information made available to any interested party or its advisers concerning this document and any liability howsoever arising (including in respect of this licensing process) is expressly disclaimed. No information contained in this document shall form the basis for any warranty or representation nor will the application for a licence, nor the grant of any licence (whether conditional or otherwise) constitute a contract with ComReg.

46. ComReg makes no representations and warranties in respect of the viability of the market or accuracy of the contents of these Guidelines so that applicants and potential applicants are responsible for their own verification and due diligence. The applicant agrees by accepting any licence, which it may be offered that the Licensee is responsible for all costs, liabilities and losses derived from the operation or non-operation of the licence or licensed service for whatever cause.
47. Applicants should note that ComReg is subject to Irish and EU rules on treatment and handling of confidential information, is a 'Public Body' for the purpose of the Freedom of Information Act, 1997 and is bound by this Act in relation to the release of information.
48. Any personal information which you provide to ComReg will be treated strictly in accordance with the Data Protection Acts, 1988 & 2003

5 Licence Information

49. A licence granted under the BWALA Regulations allows the licensee to keep and operate radio apparatus in accordance with these regulations.
50. Please refer to the Regulations for a complete list of conditions attaching to the BWALA licence.
51. A licence does not confer any right of ownership of the frequency spectrum. It allows the assigned frequency channel to be used during the term of the licence in accordance with the conditions of the licence.
52. ComReg reserves the right not to award licences.

5.1 Duration of Licences

53. BWALA licences are granted for a period of 1 year from the commencement date stated in the licence and may be renewed annually. No BWALA licences shall be granted, renewed or extended beyond the 31 July 2017 and any BWALA licence in the 3.6 GHz band that is still active on 31 July 2017 shall terminate at midnight on that date.

5.2 Licence Fee

54. As specified in section 4.1, all applications for a new BWALA channel must be made for the full channel bandwidth of the BWALA channel. (See Table 1 above)
55. The licence fees to be paid on grant of, and on each renewal of, a BWALA licence are as set out in Table 3 below.

Bandwidth (Paired channel)	Licence Fee (€)
Up to and including 7MHz	1550
Over 7 MHz and up to and including 14 MHz	2100
Over 14 MHz and up to and including 28 MHz	3000

Table 3: Schedule of Fees

56. The annual licence fee for a single channel is calculated by first determining the “equivalent” paired channel bandwidth and then using Table 3 to determine the fee.

Example:

A 1 x 35 MHz single channel allocated.

The “equivalent” paired channel bandwidth is 2 x 17.5 MHz

As this is between 14 MHz and 28 MHz, using Table 3, the licence fee is €3000.

57. Where a licence is granted for a portion of a year the licence fee to be paid by the licensee shall be calculated as follows:

$$A \times (B/12) = C$$

Where:

A is the relevant licence fee (e.g. €3000);

B is the number of whole months for which the licence is granted (if a licence is granted for a period of less than one month then, for the purpose of these calculations only, the licence shall be considered as a licence granted for a period of one month); and

C is the appropriate licence fee to be paid.

5.3 Renewal of Licences

58. Licences for BWALA systems will not be considered for renewal if the system has not been brought into service prior to the renewal date of the licence.

59. The licence, if not renewed prior to the termination date, will be deemed to have lapsed.

60. It may not, in all cases, be possible to effect renewal. In considering renewal ComReg will have regard to, inter alia:

- Whether the licence fee is paid in full;
- Whether the BWALA system is being operated in accordance with the terms and conditions of the licence;

- Whether changes in radio frequency management requirements are being considered at a national or international level for the band in question (where this is the case ComReg will endeavour to provide affected licensees with as much notice as is reasonably practicable).

61. A written request for renewal should be sent to ComReg at least 28 days prior to the termination date of the licence.

62. No BWALA licences shall be renewed or extended beyond the 31 July 2017 and any BWALA licence in the 3.6 GHz band that is still active on 31 July 2017 shall terminate at midnight on that date.

5.4 Amendments to Licences

63. It is recognised that licensees, from time to time, may wish to request a modification to an existing licence. For example, an existing licensee with a licence for part of a BWALA channel may apply to ComReg to amend its licence by requesting additional bandwidth in that channel.

64. Where the Licensee wishes to modify elements of their licence, a request must be submitted on the application form (ComReg 13/92a). Table 3 will be used to determine if a fee is required with the amendment request.

65. In exceptional circumstances and where appropriate, ComReg may need to make modifications to existing licences. In all cases of licence amendment ComReg will follow the procedures set out in the Authorisation Regulations.

66. For the avoidance of doubt, ComReg will not permit amendments to licences where the request is being made to move the central base station of the BWALA service area more than 5km in any direction from its current centre point location.

5.5 Revocation of a Licence

67. ComReg may suspend or revoke a licence where there is serious or repeated non-compliance by the licensee with the conditions of the licence. Applicants are referred to Regulation 12 of the Regulations.

5.6 Cancellation of a Licence

68. A Licence may be cancelled at the written request of the licensee. There shall be no entitlement to any refund of licence fees in the event of such cancellation.

69. A licence that has not been renewed as per Section 5.3 of this document will be deemed to have lapsed.

5.7 Non-Ionising Radiation

70. The licensee shall ensure that non-ionising radiation emissions from the broadband wireless access apparatus operated by the licensee are within the limits specified in the guidelines published by the International Commission on Non-Ionizing Radiation Protection (“ICNIRP”) and that these comply with any radiation emission standards adopted and published by ICNIRP or its successors, from time to time, any radiation emission standards of the European Committee for Electrotechnical Standardization and any other radiation emission standards specified by law.

5.8 Interference

71. Licensees are required to adhere to the guidelines in ETSI Technical Report ETR 053, *“Radio Site Engineering for Radio Equipment and Systems in the Mobile Service”*, to minimise the risk of interference between co-located radio systems.

5.9 International Coordination Obligations

72. In some cases it may be necessary for ComReg to undertake international coordination and registration procedures, particularly where there is a possibility of interference to/from the terrestrial and/or satellite services of another administration. As this may take some time, BWALA networks are licensed subject to a condition that the licence may have to be amended, or withdrawn, if successful coordination is not achieved. Where changes arising from international coordination are required to be made to a licence, the licensee will be advised of the necessary changes. In this event, all expenses must be borne by the licensee.

5.10 Commissioning/Site Inspections

73. ComReg reserves the right to inspect a BWALA station at any time to ensure that the system is configured and operating in accordance with the licence conditions. In addition, ComReg may attend the commissioning of the system and may carry out measurements on the system at that time.

5.11 Harmful Interference to other users

74. Licensees are obliged to comply with the general BWALA technical obligations (see chapter 3), which are designed to reduce:

- Co-channel interference
- Adjacent channel interference
- Cross-border interference

Annex: 1 Technical Parameters for BWALA licences

A 1.1 The following technical parameters, called Block Edge Mask (BEM) parameters, are an essential component necessary to ensure co-existence in the absence of bilateral agreements between neighbouring networks. Less stringent technical parameters, if agreed among operators of such networks, can also be used. Equipment operating in this band may also make use of E.I.R.P. limits other than those set out below provided that appropriate mitigation techniques are applied, which comply with Directive 1995/5/EC, and which offer at least an equivalent level of protection to that provided by these technical parameters.

(A) Limits for In-Block Emissions

Station Type	Maximum E.I.R.P. spectral density (dBm/MHz) (including tolerances and automatic transmitter power control (ATPC) range)
Central station (and repeater stations downlink)	+ 53 ¹²
Terminal station outdoor (and repeater station uplinks)	+ 50
Terminal stations (indoor)	+ 42

Table A1 E.I.R.P. spectral density limits for fixed and nomadic deployments between 3400 – 3800 MHz

¹² The central station E.I.R.P. spectral density value given in the table is considered suitable for conventional 90 degrees sectoral antennas

Station Type	Maximum E.I.R.P. spectral density (dBm/MHz) (Minimum ATPC range 15 dB)
Central station	+ 53 ¹³
Terminal station outdoor	+ 25

Table A2 E.I.R.P. spectral density limits for mobile deployments between 3400 – 3800 MHz

(B) Limits for out-of-block emissions (Block Edge Mask for Central Stations)

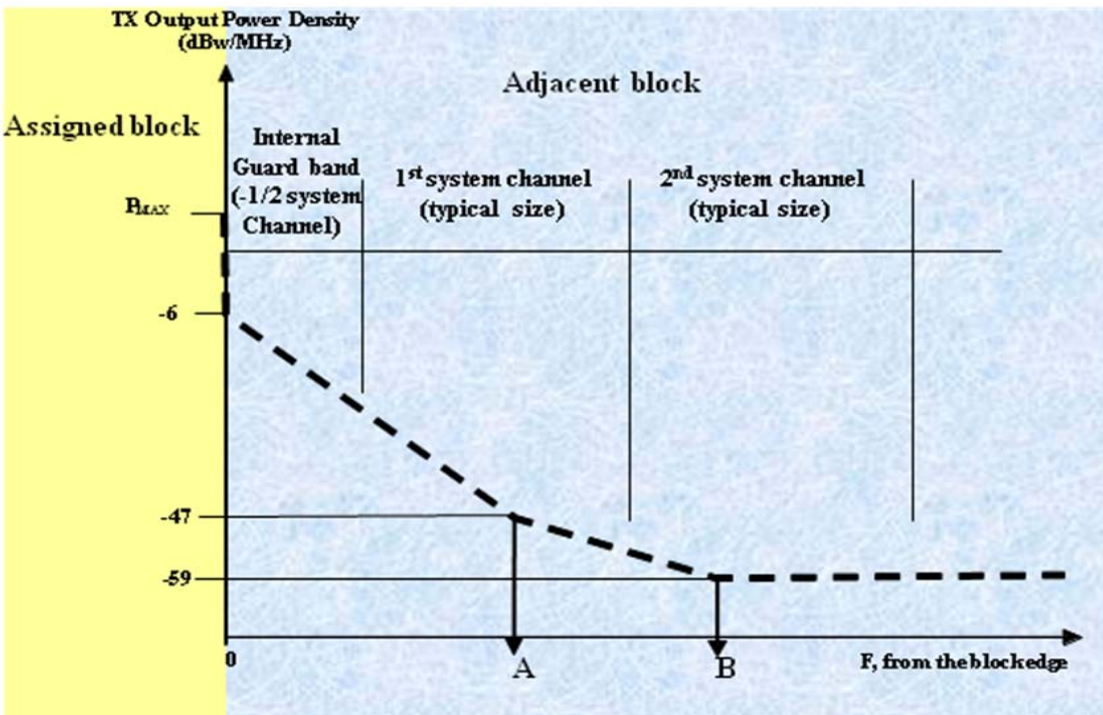


Figure A1 Central Station out-of-block emissions.

¹³ The central station E.I.R.P. spectral density value given in the table is considered suitable for conventional 90 degrees sectoral antennas

Frequency offset	Definition (% of the size of the assigned block)
A	20%
B	35%
NB: The percentages given in the "Definition" column refer to the smaller of adjacent blocks, if blocks are unequal size.	

Table A3 Frequency offset definitions

Frequency offset	Central station transmitter output power density limits (dBm/MHz)
In-band (within assigned block)	See Tables 1 and 2
$\Delta F = 0$	-6
$0 < \Delta F < A$	$-6 - 41 \cdot (\Delta F/A)$
A	-47
$A < \Delta F < B$	$-47 - 12 \cdot ((\Delta F - A)/(B - A))$
$\Delta F \geq B$	-59

Table A4 Tabular description of central station Block Edge Mask

Annex: 2 Memorandum of Understanding on 3.6 GHz.



**MEMORANDUM OF UNDERSTANDING ON
FREQUENCY COORDINATION BETWEEN
THE REPUBLIC OF IRELAND
AND
THE UNITED KINGDOM
FOR WIRELESS ACCESS SERVICES
IN THE FREQUENCY BAND
3400 TO 3800 MHz**

1. INTRODUCTION

- 1.1. This memorandum describes the procedures for the coordination of Wireless Access ¹⁴ (WA) radio services between the Republic of Ireland (ROI) and the United Kingdom (UK) in the frequency bands 3400 to 3800 MHz.
- 1.2. Services other than Wireless Access are not covered by this agreement.
- 1.3. Ofcom is the Administration of the United Kingdom responsible for all relations with Ireland concerning this MoU.
- 1.4. The Commission for Communications Regulation is the Administration of the ROI responsible for all relations with the UK concerning this MoU.
- 1.5. Accordingly, the Administrations of the UK and the ROI have agreed the following co-ordination procedures.
- 1.6. The co-ordination procedure, is based on the principle of equitable access to the spectrum resource

2. CRITERIA FOR COORDINATION

- 2.1. A station may be established without co-ordination, provided that the predicted power spectral density (PSD) produced by the station, at a height of 10m above ground at 15km from the border of the border or coast line of the neighbouring country does not exceed 24 dB μ V/m in a bandwidth of 1MHz (equivalent to an aperture power of -122 dBW/MHz/m²).
- 2.2. 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. PREDICTION OF PROPAGATION

The field prediction method shall be according to the current version of Recommendation ITU-R P.452¹⁵ which shall be applied as follows:

- 10% of the time

Taking account of:

- Height of the receiver antenna set at 10 m above ground.
- Terrain profile for the base station in all main directions

¹⁴ Recommendation ITU R F 1399 Vocabulary of terms for Wireless Access

¹⁵ Recommendation ITU-R P.452, Prediction procedures for the evaluation of microwave interference, between stations on the surface of the earth at frequencies above about 0.7 GHz.

- Type of terrain (e.g. land, sea, mixed path)
- Effective radiated field strength
- Antenna tilt and azimuth

4. CO-ORDINATION PROCEDURE

- 4.1. The Administration of the ROI and the UK are committed to ensuring that the licensees covered by this Memorandum of Understanding, respect the limits for establishment of base stations without co-ordination, given in 2 above. However, there might be an occasional need to establish stations such that the PSD will exceed the limits given in 2 above. In such cases, each administration may seek co-ordination according to paragraph 4.
- 4.2. Receive stations in a neighbour country shall not claim protection from interference from transmit stations that operate such that the signal level in a neighbour country is less than the trigger level described in this MoU or are coordinated according to this MoU.

5. EXCHANGE OF INFORMATION

- 5.1. An MoU between the administrations of the ROI and the UK, which enables co-ordination between operators, subject to agreement of the Administrations, was signed on the 22 November 2000.¹⁶ This principle shall be extended to operators of systems for the frequency bands identified in this MOU.
- 5.2. In the event of interference the affected parties shall exchange information with a view to resolving the dispute by mutual agreement. A report of the interference and the details of the information exchanged shall be sent to both administrations. The Administrations of Ireland and the United Kingdom agree to facilitate the exchange of information between operators.
- 5.3. An Administration wishing to bring a station into service or wishing to modify the characteristics of a station, such that the signal exceeds a coordination threshold given in paragraph 2, must submit a request for co-ordination with the other Administration by way of notice.
- 5.4. Exchanges of information for coordination/notification purposes shall be in the format set out in the HCM agreement Appendix 2A (revised at Vilnius 2005).
- 5.5. The affected Administration shall evaluate the request for co-ordination and shall within 30 days notify the result of the evaluation to the Administration requesting co-ordination.

¹⁶ Agreement between the administrations of United Kingdom/Ireland concerning the approval of planning arrangements between operators of mobile radio communication networks 22 November 2000

- 5.6. If in the course of the co-ordination procedure the affected Administration requires additional information, the Administration seeking co-ordination shall provide such information upon request.
- 5.7. An Administration not having responded within 30 days following communication of the reminder shall be deemed to have given its consent and the station may be brought into use with the characteristics given in the request for co-ordination.

6. REVIEW ARRANGEMENTS

The limits and prediction methods defined in this Memorandum of Understanding may be reviewed in the light of experience of operation of networks in both countries and future prediction developments.

7. TERMINATION OF THE MEMORANDUM OF UNDERSTANDING

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

8. DATE OF ENTRY INTO FORCE

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

Signed on 31 March 2008.

For the UNITED KINGDOM administration

[Signature redacted]

P BURY

For the administration of the REPUBLIC OF IRELAND

[Signature redacted]

J. CONNOLLY