Commission for
Communications Regulation

Guidelines
Guidelines to Applicants for Radio Links Licences

General Document

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Content

Annex

Section Page

1 Introduction

1. A licence to keep and operate apparatus for wireless telegraphy is required under Section 3 of the Wireless Telegraphy Act 1926. Radio Link licences are governed by the Wireless Telegraphy (Radio Link Licence) Regulations, 2009 (S.I. 370 of 2009). A holder of a wireless telegraphy licence must also comply with the General Authorisation scheme (governed by the European Communities (Electronic Communications Networks and Services) (Authorisation) Regulations 20011 (S.I. 335/20011) and with the European Communities (Radio Equipment and Telecommunications Terminal Equipment) Regulations 2001 (S.I. 240 of 2001).

2. This document sets out ComReg's revised guidelines for applicants for a radio link licence, replacing the "Guidelines to Applicants for Radio Link Licences" (ComReg Document 09/89)[1].

3. As of 1 December 2009, applications for radio link licences may be made via ComReg's online application system[2]. Applicants wishing to submit paper based applications may continue to do so. For further information on the application process, please refer to Section 4 of this document.

4. As stated in ComReg's Strategy for Managing the Radio Spectrum: 2011 – 2013[3], three new frequency bands, 28 GHz, 31 GHz and 42 GHz, have been opened for Point-to-Point (PP) fixed links. The new bands are set out in Table 1.

Frequency Band (GHz)	Raster (MHz)	ECC Recommendation	Minimum transmission capacity (Mbps)
28 (27.9405 - 28.4445 paired with 28.9485 - 29.4525)	112, 56, 28, 14, 7, 3.5	T/R 13 02 Annex C	620 (112 MHz), 310 (56 MHz)
31 (31.0 - 31.3 paired with 31.5 - 31.8)	28, 14, 7, 3.5		4
42 (40.5 - 43.5)	112, 56, 28, 14, 7	ECC/REC/(01)04	620 (112 MHz), 310 (56 MHz)

Table 1: New Fixed Links frequency bands

[1] ComReg Document 09/89 - Guidelines to Applicants for Radio Links Licences - published 27 November 2009.
[2] www.elicensing.comreg.ie
[3] ComReg Document 11/89 - Spectrum Management Strategy Statement - published 22 November 2011.

5. As part of ComReg's Strategy for Managing the Radio Spectrum: 2011 – 2013[3], ComReg conducted a fixed links survey[4] to gauge the experiences of licensees with a view to revising the current engineering guidelines. This included assessing the possibility of making 56 MHz and higher bandwidth channels available in current frequency bands.

6. Following consultation with industry[5], ComReg has decided to permit new channel bandwidths in five of the current frequency bands. This is to facilitate the increase in data demands by mobile technology. The new bandwidths are shown in Table 2.

Frequency Band (GHz)	Raster (MHz)	ECC Recommendation	Minimum transmission capacity (Mbps)
13	56	ERC/REC 12-02 E	310 (56 MHz)
15	56	ERC/REC 12-07 E	310 (56 MHz)
18	110	ERC/REC 12-03 E	620 (112 MHz)
23	112, 56	T/R 13-02 Annex 1	620 (112 MHz), 310 (56 MHz)
38	112, 56	T/R 12-01 E	620 (112 MHz), 310 (56 MHz)

Table 2: New bandwidths for existing frequency bands

7. In addition, 56 MHz bandwidth channels are also being made available in the 26 GHz band only where the licensee has a national block licence with contiguous blocks of spectrum.

8. ComReg will permit licensees to use channel aggregation, once an interference analysis has been carried out on the new link. Channel aggregation can be a useful tool to increasing microwave link throughput.

9. Furthermore, ComReg will permit the use of equipment which utilises Adaptive Coding and Modulation (ACM) to be deployed in all terrestrial microwave fixed link bands. ACM increases the data capacity of radio links without increasing power consumption or link bandwidth. The increased capacity of individual links allows operators to reduce the total number of links they deploy, thus minimising equipment costs, power consumption and carbon emissions. Further information on ACM can be found in Section 2.10.

[4] ComReg Document 12/10 - Fixed Links Survey - published 15 February 2012.
[5] ComReg document 12/104 - Response to Survey and Decision - published 17 September 2012

10. As of the 1st of October 2012, it is mandatory for operators to deploy dual polarisation for all new fixed link applications where more than one link is required on the same path.[6]

11. Radio links are commonly used for providing high bandwidth connections between two fixed points and in some circumstances radio links can provide an economic alternative to optical fibre and leased lines. There is a large variety of radio link users in Ireland, including fixed and mobile operators, broadcasters, public utilities and the emergency services. Generally these licensees use radio links to provide connections between two points in their network.

12. As shown in Figure 1 below, the use of radio links in Ireland has increased over the past number of years, and as of the 30th June 2013, there were 11,214 Point-to-Point Radio Link Licences in Ireland. This represents a 432% increase in the number of radio links since the year 2000.

[6] ComReg Document 11/89 - Spectrum Management Strategy Statement - published 22 November 2011.

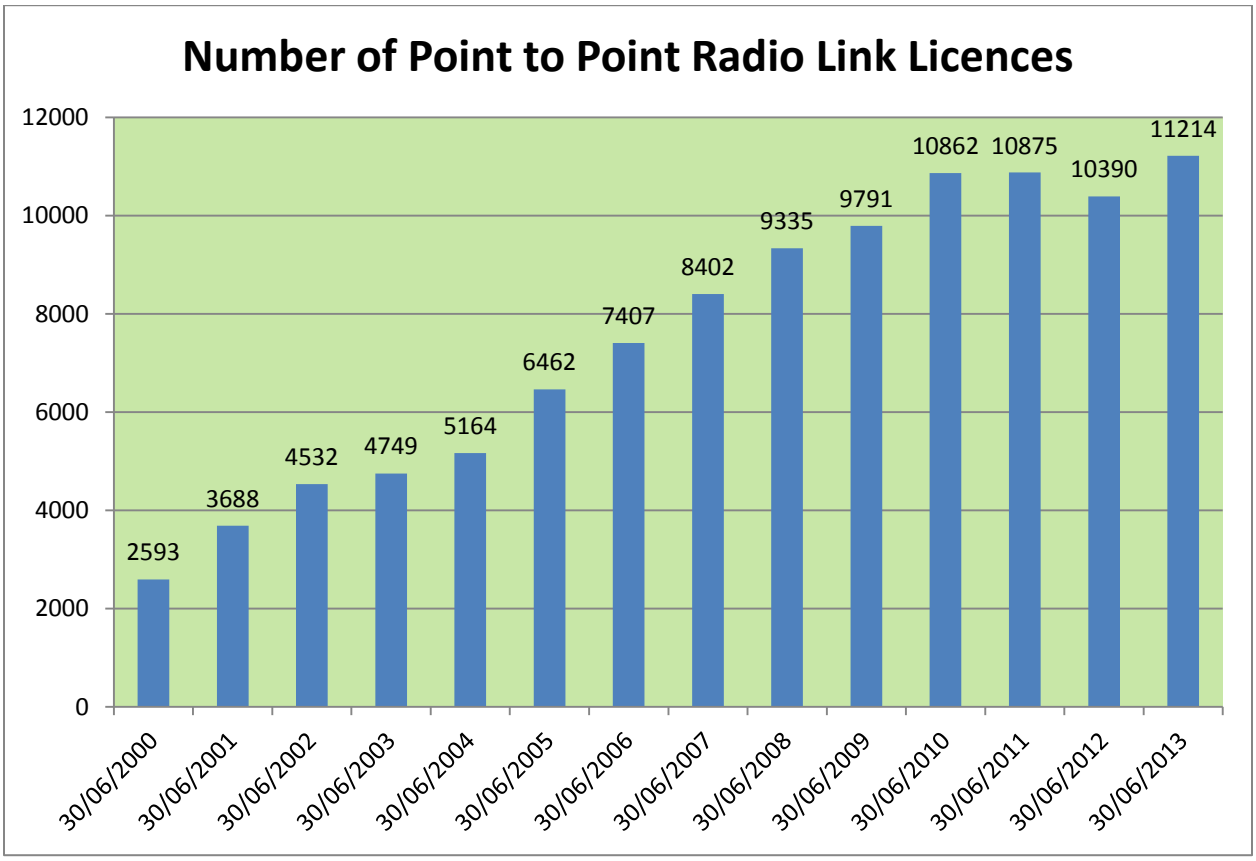

Figure 1 : Number of Point-to-Point licences at 30th June 2013

13. These guidelines provide information to the applicant on ComReg's Radio Link licensing scheme. Among other things, these guidelines provide information on:

- the frequency bands available;
- the technical licensing requirements;
- the application process; and
- the licence itself.

14. ComReg encourages all potential applicants to read these guidelines carefully if they are considering the submission of a radio link licence application to ComReg. Queries regarding these guidelines or on the licensing process can be directed to ComReg's Licensing Operations Team: via telephone to 01 804 9600, or via e-mail to licensing@comreg.ie .

15. ComReg reserves the right to revise these guidelines in the future.

2 Point-to-Point Radio Links: Technical Licensing Requirements

16. This section sets out the minimum technical requirements that must be met when applying for a Point-to-Point radio link in the frequency bands above 1 GHz. ComReg no longer licenses new fixed Point-to-Point or Point-to-Multipoint links in the sub 1 GHz bands. .

2.1 Point-to-Point (PP) Frequency Spectrum Bands

17. ComReg has reserved a number of frequency bands for point-to-point radio link licensing. These bands are based upon internationally recommended band plans.

18. Table 8 in Annex 1 of this document sets out the full list of PP radio link frequency bands available in Ireland and the technical information associated with each band. Only frequency bands and channels as per Table 8 in Annex 1 can be requested for licensing. A summary of the PP radio link frequency bands in Ireland is set out in Table 3 below.

Status	Frequency Bands (GHz)
Open	Upper 1.3, Lower 1.4 and 2, Lower 6, Upper 6, 7, Lower 8, Upper 8, 11, 13, 15 18, 23, 26, 28, 31, 38, 42, 70/80

Table 3: Summary of PP Radio Link Frequency Bands Ireland

19. From time to time, ComReg may be required to make changes to the PP Radio Link frequency bands available in Ireland and/or their technical conditions. Such changes may arise for a number of reasons, including:

- 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
- changes in the interest of efficient use of spectrum.

20. Arising from any such changes, existing licensees may be required to modify or cease their radio link operations in order to comply with the revised frequency bands and technical conditions. ComReg will endeavour to provide as much notice as possible to existing licensees in the event that any such changes are required.

2.2 Preferential Frequency Channels

21. When considering applications for new radio links, the key criteria that ComReg will take into consideration are:

- radio spectrum efficiency and optimisation of the radio link / network; and
- the current and future availability of radio spectrum.

22. Where the applicant satisfies these criteria and when appropriate[7], ComReg may identify one or more preferred frequency channels for the applicant.

23. If a preferred frequency channel is identified, ComReg will endeavour to grant the applicant use of that channel to the maximum extent possible in accordance with all relevant licence conditions for any radio links to be deployed. A preferred channel does not mean that the licensee has exclusive use of that frequency channel, as ComReg may license other applicants on the same frequency channel. Exclusive use of a frequency channel can only be obtained via a spectrum competition for a block allocation of spectrum.

[7] For example, the licensee is a large scale user of radio links and is using radio links in a spectrum efficient manner.

2.3 Cross-Border Radio Links

24. It is possible to submit an application for a Cross-Border Radio link (i.e. a radio link which spans both sides of the Republic of Ireland/Northern Ireland border). ComReg can facilitate the licensing of that part of the link which operates up to the border, while Ofcom (UK's Office of Communications) licenses that part of the link which operates on the Northern Ireland side of the border.

2.4 General link planning

25. In the interests of efficient use of radio spectrum ComReg does not permit the use of frequency diversity or the assignment of separate frequencies for standby purposes, except in the most exceptional of circumstances.

26. Licensees are encouraged to use radio network resilience techniques to improve the reliability of transmission networks. Such techniques include:

- space diversity;
- 'hot-standby' radio equipment redundancy based on one frequency channel; and
- routing diversity, which involves the construction of networks with ring or mesh architectures.

27. The following practices are discouraged as they can result in poor spectrum efficiency and excessive interference to other users or services:

- use of unnecessarily high transmit powers;
- inadequate network planning;
- lack of network resilience; and
- excessive use of star networks requiring a number of frequency channels.

2.5 Link Length planning

28. In the interests of efficient and orderly use of spectrum, ComReg operates a link length policy. This policy specifies the minimum link length permissible for a frequency band along with necessary transmission capacity. Details of minimum link lengths per frequency band are contained in Table 8 of Annex 1 of this document.

29. It is only in the most exceptional of circumstances (e.g. High/Low conflicts, see Section 2.6), that ComReg will consider licensing a radio link with a path length which is less than the specified minimum link length.

2.6 High / Low database

30. When planning a radio link, the applicant must have regard to the compatibility of the radio link with other existing radio users at the same general location. Specific sites and the immediate surrounding area may be designated “transmit high” or “transmit low” in specific frequency bands, depending on the sub-band in which existing links on that site are transmitting.

31. Prior to submitting a Point-to-Point Radio Link application, the applicant should consult the high/low database on ComReg's website[8] to ensure that their application does not have a high/low designation conflict. A high/low designation conflict arises when site designation in the application conflicts with the existing site designation in ComReg's database. For example, a High designation is requested in the application for a site that has an existing Low designation.

32. ComReg will not license a link with a high/low designation conflict.

33. In consulting the high/low database, the applicant should enter accurate site co-ordinates which are based upon measurements taken from a GPS device at the specific mast location. Inaccurate site co-ordinates may lead to licence invalidation. Table 4 sets out the high/low search radii for the fixed links frequency bands

[8] http://www.comreg.ie/licences/high_low_database.600.highlow.html

Frequency Band (GHz)	Hi/Lo search radius (metres)
L6	500
U6	500
7	500
L8	500
U8	500
11	500
13	500
15	400
18	300
23	100
26	100
28	100
31	100
38	100
42	100
70/80	100

Table 4 Hi/lo search radius for given frequency band

2.7 Equipment Requirements & Reference databases

34. ComReg will only grant licences for radio equipment that meets the minimum mandatory technical requirements as set out in Table 8 in Annex 1 of this document.

35. The minimum equipment requirements relate to the:

- transmission capacity requirement;
- minimum antenna requirement; and
- mandatory equipment class.

36. ComReg maintains three separate equipment reference databases which are available on ComReg's website[9]:

- Antenna Reference Codes;
- Radio Transmitter Reference Codes ; and
- Feeder Reference Codes.

37. Before submitting an application to ComReg for a Point-to-Point Radio Link licence, the specifications of the equipment have to be registered on ComReg's Equipment Reference Code Database. If the equipment is not registered on the database, please complete the Equipment Reference Code Registration Form[10] and send this to ComReg at refcode@comreg.ie.Please note that ComReg cannot accept radio link applications without a relevant ComReg Equipment Reference Code.

[9] http://www.comreg.ie/licences/equipment_reference_codes.601.erc.html
[10] ComReg Document 07/36 - Point to Point Radio Links Equipment Reference Code Registration Form - published 26 June 2007

2.8 R&TTE Equipment Compliance

38. In common with other licensed radio services, all radio equipment used to provide radio link services must comply with the Radio and Telecommunications Terminal Equipment Directive 1999/5/EC ("the R&TTE Directive") which was enacted into Irish law on the 5th of June 2001 by Statutory Instrument 240 of 2001[11]. Harmonised standards under the R&TTE Directive, published by the European Telecommunications Standards Institute (ETSI) and CENELEC, can be used to demonstrate compliance to the essential requirements of the R&TTE Directive[12].

39. In relation to radio services in Ireland, ComReg has set out its R&TTE interface requirements in ComReg Document 06/47R[13]. This document outlines both the mandatory and information interface requirements for point-to-point radio links in Ireland.

40. Licensees are advised to familiarise themselves with ComReg Document 06/47R, as it is the responsibility of the licensee to ensure that all equipment being used is R&TTE compliant.

2.9 Requested radio propagation availability & power

41. ComReg aims to licence a radio link in the most appropriate frequency band with an assigned bandwidth and transmitter EIRP (Equivalent Isotropic Radiated Power) that are the minimum consistent with capacity and availability requirements for that link.

42. In submitting an application to ComReg, the applicant should request the minimum transmitter EIRP that is required for the propagation availability and capacity of the link as set out in Annex 2. The channel that is eventually licensed, and the transmitter power, may be different from those requested that were originally requested by the applicant.

[11] European Communities (Radio Equipment and Telecommunications Terminal Equipment) Regulations, 2001 (S.I. No. 240 of 2001) http://www.irishstatutebook.ie/2001/en/si/0240.html
[12] A list of the harmonised standards under the R&TTE Directive is maintained at http://europa.eu.int/comm/enterprise/newapproach/standardization/harmstds/reflist/radiotte.html
[13] ComReg Document 06/47R - Interface Requirements for Radio Services in Ireland - published 5 September 2006. Note: This document is subject to revision and updates.

43. To determine the minimum transmitter EIRP (i.e. maximum permissible transmitted power) for a radio link, the applicant should carry out a path calculation (link budget). This path calculation should be based on the same technical parameters as used by ComReg (see Table 5 below) and take account of the transmitter output power levels, antenna gains, feeder losses and receiver sensitivity levels.

44. The applicant should submit a .pdf copy of the path calculation to Licensing@comreg.ie in respect of each proposed radio link. The appropriate application reference number (APP No.) must be used to identify the application in question. Failure to provide the path calculation (link budget) will result in the application being invalid and therefore will be rejected.

Radio Factor	ITU-R Recommendation	Equation No. (or Table/Figure)
Free Space Loss	P. 525-2, Annex 1	4
Gaseous Absorption	P.676-9	22a-22u, 23a-23d, 24, 25a-25e, 26a & 26b, 27
	P.530-14	1
	P.836-4	Figure 4
Rain Attenuation	P.838-4	1, 2, 3, Table 1
	P.837-4	32mm/hr, Figure 2
	P.841-4	3, 4, 5 with Q1 and Beta user adjustable.
	P.530-14	35, 36, 37, 38
Multipath Fading	P.530-14	4, 5, 6, 8, 13, 15, 16 and for an unknown sized body of water, 18, 19, 20, 21, 22, 23, 24, 30, 31
	P.530-14	5 or 39, 40
	P.453-10	Figure 9 (pl user adjustable)

Table 5 Availability formulae used in ComReg's path calculations

45. Additionally, the applicant is required to manage any internal interference issues on the same channel, as ComReg only carries out an inter-operator interference checks in its path calculations.

2.10 Adaptive Modulation[14]

46. As part of ComReg's spectrum strategy[15], operators are encouraged to use the latest technology and higher order modulation schemes in line with ensuring the efficient use of spectrum. ComReg encourages the use of equipment which utilises Adaptive Coding and Modulation (ACM) in all terrestrial microwave fixed link bands.

47. ETSI standard (ETSI EN 302 217-2-2)[16] sets out the manner in which ACM should be deployed. In line with this ETSI standard, ComReg requires that a reference mode for a fixed link be defined by the applicant. This reference mode should be capable of delivering the core bit rate (high availability traffic), and utilise the fade margin when possible to increase the data rate (for lower priority traffic). An application for a fixed link using ACM must be for the minimum modulation scheme it will use on the link.

48. The Received Signal Level (RSL) will be determined by the RSL of the system in reference mode, and this RSL will be used in assigning an EIRP which in turn will determine level of availability allowable for the given link. The ratio of C/I used to protect the radio link will be determined by the C/I defined for the reference mode.

49. At all times, the EIRP assigned to the system must be consistent and must not vary from the value stipulated in its licence, even when there is a transition of modulation schemes and capacity. As stated in the ETSI standard: "*TX emission should not exceed that of the reference mode*". In doing so, currently licensed links and future links in bands, whether deploying ACM or fixed modulation technology, would not be adversely affected by a system deploying ACM in the same band.

50. The licence which will be issued to an ACM system will include the modulation scheme and capacity of the reference system. These values will be indicative of the reference system nominated by the licensee, and these values are not descriptive of the range of capacity and modulation schemes the system can utilise.

[14] ComReg Document 09/87 - Use of Adaptive Coding and Modulation in Terrestrial Fixed Link Bands - published 18 November 2009
[15] ComReg Document 11/89 - Spectrum Management Strategy Statement 2011-2013 - published 22 November 2011
[16] http://www.etsi.org

2.11 Congested Area Links

51. Increasing congestion in certain frequency bands has prompted ComReg to introduce higher fees for certain spectrum within a specific geographical area, called the "congested area". Currently the congested area applies to links in Grid 3122 and 3123 in the 18 GHz and 23 GHz frequency bands only (See Figure 2 below). Therefore, if either ends of an 18 GHz or 23 GHz link falls within the range E310000 to E320000 and N220000 to N240000, then a congestion charge applies. The higher fee for links within this geographical area reflects the scarcity of spectrum within the area and in those bands. The applicable fees are detailed in Table 6 in Section 5 below.

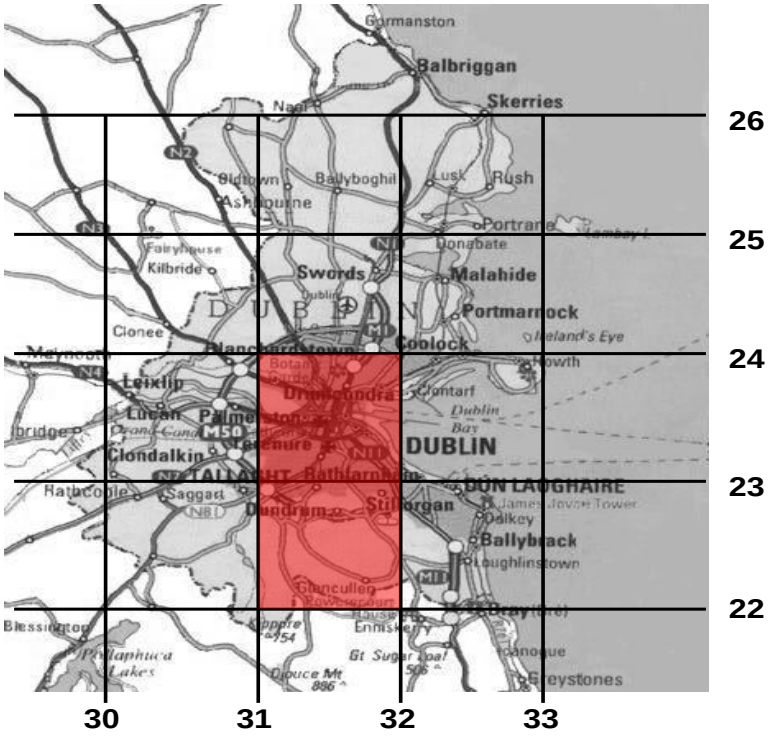

Figure 2: Location of the congested area for 18 GHz and 23 GHz bands

2.12 Single Channel Dual Polarity Links (SCDP)

52. A single channel dual polarity link (SCDP) is a link having both vertical and horizontal polarisation on the same path and same frequency channel. SCDP links are charged and licensed as a single link licence. This is intended to encourage the efficient use of spectrum and provide an incentive to licensees who have multiple links on the same path to consider using both H and V polarisation on the same frequency channel. From the 1st of October 2012, dual polarisation will be mandatory for all new fixed link applications, where more than one link is required on the same path in the same frequency band.

2.13 High Usage Paths

53. ComReg's seeks to promote radio fixed links as a means of facilitating market entry and the rollout of alternative infrastructure. In high usage areas, established operators whose capacity requirements have grown to the extent that fibre would provide an effective alternative are therefore being encouraged to make this migration, where practicable, in order to release spectrum for new entrants.

54. With this in mind, under the new regulations an additional 'High Usage' charge will be incurred by operators who have 5 or more licensed radio links over a particular link path. Because an operators' usage of any one particular radio link path varies throughout the year the fee for the High Usage Path will be calculated and invoiced for on a quarterly basis. The High Usage Path fee will be calculated using Table 7 in Section 5 below.

3 Before Applying for a Radio Link Licence

55. There are many technical parameters that need to be considered when planning a radio link or a network of radio links, and before submitting a radio link licence application to ComReg.

3.1 Planning a radio link

56. The general aim of planning a radio link is to identify the desired site locations, frequency band and channel spacing to meet the transmission and availability requirements of the radio link. The following may assist the applicant in this process:

- when planning a radio link or a network of radio links, the applicant must ensure optimal radio link spectrum efficiency, and repeat usage of the same frequency channel(s) throughout the network should be maximised;
- where the applicant already has existing radio link licences, any future applications should be based upon frequency channels already licensed to the applicant;
- when a preferential frequency channel has been identified, the applicant should aim to re-utilise this channel to the maximum extent possible for any planned radio links. Where possible, ComReg will endeavour to facilitate these applications;
- the applicant should check that their desired radio link plan is in compliance with the technical requirements as set out in Table 8 of Annex 1. For example, the radio link plan meets the minimum link length and transmission requirements for the specific frequency band;
- the applicant should check the planned site co-ordinates with reference to ComReg's on-line high/low database[17] to ensure that there are no high / low designation issues. This may eliminate certain site locations in particular frequency bands;
- the applicant should plan their radio link network based on the minimum Equivalent Isotropic Radiated Power (EIRP) necessary to achieve the required availability. Additionally, in order to minimise the risk of interference to others, the most directional antennas possible should be proposed;

[17] http://www.comreg.ie/licences/

- the applicant should engage with their equipment manufacturer to ensure that the desired radio link equipment (i.e. frequency band, transmission capacity etc.) is available, should a radio licence be issued by ComReg; and
- the applicant should ensure that there are no internal interference issues on their desired frequency channels, as ComReg does not take internal interference issues into consideration when evaluating a radio link application.

57. The above process should be repeated in order to refine the initial radio plan. Prior to application, it is prudent that all new applicants engage with ComReg, particularly those planning the implementation of a radio link network.

58. The scope of the consultation would include, inter alia, the following;

- support and clarification, provided by ComReg, on any element of the radio link licensing process;
- provision, by the prospective applicant to ComReg, of complete details for their radio link requirements;
- assessment by ComReg of the radio spectrum usage requirements of the applicant, and liaison with the applicant to examine suitable frequency bands/channels that may be appropriate for the applicants requirements; and
- for a large scale, spectrally efficient radio link network, ComReg will consider, as required, the identification of one or more preferential frequency channels for the applicant.

4 The Application Process

4.1 Submitting an Application

59. Applications for new or amended radio link licences must be submitted to ComReg together with the appropriate fees. All required details must be submitted in accordance with the parameters as set out in this document.

60. Prior to submitting an application, it is recommended that the applicant has carried out the necessary checks as set out in Section 3 above. This minimises the possibility of the application proving unsuccessful due to technical issues, such as high/low conflicts, inter-operator interference, etc.

61. Applications for new or amended radio link licences may be submitted using either of the following methods:

- On-line; using ComReg's web-based radio link application system on www.elicensing.comreg.ie, or
- Application Form 09/89A[18] with data file (XML) containing the technical data.

62. The on-line option will ensure the optimum turnaround time for processing in that the data goes directly to the ComReg database for immediate processing.

4.2 On-Line Applications:

63. The online system on www.elicensing.comreg.ie guides applicants through the application process step by step. The information requested online is the same information which is requested in the paper application form.

64. To make an application on-line the applicant must be an account holder with ComReg. If not the applicant may register by using the registration facility - also available on www.elicensing.comreg.ie. The applicant will be requested to provide a contact email address for correspondence regarding the application. The application data must be compiled into a data file (XML)[19] prior to making the application. The number of links that can be included in a data file (XML) is limited to 9.

65. In compiling the data, the applicant should ensure that, among other things:

[18] ComReg Document 09/89A - Application Form for Radio Link Licences - published 30 November 2009
[19] http://www.comreg.ie/_fileupload/File/FixedLinks_PP_PM_samples.zip

- the appropriate ComReg equipment and antenna reference (AREF and EREF) codes are provided; and
- for amended licences; that the licence being amended is identified using the appropriate LPP number

66. Details on the file format and how to compile the.xml file are available on the elicensing website; www.elicensing.comreg.ie in the area entitled: *"apply for a Fixed Link (PP or PM) Licence*[20]*".* This file is then uploaded during the on-line application process and payment can only be made using either:

- credit card; or
- by arranging to have your account with ComReg, in credit to, at least the value of the application being made at the time of application.

67. Applications will not be accepted as valid on-line applications if:

- the XML data file fails to load; or
- correct payment is not made or insufficient funds are available in the account to meet the cost of the application.

68. Where a problem does occur, you will be advised of the nature of the problem via an on-line message. You will be given a Transaction Code once your application has been received. This will be followed shortly by an email notification of the ComReg application reference number which has been generated (APP No.). The APP Number should be used to email additional information such as Path profiles Link Budget etc or for any further correspondence regarding the application.

4.3 Application Form with Text File:

69. To submit a non-electronic application for a new or amended licence, the appropriate application form 09/89A[21] must be completed and the technical details (in XML format) emailed to Licensing@comreg.ie

[20] For further assistance, please contact the licensing operations team in ComReg (tel. +353 1 8049600), or alternatively you may e-mail to; mailto:licensing@comreg.ie

[21] ComReg Document 09/89A - Application Form for Radio Link Licences - published 30 November 2009

70. To submit a valid application:

- the application form must be completed in full, in accordance with the guidelines and the information stipulated in the application form;
- the declaration form in the application form must be signed;
- the *.xml file must be sent electronically to Licensing@comreg.ie using ‘LINKXML’ as the email subject field; and
- the full licence fees must accompany the application form. Alternatively, the applicant may arrange payment of the necessary funds into their ComReg account in advance of submitting their application.

71. Completed signed application forms must be submitted in writing to ComReg, either via post (at address below), fax or as a scanned copy via e-mail to Licensing@comreg.ie. Please quote 'LINKXML' in the email subject field.

    Licensing Operations

    The Commission for Communications Regulation,

    Abbey Court, Irish Life Centre,

    Abbey Street, Dublin 1.

4.4 Applications containing Dual Polarity Links:

72. For internal processing, dual polarity links are loaded to the ComReg database as two links (i.e. V and H), the applicant must therefore identify, at application stage, which links comprise the dual polarity pairing.

73. As an amendment will apply to both the H and V sides of the dual polarity link, the applicant must provide details of both the V and H polarities in their amendment request.

74. To convert a single polarity link to dual polarity, a new dual polarity link application must be submitted to “replace” the existing link. As full processing of both polarities is required, such applications are not considered as an amendment.

4.5 Link Application File (*.xml)

75. An .xml file is used to load link application technical data to the ComReg database.

- Where the on-line application facility is used, the XML file must be prepared and available for submission with the on-line application.
- Where a paper application is being submitted the XML file must be sent electronically as a text file to Licensing@comreg.ie using 'LINKXML' as the email subject field and appropriately referenced to the paper application.

76. For on-line applications; details of the xml file format and how to compile the file, is available on the elicensing website ; www.elicensing@comreg.ie in the area entitled "*apply for a Fixed Link (PP or PM) Licence*"

77. For paper applications; details of the xml file format and how to compile the file. is available on the ComReg website; www.comreg.ie

4.6 The Evaluation Process

78. Unless ComReg indicates otherwise, all valid applications for a radio link licence will be evaluated on a "first come, first served" basis.

79. The applicant should note that while ComReg will endeavour to accommodate their needs, ComReg cannot guarantee that licences will be granted or that licences will be granted with the requested frequency band and channel.

80. Following conclusion of the evaluation phase, the applicant will be informed of the Commission's decision to grant or refuse a licence. In the event of refusal, the reasons for refusal will be specified.

4.7 Provision of Further Information

81. ComReg reserves the right to request an applicant to submit further material, link budgets and documents in addition to the information already provided within such time and within such format as ComReg may stipulate.

4.8 Publication of Licensee Details

82. ComReg reserves the right to publish information in relation to the licensee and licence details, subject to its own guidelines on the treatment of confidential information. These guidelines – ComReg publication 05/24[22] – are available on the ComReg website, www.comreg.ie.

83. 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. Any personal information which you provide to ComReg will be treated in accordance with the Data Protection Acts, 1988 & 2003.

4.9 Application Conditions

84. By participating in this process, the applicant undertakes to accept the terms of this application document, will 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 evaluation or until such time as the applicant has been awarded or declined a licence, or ComReg has otherwise terminated the application. All expenses incurred by the applicant or potential applicants shall be borne by themselves exclusively.

85. ComReg reserves the right to alter any of conditions of 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 by or term of any contract with ComReg.

[22] ComReg Document 05/24 - Guidelines on the treatment of confidential information - published 22 March 2012.

86. ComReg makes no representations and warranties in respect of the viability of the market or accuracy of the contents of this document so that the applicant 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.

87. The applicant 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.

88. While ComReg endeavours to minimise the potential for interference between users and services, no liability shall accrue to ComReg arising from interference to licensees of radio systems.

5 Licence Information

89. A Radio Link licence granted under the Wireless Telegraphy (Radio Link Licence) Regulations 2009 permits the licensee to keep and operate radio apparatus in accordance with these regulations. The licence conditions pertaining to Radio Links licences are contained in the above referenced Regulations and all licensees should familiarise themselves with same. It should be noted that ComReg reserves the right not to grant a licence.

5.1 Licensee

90. The Radio Link licensee can be an individual, company or firm. It is the responsibility of the licensee to ensure compliance with the Radio Link licence conditions. Additionally, it is the responsibility of the licensee to ensure that their licence details as submitted to ComReg remain valid and updated. The licensee should inform ComReg of any licence amendments (e.g. change of address) as soon as they occur.

5.2 The Licensed Frequency

91. A Radio Link licence allows the licensee to install and operate a radio link on a specified frequency band and channel spacing at particular sites. Licensees should be aware that ComReg licenses other users on the same frequency channels, provided that there is minimal interference potential.

92. 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.

5.3 Licence Duration and Renewal

93. The duration of the licence is one year. At the request of the licensee, ComReg may renew a licence subject to the necessary renewal conditions being met.

94. In considering a renewal request, ComReg will have regard to whether, inter alia:

- the licence renewal fee or any applicable High Usage charges are paid in full;
- the Radio Link system is being operated in accordance with the terms and conditions of the licence; and

- there are changes being considered or implemented to the Radio Link frequency bands available in Ireland and/or their technical conditions. These changes may due to national or international considerations.

95. As a consequence of any such changes, existing licensees may be required to modify or cease their radio link operations in order to comply with the revised frequency bands and technical conditions. ComReg will endeavour to provide as much notice as possible to existing licensees in the event that any such changes are required.

96. Where renewal of a licence has not been affected prior to the licence expiry date that licence lapses automatically. Such link licences cannot be re-instated. New applications are required in all cases and subject to spectrum availability, new licences may be issued.

5.4 Temporary Licence Duration

97. The maximum duration of a temporary radio link licence is six (6) months and is non-renewable.

98. If the licence is granted for a period of less than one month, for the purposes of fee calculation only, the licence shall be considered as a licence granted for a period of one month

5.5 Amendments to a Licence

99. It is the responsibility of the licensee to inform ComReg of any licence amendments as soon as they occur.

100. A licence amendment occurs when the details on the licence are no longer correct and therefore need to be updated, for example, when the technical characteristics of the link need to be changed in order to facilitate an upgrade of equipment etc.

101. It should be noted that a change in the site co-ordinates of the radio link licence is not an amendment. In such cases, the existing licence will be cancelled and the licensee must apply for a new link with the new site co-ordinates.

102. Where the technical characteristics of a licence are amended, ComReg will issue an amended licence to the licensee, subject to any fees that may arise due to increased bandwidth usage or change in frequency. An amendment fee is due when either/or both the bandwidth or frequency channel on which the link operates has changed such that the annual cost of the link increases. The amendment fee charged is the difference between the old and new fee.

103. There is no amendment fee where the annual cost of the link decreases on amendment.

5.6 Changes to Dual Polarity Links:

104. A dual polarity link licence may be converted to a standard (single) link licence on written request to remove either the V or H polarisation on the link.

105. Dual polarity links may be amended (as above) however, as the amendment will apply to both the H and V sides of the link, the applicant must provide details of both the V and H polarities in their amendment request.

106. In exceptional circumstances and where appropriate, ComReg may need to make modifications to existing licences. Where this is required, ComReg will endeavour to provide as much notice as possible to the affected licensees in advance.

5.7 Cancellation of a Licence

107. 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 any such cancellation.

5.8 Transfer of a Licence

108. A licensee may request that a radio link licence be transferred to another party. This request must be made in writing and is subject to the approval of ComReg.

5.9 Licence fees

109. The fee associated for fixed links are set down in Statutory Instrument No. 370 of 2009 Wireless Telegraphy (Radio Link Licence) Regulations 2009. All applications for radio links must be accompanied by the full fee. The details of the fees applying to radio links are as follows;

Bandwidth (BW) / Frequency (F)	BW < 3.5 MHz	3.5 MHz < BW < 20 MHz	20 MHz < BW < 40 MHz	BW >40 MHz
F < 1 GHz	€750	N/A	N/A	N/A
1 GHz < F < 17 GHz	€1,000	€1,100	€1,200	€1,500
17 GHz < F < 37 GHz	€750	€825	€900	€1,125
37 GHz < F < 39.5 GHz	€550	€605	€660	€825
F > 39.5 GHz	€100	€110	€120	€150

Table 6: Annual Fee (€) for a Point to Point Radio Link which is not on a High Usage Path or in the Congested Frequency Band Area

Bandwidth (BW) / Frequency (F)	BW < 3.5 MHz	3.5 MHz < BW < 20 MHz	20 MHz < BW < 40 MHz	BW >40 MHz
F < 1 GHz	€900	N/A	N/A	N/A
1 GHz < F < 17 GHz	€1,200	€1,320	€1,440	€1,800
17 GHz < F < 37 GHz	€900	€990	€1,080	€1,350
37 GHz < F < 39.5 GHz	€660	€726	€792	€990
F > 39.5 GHz	€120	€132	€144	€180

Table 7: Annual Fee (€) for a Point to Point Radio Link which is on a High Usage Path or in the Congested Frequency Band Area

Where:

- frequency (F) is the frequency that may be utilised by the radio link as specified in the licence;
- bandwidth (B/W) is the width of the frequency band or channel that may be utilised by the radio link as specified in the licence;
- a High Usage Path is a Radio Link Path upon which the Licensee has five (5) or more Radio Links; and
- the Congested Frequency Band and Area is: The 18 GHz Band (17.7 GHz to 18.761 GHz paired with 18.71 GHz to 19.7 GHz) or the 23 GHz Band (22.0 GHz to 22.6 GHz paired with 23.0 GHz to 23.6 GHz) within the range E310000 to E320000 and N220000 to N240000.

110. For a Point to Multi-Point Radio Link, the annual fee is four (4) times the Annual Fees (€) for a Point to Point Radio Link.

111. Temporary Licence Fees are applied pro-rata to the relevant annual fee using the number of months for which the licence is granted. (i.e. 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).

112. An amendment fee is due when either/or both the bandwidth or frequency channel on which the link operates has changed such that the annual cost of the link increases. The amendment fee charged is the difference between the old and new fee.

113. There is no amendment fee where the annual cost of the link decreases on amendment.

114. Licence fees are not refundable.

5.10 International Coordination Obligations

115. 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, radio links 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.

5.11 Harmful Interference to other licensed users

116. 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-sited/adjacent radio systems.

5.12 Technical Conditions

117. ComReg issues a radio link licence subject to adherence to a number of technical conditions which specify the operating characteristics of the radio link. These technical conditions vary for each radio link licence. The specified technical conditions include:

- site height above sea level (m) and site co-ordinates;
- maximum transmitter power (dBW) and emission designation;
- antenna gain (dBi), beamwidth, height above ground (m) and polarisation; and
- frequency channel (MHz) & CCIR Rec.

5.13 Commissioning/Site Inspections

118. ComReg reserves the right to inspect a radio link 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 sites and may carry out measurements on the system.

5.14 Interference to the radio link

119. While ComReg endeavours to minimise the potential for interference between users and services, no liability shall accrue to ComReg arising from interference to licensees of radio systems.

120. Where a licensee experiences interference, it is advisable that they first check that their own equipment is operating to the terms of its licence, i.e. correct output power, frequency etc. and that the interference is not due to its own network.

121. ComReg deals exclusively with inter-operator interference issues. Users experiencing interference issues caused by their own network must resolve these issue's internally.

122. In the event that the licensee is satisfied of the above, it is advised to contact the Spectrum Compliance unit within ComReg at compliance@comreg.ie.

Annex: 1 Frequency Bands & mandatory technical conditions

Table 8 sets out the necessary technical requirements for submitting a radio link application. Please note that these requirements vary per frequency band.

Please note that due to congestion there is limited channel availability in the Greater Dublin area for the 13 GHz, 15 GHz, 18 GHz and 23 GHz frequency bands

Table 8: Radio Link Frequency bands, mandatory technical conditions and status

Band	Frequency	Transmit / Receive spacing (duplex direction)	Band Plan	Channel Spacing	Maximum Transmit Power	Minimum path length per Link (km)	Minimum Transmission Capacity	Minimum Antenna Requirement	Mandatory Equipment Class	Notes
1.3 GHz	1370-1375 MHz and 1512-1517 MHz	142MHz	CEPT Recommendation T/R 13-01 E, Annex A	0.25 MHz 0.5 MHz 1 MHz	Minimum required to obtain required availability level	n/a	-	Class 2 EN 302 217-4	Classes 1, 2, 3 EN 302 217-2	Open
1.4 GHz	1375-1385MHz and 1427-1437 MHz	52MHz	CEPT Recommendation T/R 13-01 E, Annex B	0.25 MHz 0.5 MHz 1 MHz	Minimum required to obtain required availability level	n/a	-	Class 2 EN 302 217-4	Classes 1, 2, 3 EN 302 217-2	Open
2 GHz	2025 - 2110 MHz and 2200 – 2290 MHz	175MHz	CEPT Recommendation T/R 13-01 E, Annex C	3.5 MHz 7 MHz 14 MHz	Minimum required to obtain required availability level	25 km	4Mbit/s	Class 3 EN 302 217-4	Classes 2, 3 EN 302 217-2	Open

Band	Frequency	Transmit / Receive spacing (duplex direction)	Band Plan	Channel Spacing	Maximum Transmit Power	Minimum path length per Link (km)	Minimum Transmission Capacity	Minimum Antenna Requirement	Mandatory Equipment Class	Notes
L6 GHz	5.925 - 6.425 GHz	252.04 MHz	CEPT/ERC/REC 14-01 E, Annex 1	29.65 MHz	Minimum required to obtain required availability level	25 km	140 Mbit/s	Class 3 EN 302 217-4	Class 3 EN 302 217-2	Open
U6 GHz	6.425 - 7.125 GHz	340 MHz	CEPT/ERC/REC 14-02 E, Annex 1	20 MHz 40 MHz	Minimum required to obtain required availability level	25 km	140 Mbit/s	Class 3 EN 302 217-4	Class 3 EN 302 217-2	Open
L7	7.125 – 7.425 GHz	154 MHz	CEPT/ECC/REC 02-06 Annex 1	7 MHz 14 MHz 28 MHz	Minimum required to obtain required availability level	25 km	28 MHz - 140 Mbit/s	Class 3 EN 302 217-4	Class 3 EN 302 217-2	Open Note: Part of the L7 band (7.125 - 7.425 GHz) may be allocated towards unidirectional links such as ENG/OB
U7 GHz	7.425 – 7.725 GHz	154 MHz	CEPT/ECC/REC 02-06 Annex 1	7 MHz 14 MHz 28 MHz	Minimum required to obtain required availability level	25 km	140 Mbit/s	Class 3 EN 302 217-4	Class 3 EN 302 217-2	Open
L8 GHz	7.725 – 8.275 GHz	311.32 MHz	ITU-R F. 386-8, Annex 6	29.65 MHz	Minimum required to obtain required availability level	25 km	140 Mbit/s	Class 3 EN 302 217-4	Class 3 EN 302 217-2	Open

Band	Frequency	Transmit / Receive spacing (duplex direction)	Band Plan	Channel Spacing	Maximum Transmit Power	Minimum path length per Link (km)	Minimum Transmission Capacity	Minimum Antenna Requirement	Mandatory Equipment Class	Notes
U8 GHz	8.275 – 8.5 GHz	126 MHz for 3.5 MHz & 7MHz channel spacing and 119 MHz for 14 MHz channel spacing	ITU-R F. 386-8, Annex 2	3.5 MHz 7 MHz 14 MHz	Minimum required to obtain required availability level	25 km	4 Mbit/s	Class 3 EN 302 217-4	Classes 1, 2, 3 applicable EN 302 217-2	Open
11 GHz	10.7 - 11.7 GHz	490 MHz	CEPT/ERC/REC 12-06 E	40 MHz	Minimum required to obtain required availability level	10 km	140 Mbit/s	Class 3 EN 302 217-4	Class 3 EN 302 217-2	Open
13 GHz	12.75 - 13.25 GHz	266 MHz	CEPT/ERC/REC 12-02 E	3.5 MHz 7 MHz 14 MHz 28 MHz 56 MHz 112 MHz	Minimum required to obtain required availability level	9 km	4 Mbit/s 56 MHz - 310 Mbit/s (2 x STM-1) 112 MHz - 620 Mbit/s (4 X STM-1)	Class 3 EN 302 217-4	Classes 1, 2 applicable EN 302 217-2	Open
15 GHz*	14.5 - 15.35 GHz	420 MHz	ITU-R F. 636-4	3.5 MHz 7 MHz 14 MHz 28 MHz 56 MHz	Minimum required to obtain required availability level	9 km	4 Mbit/s 56 MHz - 310 Mbit/s (2 X STM-1)	Class 3 EN 302 217-4	Classes 1, 2 applicable EN 302 217-2	Open

Band	Frequency	Transmit / Receive spacing (duplex direction)	Band Plan	Channel Spacing	Maximum Transmit Power	Minimum path length per Link (km)	Minimum Transmission Capacity	Minimum Antenna Requirement	Mandatory Equipment Class	Notes
18 GHz	17.7 - 19.7 GHz	1010 MHz	CEPT/ERC/REC 12-03 E, Annex A	27.5 MHz 55 MHz 110 MHz	Minimum required to obtain required availability level	6km (≤34Mbit/s) 0km (> 34Mbit/s)	34 Mbit/s 55 MHz - 310 Mbit/s (2 X STM-1) 110 MHz -620 Mbit/s (4 X STM-1)	Class 3 EN 302 217-4	PDH: Classes 1 & 2 applicable EN 302 217-2 SDH Classes 4,5 Applicable EN 302 217-2	Open
23 GHz*	22.0 - 22.6 GHz and 23.0 – 23.6 GHz	1008 MHz	CEPT Recommendation T/R 13-02 E, Annex A	3.5 MHz 7 MHz 14 MHz 28 MHz 56 MHz 112 MHz	Minimum required to obtain required availability level	3km (≤34Mbit/s) 0km(> 34Mbit/s or 34Mbit/s in 14MHz channel spacing)	4 Mbit/s 56 MHz - 310 Mbit/s (2 X STM-1) 112 MHz - 620 Mbit/s (4 X STM-1)	Class 3 EN 302 217-4	PDH: Class 2 applicable EN 302 217-2 Class3 applicable to SDH. EN 302 217-2	Open

Band	Frequency	Transmit / Receive spacing (duplex direction)	Band Plan	Channel Spacing	Maximum Transmit Power	Minimum path length per Link (km)	Minimum Transmission Capacity	Minimum Antenna Requirement	Mandatory Equipment Class	Notes
26 GHz	Part of 24.5 - 26.5 GHz band namely: 25.277 – 25.445 GHz and 26.285 – 26.453 GHz	1008 MHz	CEPT/ERC/REC 13-02 E, Annex B	3.5 MHz 7 MHz 14 MHz 28 MHz 56 MHz 112 MHz	Minimum required to obtain required availability level	3km (≤34Mbit/s) 0km (> 34Mbit/s or 34Mbit/s in 14MHz channel spacing)	4 Mbit/s 56 MHz - 310 Mbit/s (2 X STM-1) 112 MHz - 620 Mbit/s (4 X STM-1)	For Point to Point antennas : Class 3 EN 302 217-4 Note for Point to Multipoint antennas: EN 302 326-3	Class2 applicable to PDH. EN 302 217-2 Class3 applicable to SDH. EN 302 217-2 Class B equipment applicable (PDH and SDH) EN 302 326-1	Open
28 GHz	Part of 27.5 - 29.5 GHz band namely: 27.9405 - 28.4445 GHz paired with 28.9485 - 29.4525 GHz	1008 MHz	CEPT/ERC/REC T/R 13 02 Annex C	3.5 MHz 7 MHz 14 MHz 28 MHz 56 MHz 112 MHz	Minimum required to obtain required availability level	3km (≤34Mbit/s) 0km (>34Mbit/s or 34Mbit/s in 14MHz channel spacing)	4 Mbit/s 56 MHz - 310 Mbit/s (2 X STM-1) 112 MHz - 620 Mbit/s (4 X STM-1)	Class 3 EN 302 217-4	Class 2 applicable to PDH. EN 302 217-2 Class 3 applicable to SDH. EN 302 217-2	Open

Band	Frequency	Transmit / Receive spacing (duplex direction)	Band Plan	Channel Spacing	Maximum Transmit Power	Minimum path length per Link (km)	Minimum Transmission Capacity	Minimum Antenna Requirement	Mandatory Equipment Class	Notes
31 GHz	31.0 - 31.3 GHz paired with 31.5 - 31.8 GHz	514 MHz		3.5 MHz 7 MHz 14 MHz 28 MHz	Minimum required to obtain required availability level	3km (≤34Mbit/s) 0km (>34Mbit/s or 34Mbit/s in 14MHz channel spacing)	4 Mbit/s	Class 3 EN 302 217-4	Class 2 applicable to PDH. EN 302 217-2 Class 3 applicable to SDH. EN 302 217-2	Open
38 GHz	37 - 39.5 GHz	1260 MHz	CEPT Recommendation T/R 12-01 E, Annex A	3.5 MHz 7 MHz 14 MHz 28 MHz 56 MHz 112 MHz	Minimum required to obtain required availability level	0 km	4 Mbit/s 56 MHz - 310 Mbit/s (2 X STM-1) 112 MHz - 620 Mbit/s (4 X STM-1)	Class 3 EN 302 217-4	Class 2 applicable to PDH. Class 3 applicable to SDH. EN 302 217-2	Open
42 GHz	40.5 - 43.5 GHz	1500 MHz	CEPT Recommendation (01)04	7 MHz 14 MHz 28 MHz 56 MHz 112 MHz	Minimum required to obtain required availability level	0 km	4 Mbit/s 56 MHz - 310 Mbit/s (2 X STM-1) 112 MHz - 620 Mbit/s (4 X STM-1)	Class 3 EN 302 217-4	Class 2 applicable to PDH. Class 3 applicable to SDH. EN 302 217-2	Open

Band	Frequency	Transmit / Receive spacing (duplex direction)	Band Plan	Channel Spacing	Maximum Transmit Power	Minimum path length per Link (km)	Minimum Transmission Capacity	Minimum Antenna Requirement	Mandatory Equipment Class	Notes
70 / 80 GHz	71-76 GHz / 81-86 GHz	10 GHz, < 5 GHz.	ECC/REC/(05)07	250 MHz – 4.75 GHz	Minimum required to obtain required availability level	0 km	150 Mbit/s (STM-1)	Class 3 EN 302 217-4	EN 302 217-3	Open These bands are open for both FDD and TDD systems.

Annex: 2 Propagation Availability Requirements

123. ComReg licenses radio links with different levels of radio propagation availability. There are a number of requirements that must be met in order to be eligible to apply for a particular radio propagation availability category. These are set out in Table 9 below.

124. The applicant may be able to improve their overall network availability by using network resilience techniques such as hot-standby, space diversity, routing diversity, planned maintenance etc.

Target Radio Outage per yea	Required Radio Propagation Availability	Requirements to be met in order to apply for required availability		
		High capacity links in bands > 3 GHz	Low Capacity links in bands > 3 GHz	Bands < 3 GHz
Approx. 263 Minutes	99.95%		Meets minimum technical requirements in these guidelines but antenna is not compliant with class 3 in ETSI standard EN 302 217 at either site	Meets minimum technical requirements in these guidelines but antenna is not compliant with class 3 in ETSI standard EN 302 217 at either site
Approx. 52.6 minutes	99.99%	Meets minimum technical requirements in these guidelines and antenna is compliant with at least class 3 in ETSI standard EN 302 217 at both sites	Meets minimum technical requirements in these guidelines and antenna is compliant with class 3* in ETSI standard EN 302 217 at both sites	Meets minimum technical requirements in these guidelines and antenna is compliant with class 3* in ETSI standard EN 302 217 at both sites

Approx. 26.3 minutes	99.995%	Meets requirements for 99.99% availability and (1 or 2 or 3) including equipment resilience at both sites Routing diversity using for e.g. network meshing, rings etc. on radio, fibre or coax or the use if an alternative infrastructure provider. Is site sharing at either mast with another licensee**	
Approx. 5.3 minutes.	99.999%	Meets requirements for 99.995% availability and (1 or 2) the applicant is allowing other licensees** to share the mast Is site sharing at both masts with another licensee**	
Approx. 26.3 – 5.3 minutes	99.995% - 99.999%	Meets requirements for 99.995% availability and satisfies ComReg that the higher availability of 99.999% is necessary.	Meets requirements for 99.995% availability (or 99.99% in rural areas where there is no shortage of spectrum) and satisfies ComReg that the higher availability is necessary.

Table 9: Application requirements for required Radio Propagation Availability

* In rare circumstances for example in rural areas where there is no spectrum congestion and where there is no alternative means of communication and where there is no possibility of providing adequate antenna support and where the links are access or low capacity links, the use of Class 2 Antennae may be permitted. However, these may have to be upgraded (at the licensee's own expense) if spectrum problems arise.

** For the purpose of these guidelines, licensee means a licensee of links above 1GHz, an FWA, FWPMA, WDMDS, WAPECS, 3G or GSM license.