
OfW 590 Technical Frequency Assignment Criteria for Shared Access Radio Services

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1. Forward

1.1 The Wireless Telegraphy Act 2006 requires that only radio equipment that the Office of Communications (Ofcom) has granted a licence to, unless licence exempt, can be installed and used in the United Kingdom. This is under the condition that the radio equipment meets certain minimum requirements set in the appropriate Interface Requirement.

- IR2103 (Shared Access Low Power)
- IR2104 (Shared Access Medium Power)
- IR2105 (Shared Access 2G Indoors)

1.2 This document details the technical frequency assignment criteria and the principles that Ofcom will employ in the frequency bands for use by Shared Access systems.

1.3 This Technical Frequency Assignment Criteria (TFAC) is subject to revision.

1.4 Operators and manufacturers can obtain the latest copy of this document from the Ofcom website. If you do not have access to the internet, you can request a printed copy to be posted to you from Spectrum Licensing, contact details are below.

1.5 Please see below for full contact details:

Ofcom,
FAO Spectrum Licensing,
PO Box 1285,
Warrington,
WA1 9GL

Email: spectrum.licensing@ofcom.org.uk

Tel: 020 7981 3131

Website: www.ofcom.org.uk

2. Introduction

- 2.1 Shared Access products are part of a new framework¹ enabling shared use of spectrum. This product provides additional spectrum option which could support the rollout of wide range of local wireless connectivity applications. Please refer to our statement published on 25th July 2019².

Spectrum Bands available for Shared Access

Band	Bandwidth/Channel plan
1.8 GHz shared spectrum Lower Duplex 1.7817-1.785 GHz (mobile transmit) Upper Duplex 1.8767-1.880 GHz (base transmit)	2 X 3.3 MHz
2.3 GHz shared spectrum 2.39 – 2.4 GHz	10 MHz
3.8 – 4.2 GHz	10 MHz, 20 MHz, 30 MHz, 40 MHz, 50 MHz, 60 MHz, 80 MHz and 100 MHz
Lower 26 GHz 24.25 – 26.5 GHz	50 MHz, 100 MHz and 200 MHz

- 2.2 Common authorisation approach applies for access to any of these bands. Potential applicants will apply to Ofcom for a licence for a specific location. For each licence application, we will assess interference to and from other licensees³ in the band, based on our coordination parameters and methodology outlined in this document. Assignments will be made on a first come, first served basis with regards to other users in the band.
- 2.3 There are two types of licence to cater for different types of potential uses:
- **Low power licence** for local connectivity (per area licence). This would allow users to deploy as many base stations as they like within a 50-metre radius circle without further authorisation from Ofcom. Licensees can apply for multiple licence areas if the required coverage area is larger than the coverage area defined by a single licence.
 - **Medium power licence** for longer range connectivity (per base station licence). Given the higher transmit power and larger potential interference area, we will authorise

¹ <https://www.ofcom.org.uk/consultations-and-statements/category-1/enabling-opportunities-for-innovation>

² https://www.ofcom.org.uk/data/assets/pdf_file/0033/157884/enabling-wireless-innovation-through-local-licensing.pdf

³ Self-interference for Shared Access stations isn't taken account of within the technical assignment process. A Licensee is determined by the organisation name and organisation code used by the Ofcom Licensing Systems

medium power base stations on a per base station basis and limit deployments to rural areas only.

- Usage will be designated for indoor or outdoor use. “Indoor” means a location inside a building or place in which the shielding will typically provide the necessary attenuation to protect wireless telegraphy against harmful interference

Medium power licences are restricted for use in rural locations. Use in urban areas is not permitted unless agreed by Ofcom. Further information on this exception process is set out in section 10.

Ofcom has defined “Rural” for the purposes of these licences as:

- a) any location in England or Wales in an ONS 2011 Census Output Area which falls into **categories D1, D2, E1, E2, F1 or F2** (i.e. “town and fringe”, “villages” and “hamlets and isolated dwellings”);⁴
- b) any location in Scotland which falls into **categories 3-8** based on the Scottish Government’s 8-fold Urban Rural Classification; (i.e. any area outside a settlement of over 3,000 people)⁵ and
- c) any location in Northern Ireland which falls into **bands E-H** of the Northern Ireland Statistics and Research Agency’s settlement classification bands⁶ (i.e. any area outside a settlement of over 2,500 people)

In addition, any area which falls outside one of these areas, but which is within the limit of the UK’s territorial seas, will be considered as rural.⁷

- 2.4 The licence terms and conditions will have a requirement for equipment to start transmitting within six months of the licence being issued and continue to be operational afterwards. If spectrum is not used in this timeframe, Ofcom may revoke the licence with one month’s notice.

⁴ Office of National Statistics, *2011 Rural/Urban Classification*, <https://www.ons.gov.uk/methodology/geography/geographicalproducts/ruralurbanclassifications/2011ruralurbanclassification>

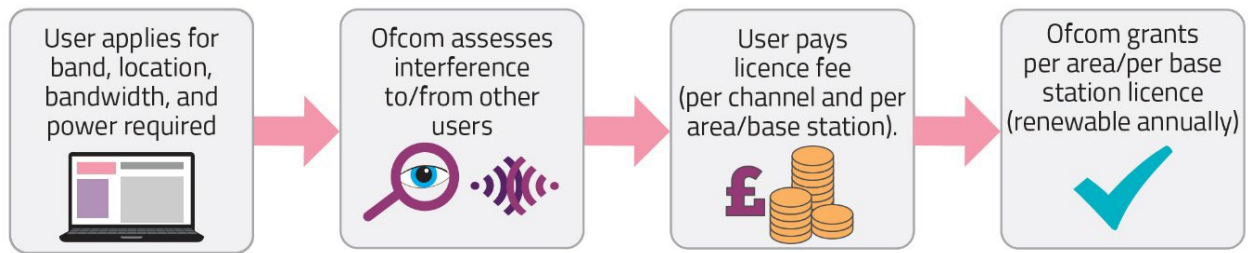
⁵ Scottish Government, *Scottish Government Urban Rural Classification*, <https://www.gov.scot/Topics/Statistics/About/Methodology/UrbanRuralClassification>

⁶ Northern Ireland Statistics and Research Agency, *Urban-Rural Classification*, <https://www.nisra.gov.uk/support/geography/urban-rural-classification>

⁷ For more information, see the UK Government website: <https://www.gov.uk/guidance/uk-maritime-limits-and-law-of-the-sea>. The UK Hydrographic Office also produces a map showing the limits of the UK’s territorial seas, for reference: <https://data.admiralty.co.uk/portal/apps/sites/#/marine-data-portal>

Application process

High level process for new applications



3. Frequency Assignment

- 3.1 Each station will be assessed against a series of checks that cover inter-service analysis, exclusion zone checks, national coordination, intra-service coordination and international/MoU checks. Any remaining frequencies that are available after these checks will be considered for assignment.
- 3.2 The technical procedures for channel assignment include a protection radius of 50m for Low Power systems, this is managed by adding 2dB to the EIRP and 1dB to the I/N to account for stations being anywhere in this 50m area. For the 3.8-4.2 GHz band a reuse criterion will be utilised⁸ to protect against inter service FDD/TDD interference.
- 3.3 EIRP used for coordinating low power Shared Access system is the maximum allowed EIRP per base station with the addition of 2 dB whilst for medium power Shared Access it is the applicant’s provided EIRP⁹. For indoor use an attenuation of 12dB is added to the calculation for both outgoing and incoming signal. We will use terrain and clutter maps of 50-metre resolution as part of the path loss model.
- 3.4 The licensing tool has a set coordination area per station type¹⁰. All unwanted station types within these areas will be assessed in turn.
- 3.5 Where Shared Access stations are the victim receiver, the interference analysis calculation I/N for low and medium power systems are as follows:

Band	Low Power I/N	Low Power Noise Figure (NF)	Medium Power I/N	Medium Power Noise Figure (NF)
1.8 GHz	1dB	13dB	0dB	10dB
2.3 GHz	1dB	13dB	0dB	10dB
3.8 GHz	-5dB	13dB	-6dB	10dB

- $N = KTB + NF$, where NF is 13dB for Low power and 10dB for Medium power.
- For Medium Power stations the applicant provided receiver gain will be taken into consideration
- An omni directional antenna is modelled for all applications. The antenna gain for medium power Shared Access will be taken into consideration for the receive path only.
- 1.8 GHz band is FDD with the base station as Tx on Upper Duplex and Rx on Lower Duplex. The licensing tool will model a virtual terminal at the base station location, it

⁸ See Annex 1 – Co-site re-use distance

⁹ See section 4

¹⁰ See Annex 2 – Coordination areas

will be 2m above ground, Tx on Lower Duplex and Rx on Upper Duplex for interference calculation.

Propagation model ITU-R P.452 (v10) for 20% of time will be used for the I/N calculation.

3.6 For inter-service coordination (Fixed Links, PES & UK Broadband) where the shared Access station is the interferer the interference analysis calculation will be derived from the affected stations Technical Frequency parameters present in our licensing tool.

Fixed links	Permanent Earth Station (PES) <i>(for RSA for ROES, we only apply test 2)</i>	UK Broadband deployments
<u>Test 1:</u> Ensure the equipment specific protection ratio is met, assuming 50% of time and the RSL specified in TFAC OFW446	<u>Test 1:</u> I/N = 0dB and for 0.005% of time	<u>Test 1:</u> T/I = 27dB and for 50% of time, assuming RSL = -75dBm
<u>Test 2:</u> Ensure the equipment specific protection ratio is met, assuming time % = (100 - link availability) and the RSL specified in TFAC OFW446 + fade margin	<u>Test 2:</u> I/N = -10dB and for 20% of time	<u>Test 2:</u> T/I = 6.5dB and for 0.001% of time, assuming RSL = -75dBm

RSL = Receive Sensitivity Level

T/I = Threshold to Interference

I/N – Interference to Noise

3.7 Frequency assignment for the 26 GHz band will be based on a simple re-use criterion¹¹.

Transmit Mask & Receive Filter

1.8 GHz & 2.3 GHz

3.8 A transmit mask or receive filter will not be used for as there will only be a single channel.

¹¹ See Annex 1 – Co-site re-use distance

3.8-4.2 GHz Band

Tx mask for all BW (Bandwidth) sizes

Offset from centre operational frequency [MHz]	Gain [dB]
-2.5x <i>BW</i>	-53
- <i>BW</i> /2 – 10	-53
- <i>BW</i> /2 -5	-53
- <i>BW</i> /2 – 5	-45
- <i>BW</i> /2	-45
- <i>BW</i> /2	0
0	0
<i>BW</i> /2	0
<i>BW</i> /2	-45
<i>BW</i> /2 + 5	-45
<i>BW</i> /2 +5	-53
<i>BW</i> /2 + 10	-53
2.5x <i>BW</i>	-53

Receive mask for *BW* sizes up to 20MHz

Offset from centre operational frequency [MHz]	Relative selectivity [dB] for low power BS	Relative selectivity [dB] for medium power BS
-2.5x <i>BW</i>	-54.1	-57.1
- <i>BW</i> /2 – 5	-54.1	-57.1
- <i>BW</i> /2 – 5	-45.1	-48.1
- <i>BW</i> /2	-45.1	-48.1
- <i>BW</i> /2	0	0
0	0	0
<i>BW</i> /2	0	0
<i>BW</i> /2	-45.1	-48.1
<i>BW</i> /2 + 5	-45.1	-48.1
<i>BW</i> /2 + 5	-54.1	-57.1
2.5x <i>BW</i>	-54.1	-57.1

Receive mask for BW sizes greater than 20MHz

Offset from centre operational frequency [MHz]	Relative selectivity [dB] for low power BS	Relative selectivity [dB] for medium power BS
-2.5x BW	-48.1	-51.1
-BW/2 – 19	-48.1	-51.1
-BW/2 – 19	-39.1	-42.1
-BW/2	-39.1	-42.1
-BW/2	0	0
0	0	0
BW/2	0	0
BW/2	-39.1	-42.1
BW/2 + 19	-39.1	-42.1
BW/2 + 19	-48.1	-51.1
2.5x BW	-48.1	-51.1

4. Technical Frequency Assignment Data

Data Table

4.1 The following table outlines the technical data that is required to process the application.

Information type required for Technical Assignment/Coordination	Required from applicant	1.8 GHz (1781.7-1785 MHz/ 1876.7-1880 MHz)	2.3 GHz (2.39-2.40 GHz)	3.8-4.2 GHz	26 GHz (24.25-26.5 GHz)
Licence Product	Yes	Low Power, or Medium Power	Low Power (only)	Low Power, or Medium Power	Low Power (only)
Station Coordinate	Yes	NGR or Latitude, Longitude	NGR or Latitude, Longitude	NGR or Latitude, Longitude	NGR or Latitude, Longitude
Antenna Location	Yes	Indoor, Outdoor	Indoor (only)	Indoor, Outdoor	Indoor (only)
Antenna Type	No	Omni	Omni	Omni	
Low Power Receive Antenna Gain	No	0 dBi used for coordination	0 dBi used for coordination	0 dBi used for coordination	
Medium Power Receive Antenna Gain	Yes	0-16 dBi max range		0-16 dBi max range	
Medium Power Rural Location confirmation	Yes	Yes		Yes	

Low Power Indoor Antenna height AGL	No	5m height used for coordination purpose	5m height used for coordination purpose	5m height used for coordination purpose	
Low Power Outdoor Antenna Height	Yes (10m max height)	As per application		As per application	
Medium Power Indoor Antenna height AGL	Yes	As per application		As per application	
Medium Power Outdoor Antenna Height	Yes (10m max height for 1.8 GHz band)	As per application		As per application	
Bandwidth	Yes (3.8-4.2 GHz and 26 GHz only)	2 x 3.3 MHz channel	10 MHz channel	10, 20, 30, 40, 50, 60, 80 and 100 MHz channels	50, 100 and 200 MHz channels
EIRP Low Power¹² (default power listed)	No	24 dBm / 3 MHz	24 dBm / 10 MHz	24 dBm / BW for BW ≤ 20 MHz; <i>OR</i> 18 dBm / 5 MHz for BW > 20 MHz	23 dBm / 200 MHz (TRP)
EIRP Medium Power (maximum powers listed)	Yes	42 dBm / 3 MHz	42 dBm / 10 MHz	42 dBm / BW for BW ≤ 20 MHz; <i>OR</i> 36 dBm / 5 MHz for BW > 20 MHz	

¹² The technical procedures for channel assignment include a protection radius of 50m for Low Power systems, this is managed by adding 2dB to the EIRP for the 1.8 GHz, 2.3 GHz and 3.8-4.2 GHz bands

5. Channel Plan Design

- 5.1 The 1.8 GHz band has a single 2 x 3.3 MHz channel, which is lower duplex 1.7817-1.785 GHz & upper duplex 1.8767-1.880 GHz.
- 5.2 The 2.3 GHz band has a single 10 MHz channel centred on 2.395 GHz.
- 5.3 Our channel plan for 3.8 - 4.2 GHz is below. In the case of the larger bandwidths, we will have channels that overlap with a 10 MHz offset. Whilst multiple overlapping channels will not be usable within the same area, this approach will give us the most flexibility when assigning frequencies to be able to avoid those frequencies used by earth stations, fixed links or existing UK Broadband coordinated base stations within a given area. We do not allocate spectrum in the bottom and top 5 MHz blocks of the band.

f_n is the centre frequency (MHz) of a radio-frequency channel in the band; and Individual channel frequencies are expressed by the following relationships:

- a) For systems with a carrier spacing of 10 MHz:

$$f_n = 3805 + ((2n-1)/2)*10 \text{ MHz}$$

where $n = 1, \dots, 39$

- b) For systems with a carrier spacing of 20 MHz:

$$f_n = 3805 + ((2n-1)/2)*20 \text{ MHz}$$

where $n = 1, \dots, 19$

- c) For systems with a carrier spacing of 30 MHz:

$$f_n = 3805 + ((2n-1)/2)*30 \text{ MHz}$$

where $n = 1, \dots, 13$

- d) For systems with a carrier spacing of 40 MHz (overlapping channel arrangement with a 10 MHz step):

$$f_n = 3825 + (n-1)*10 \text{ MHz}$$

where $n = 1, \dots, 36$

- e) For systems with a carrier spacing of 50 MHz (overlapping channel arrangement with a 10 MHz step):

$$f_n = 3830 + (n-1)*10 \text{ MHz}$$

where $n = 1, \dots, 35$

- f) For systems with a carrier spacing of 60 MHz (overlapping channel arrangement with a 10 MHz step):

$$f_n = 3835 + (n-1)*10 \text{ MHz}$$

where $n = 1, \dots, 34$

- g) For systems with a carrier spacing of 80 MHz (overlapping channel arrangement with a 10 MHz step):

$$f_n = 3845 + (n-1)*10 \text{ MHz}$$

where $n = 1, \dots, 32$

- h) For systems with a carrier spacing of 100 MHz (overlapping channel arrangement with a 10 MHz step):

$$f_n = 3855 + (n-1)*10 \text{ MHz}$$

where $n = 1, \dots, 30$

5.4 Our channel plan for 26 GHz (24.25 – 26.5 GHz) is provided below.

f_n is the centre frequency (MHz) of a radio-frequency channel in the band; and Individual channel frequencies are expressed by the following relationships:

- a) For systems with a carrier spacing of 50 MHz:

$$f_n = 24225 + (n)*50 \text{ MHz}$$

where $n = 1, \dots, 45$

- b) For systems with a carrier spacing of 100 MHz:

$$f_n = 24250 + (n)*100 \text{ MHz}$$

where $n = 1, \dots, 22$

- c) For systems with a carrier spacing of 200 MHz:

$$f_n = 24200 + (n)*200 \text{ MHz}$$

where $n = 1, \dots, 11$

6. Band Specific Issues

Band Specific Issues Table

1.8 GHz band	<ul style="list-style-type: none"> • Ofcom will coordinate proposed base stations with other licensees' low and medium power base stations (including migrated deployments) in this band. As there is a single bandwidth available in this band, all base stations are treated as co-channel assuming the carrier power is spread across a 3 MHz bandwidth, even if they are using only a portion of the available bandwidth; • Not available in Isle of Man or the Channel Islands; and • It's possible that users of the shared spectrum could experience periodic interference from MoD use of this band in some locations. This could happen near three specific sites: RAF Colerne in Wiltshire, RAF Oakhanger in Hampshire, and RAF Menwith Hill in North Yorkshire. We consider the risk of interference to be very low.
2.3 GHz band	<ul style="list-style-type: none"> • Ofcom will coordinate proposed applications with other licensees' licenses in the band on a single 10 MHz co-channel basis; • This band is currently only available for low power indoor use; • Not available in Northern Ireland, Isle of Man or Channel Islands; and • Users of this band should be aware that the band is shared by amateur radio users. These uses are mainly temporary, and we expect the risk of interference to be very small. However, it is possible that Shared Access licence users in this band could experience interference from amateur radio users, as Ofcom does not coordinate these. If you do receive interference to your licensed equipment, you can report this to Ofcom – although it should be noted that Ofcom cannot guarantee spectrum will always be free of interference.
3.8 – 4.2 GHz band	<ul style="list-style-type: none"> • Ofcom will coordinate proposed stations with both existing and new users as follows: <ul style="list-style-type: none"> ○ other licensees' co-channel low and medium power shared access base stations in the band; ○ co-channel and adjacent channel fixed links – typically we expect these to operate in 3815-3875 MHz paired with 4135-4195 MHz; ○ co-channel and adjacent channel UK Broadband¹³ deployments within the 3925-4009 MHz spectrum; ○ co-channel and adjacent channel Earth stations (receive-only in this band) which have protection afforded to them as part of a PES licence or grant of RSA for ROES;

¹³ Acquired by Hutchison 3G UK Limited

	<ul style="list-style-type: none"> • Not available in Isle of Man or Channel Islands; • Subject to 5km MoD exclusion zone at locations near GCHQ Bude, Cornwall and RAF Menwith Hill, North Yorkshire; and • Re-Use Distance Assignment FDD/TDD¹⁴ region: 500m co-site analysis will be used to remove any frequencies belonging to fixed link stations that could receive harmful interference.
26 GHz band	<ul style="list-style-type: none"> • 100m reuse distance to be used for frequency assignment; • Initially not available within 1 km of the following location. <ul style="list-style-type: none"> i. Harwell Earth Exploration Satellite Service earth station, Oxfordshire <p>Please be aware that new sites can be added in the future.</p>

¹⁴ FDD (Frequency Division Duplex) & TDD, (Time Division Duplex) are duplex methods deployed in telecommunication networks

7. National/International Coordination

National Coordination

- 7.1 3.8 – 4.2 GHz band will be coordinated with the MoD if the station falls within the 50km coordination zones at GCHQ Bude and RAF Menwith Hill. These two sites also utilise a 5km exclusion zone, all stations that fall within these zones will be rejected.

International Coordination / MoU check

- 7.2 Coordination check will be carried out for Medium Power licences in the 1.8 GHz. Ofcom will either pass or fail the assignment if it breaches the limits in tables below:

1.8 GHz band

Countries	Threshold	Propagation model parameters
From the UK (England, Scotland, Northern Ireland) to France From the Channel Islands to France	37dB μ V/m/3.3 MHz at 3m AGL for all points on the coastline of France	ITU-R P.1546 v5 50% of time and 50% of locations
From the UK (England, Scotland, Northern Ireland) to the Republic of Ireland From the Isle of Man to the Republic of Ireland	37dB μ V/m/3.3 MHz at 3m AGL for all points at the border or coastline of the Republic of Ireland	ITU-R P.1546 v5 50% of time and 50% of locations
From the UK (England, Scotland, Northern Ireland) to the Isle of Man From the Isle of Man to the UK (England, Scotland, Northern Ireland)	37dB μ V/m/3.3 MHz at 3m AGL for all points at the border or coastline of the neighbouring country	ITU-R P.1546 v5 50% of time and 50% of locations

8. Supplementary Notes

Maximum power of Radio Equipment outside the Permitted Frequency Channel

1800 shared spectrum

8.1 When transmitting, the Licensee must transmit within the limits set out below.

Frequency offset from the lower frequency of the band edge	Maximum mean EIRP density
-6.2 to -3.2 MHz	-55 dBm / kHz
-3.2 to 0 MHz	$-45 + 10 \times (\Delta_{FL}^* + 0.2) / 3$ dBm / kHz
Frequency offset from the upper frequency of the band edge	Maximum mean EIRP density
0 to 0.05 MHz	$-23 - 60 \times \Delta_{FH}^*$ dBm / kHz
0.05 to 0.1 MHz	$-26 - 153.3 \times (\Delta_{FH}^* - 0.05)$ dBm / kHz
0.1 to 2.8 MHz	$-45 - 10 \times (\Delta_{FH}^* + 0.2) / 3$ dBm / kHz
2.8 to 5.8 MHz	-55 dBm / kHz

* Note: Δ_{FL} in MHz is the offset from the lower edge of the permitted frequency band at 1876.7 MHz (it has values in the range -3.2 to 0 MHz)

Δ_{FH} in MHz is the offset from the upper edge of the permitted frequency band at 1880 MHz (it has values in the range 0 to 2.8 MHz)

2300 MHz shared spectrum

8.2 When transmitting, the Licensee must transmit within the limits set out below:

2385 to 2390 MHz 2400 to 2403 MHz	(PMax – 40) dBm / 5 MHz EIRP per antenna
2300 to 2385 MHz	(PMax – 43) dBm / 5 MHz EIRP per antenna
<u>Above 2403 MHz</u> 24 dBm < PMax ≤ 42 dBm PMax ≤ 24 dBm	 (PMax -41) dBm / 5 MHz EIRP* -17 dBm / 5 MHz EIRP*

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

8.3 The licensee’s base stations must transmit within the limits of transmission Frame Structure A. Frame Structure A means:

- timeslots (or subframes) 0, 2 to 5 and 7 to 9 must be allocated to Downlink (D) or Uplink (U) transmissions as indicated or may be left with no transmissions;
- the Licensee must ensure that the special subframe (S) in timeslots 1 and 6 has a structure that is compatible with TD-LTE special subframe configuration 6, also known as 9:3:2;
- all timeslots must be 1 millisecond in duration and the frame must start at a common reference time so that frames are aligned with Telefónica and transmissions synchronised; and
- TD-LTE frame configuration 2 (3:1) is compatible with this frame structure. Other technologies are permitted provided that the requirements are met.

Frame Structure A

DL/UL ratio	Subframe number									
	0	1	2	3	4	5	6	7	8	9
3:1	D	S	U	D	D	D	S	U	D	D

3.8 – 4.2 GHz

8.4 When transmitting, the Licensee must transmit within the limits set out below.

-5 to 0 MHz offset from lower channel edge 0 to 5 MHz offset from upper channel edge	(PMax – 40) dBm / 5 MHz EIRP per antenna
-10 to -5 MHz offset from lower channel edge 5 to 10 MHz offset from upper channel edge	(PMax – 43) dBm / 5 MHz EIRP per antenna
Out of channel baseline power limit (BS) < -10 MHz offset from lower channel edge > 10 MHz offset from upper channel edge	(PMax – 43) dBm / 5 MHz EIRP per antenna

8.5 In addition, the EIRP emanating from the Radio Equipment transmissions at any frequency outside the Permitted Frequency Channel shall not exceed the following additional band edge requirements:

3795 MHz – 3800 MHz 4200 MHz – 4205 MHz	(PMax – 40) dBm / 5 MHz EIRP per antenna
3760 MHz - 3795 MHz 4205 MHz – 4240 MHz	(PMax – 43) dBm / 5 MHz EIRP per antenna
Below 3760 MHz Above 4240 MHz	-2 dBm / 5 MHz EIRP per antenna

26 GHz shared band

8.6 When transmitting, the Licensee must transmit within the limits set out below.

Frequency offset from the lower and upper frequency of the channel edge	Maximum base station power (TRP)
- Up to 50 MHz	12 dBm / 50 MHz
Beyond 50 MHz	4 dBm / 50 MHz
Within the frequency band 23.6 – 24 GHz	Initial limit before 1 January 2024: -33 dBW / 200 MHz Final limit from 1 January 2024: -39 dBW / 200 MHz
	Maximum terminal station power (TRP)
Within the frequency band 23.6 – 24 GHz	Initial limit before 1 January 2024: -29 dBW / 200 MHz Final limit from 1 January 2024: -35 dBW / 200 MHz

A1. Co-site re-use distance

Band	Re-use Type	Distance	Lower Frequency	Upper Frequency	Lower Frequency Offset Formula	Upper Frequency Offset Formula	Max offset
3.8-4.2 GHz	Co-site	500 m	3.8 GHz	4.2 GHz	0	$(BWT_x + BWR_x) * 1.25$	Up to 2.5 times the BW
26 GHz	Co-site	100 m	24.25 GHz	26.5 GHz	0	$(BWT_x + BWR_x) * 1.25$	Up to 2.5 times the BW

BW=Band Width

Tx=Transmit

Rx=Receive

A2. Coordination areas

8.7 Ofcom’s licensing tool will apply band-specific coordination distances for candidate transmitting stations. The table below provides coordination distance per band and product type.

Band		1.8 GHz	2.3 GHz	3.8-4.2 GHz
Service		Shared Access	Shared Access	Shared Access
Frequency range	MHz	(1781.7 MHz,1880 MHz)	(2390 MHz,2400 MHz)	(3800 MHz,4200 MHz)
Coordination Radius (inter service)	km			287
Coordination Radius Low Power	km	20	20	20
Coordination Radius Medium Power	km	115	115	115

A3. Document history

Version	Date	Changes
1.0	9 December 2019	Published
1.1	16 April 2020	Edited section 3 and 4 for EIRP clarification
1.2	16 September 2022	Amending the out-of-band emissions as per our statement to implement the harmonised limits and removing the 1 km exclusion zones around Jodrell Bank and Cambridge radio astronomy sites.