Ofcom application form OfW 434

Application Form for a Business Radio Technically Assigned Licence

www.ofcom.org.uk

Please read before completing this application form

Additional Guidance on specific questions is at the end of the form.

1. The fastest way to apply is online at: **https://secure.ofcom.org.uk/busrad**
2. Technical details will be notified to the licensee after full payment has been received.
3. Incomplete or unreadable applications will be returned.
4. All fields are mandatory unless stated otherwise.
5. After a licence is granted, it is the licensee's responsibility to ensure that the contact details held by Ofcom are accurate and to inform Ofcom immediately of any change to those details.
6. Ofcom recommends that you do not commit to purchasing or installing equipment until you receive your licence.
7. The Wireless Telegraphy (Licence Charges) Regulations set out the fees for licences to use radio equipment issued under the Wireless Telegraphy Act. Information on how to calculate your licence fee can be found on the Ofcom website.
8. It is your responsibility to remain licensed for the entire time that your equipment is installed and/or used.
9. Annual charges need to be paid by the date specified, otherwise enforcement action may be taken. If these are not paid then your assigned frequencies may not be available to you for future assignment.
10. How we use your data

    We require this information in order to carry out our licensing duties under the Wireless Telegraphy Act.

    Please see Ofcom's General Privacy Statement for further information about how Ofcom handles your personal information and your corresponding right:

    www.ofcom.org.uk/about-ofcom/foi-dp/general-privacy-statement

A Customer details

A.1 If you are an existing licensee please provide your customer reference number and go to question A5. If not, please complete all sections.

A.2 Who is the licence to be issued to?

A licence can only be issued to a legal entity. Ofcom recognises the following types of entity. Please tick the relevant box:

☐ individual or sole trader	☐ public body	☐ non UK govt/administration
☐ partnership	☐ registered charity	☐ non UK company
☐ limited company/plc	☐ university/educational	☐ unincorporated association
☐ government/local government	☐ crown body	☐ community interest company
☐ royal charter	☐ religious body	

Individual or sole trader Full name

Partnership Full name

NB: For a partnership, please give the full name of one partner (who must also sign the declaration on page 11) and supply a list of the full names of all other partners in the declaration.

For other legal entities Full name

Registration Number (where applicable). For example, as shown on Companies House or the Charity Register)

If your organisation is a registered charity, does it have as its objective, the safety of human life in an emergency? ☐ Yes ☐ No

A.3 Licensee address

- Limited companies should use the registered address from **http://www.companieshouse.gov.uk**
- Registered charities should use the address from **https://www.gov.uk/government/organisations/charity-commission**

For all other Licensees, please use your main business address

Address

Postcode

Tel

E-mail

Please tick this box if you are happy for all correspondence addressed to the Licensee to be sent to the email address you have provided above. ☐

A.4 Business trading name

A.5 Licence contact name and address (where different from above)

NB: This is the person who is responsible for the licence And will receive all important documents including:

- Validation notice (licence amendment reminder)
- Notice of Proposed Revocation (where applicable)
- Revocation notice (where applicable)
- Surrender letters
- Trade documents (if no details added in section A.8)

Name

Address

Postcode

Tel

E-mail

Please tick this box if you are happy for all correspondence addressed to the Licensee to be sent to the email address you have provided above. ☐

A.6 Contact name and address for payments or account queries (where different)

NB: This is the person who will receive **invoices** and **reminders** when payments are due.

Name

Address

Postcode

Tel

Fax

E-mail

If an email address is provided, we will send all correspondence addressed to the Licensee by this method, unless you have indicated that you do not wish us to do so by ticking this box. ☐

A.7 If you are applying via a third party (e.g. radio supplier, consultant etc) **please complete the following:**

Name

Address

Postcode

Tel

Fax

E-mail

If an email address is provided, we will send all correspondence addressed to the Licensee by this method, unless you have indicated that you do not wish us to do so by ticking this box. ☐

A.8 Contact name and address for licence trades

Name

Address

Postcode

Tel

Fax

E-mail

If an email address is provided, we will send all correspondence addressed to the Licensee by this method, unless you have indicated that you do not wish us to do so by ticking this box. ☐

A.9 If you wish to apply for a licence period of less than 12 months, please indicate the duration required

☐ Months

A.10 If you are an existing customer and wish to harmonise the renewal date of your new licence with the renewal date of an existing licence *(of the same type)*, please enter the preferred renewal date

Day ☐ Month ☐ Year ☐

Do you require a:

☐ **Base station**
Please tick and complete section B

Do you also require a remote control point?* ☐ Yes ☐ No

☐ **Operational area**
Please tick and complete section C

*This should only be ticked for Remote Control Points (RCPs) using Reverse Frequency Working as the control method. RCPs using other control methods, e.g. landline, do not need to be captured.

B Base station details

If you do not require a base station, please proceed to section C

B.1 Base Station Location* (choose one of the following possibilities to input the data)

GB National Grid Reference
(1 metre accuracy, e.g. TQ 32284 80497)

T Q | 3 2 2 8 4 | 8 0 4 9 7

(2 Letters; 5-figure Easting; 5-figure Northing)

OR

Latitude 5 1 **°N** 3 0 2 8 5 4 0

Longitude 0 0 **°E/W** 0 5 4 3 0 0 5

51N:30:28.540 0W:5:43.005

(circle E or W as appropriate)

*It is vital that this information is accurate, as errors could lead to an application being declined.

B.2 Site address

Address

Postcode

B.3 Site contact name and address

Name

Address

Postcode

Tel

Fax

E-mail

B.4 Customer Requested Service Area

Circle radius: 0 0 1 **km**

The assignment will take the customer requested service area (CRSA), and use this with the supplied technical parameters and propagation model, to derive a designated service area, which forms part of the terms and conditions of the granted licence. At the boundaries of this coverage, the service threshold will be assumed to be -104 dBm per 12.5 KHz.

B.5 Additional services:

a) Talkthrough ☐

b) Trunking (note this will require exclusive assignment type) ☐

B.6 Assignment type

☐ **Shared** ☐ **Exclusive**

The assignment type that you choose will apply to all channels associated with this station

B.7 Callsign/System ID [ ]

B.8 Mobile ERP [0][1] **W**

B.9 Antenna location

☐ **Outdoor** ☐ **Indoor** ☐ **Underground**

B.10 Antenna height [0][0][1] **m**

(in metres above ground level)

B.11 Antenna ERP [0][0][1] **W**

B.12 Antenna type

☐ **Omni-directional** ☐ **Radiating Cable**

☐ **Down-fire** ☐ **Directional** (If directional is chosen, please also complete question 13)

Angle of tilt (where applicable) [2][3] **°** **down/up** (delete where appropriate)

Gain [0][1] **dB** (relative to a half-wave dipole)

B.13 Directional antenna type

(only applicable if the directional antenna option is chosen in B12)

Directional antenna type:

☐ **Offset Omni** ☐ **Yagi** ☐ **Cardioid** ☐ **Figure-of-Eight**

Azimuth [0][0][1] **degrees East of True North**

Beam width [0][0][1] **degrees**

Front-to-back ratio [0][1] **dB**

OPTIONAL

B.14 Advanced antenna options

HCM Antenna Codes **Horizontal** [ ][ ][ ] [ ][ ] [ ][ ]

Vertical [ ][ ][ ] [ ][ ] [ ][ ]

Gain [0][1] **dB** (relative to a half-wave dipole)

Azimuth [0][0][1] **degrees East of True North**

Angle of tilt (where applicable) [2][3] **°** **down/up** (delete where appropriate)

C Operational area details

This section should only be completed if a base station is not being used

C.1 Centre of operational area* (choose one of the following possibilities to input the data)

GB National Grid Reference
(1 metre accuracy, e.g. TQ 32284 80497)

T Q | 3 2 2 8 4 | 8 0 4 9 7

(2 Letters; 5-figure Easting; 5-figure Northing)

OR

Latitude 5 1 **°N** 3 0 | 2 8 | 5 4 0

Longitude 0 0 **°E/W** 0 5 | 4 3 | 0 0 5

e.g 51N:30:28.540 0W:5:43.005

(circle E or W as appropriate)

*It is vital that this information is accurate, as errors could lead to an application being declined.

C.2 Radius of operational area

0 1 **km** (maximum of 30 kms permitted)

C.3 Site address

Address

Postcode

C.4 Site contact name and address

Name

Address

Postcode

Tel

Fax

E-mail

C.5 Assignment type

☐ **Shared** ☐ **Exclusive**

The assignment type that you choose will apply to all channels associated with this operational area

C.6 Callsign/System ID

C.7 Mobile ERP

0 1 **W**

D Spectrum details

D.1 Please indicate your preferred choice of frequency band
(As it may not be possible to assign your preferred band, you should also indicate a second choice.)

- ☐ **Paging** 26.225 to 49.49375 MHz
- ☐ **VHF-Low** 68.08125 to 87.49375 MHz
- ☐ **VHF-High** 165.04375 to 173.09375 MHz
- ☐ **UHF-1** • 425.00625 to 449.49375 MHz
- ☐ **Band 1** 55.75 to 68.0 MHz
- ☐ **VHF-Mid** 137.9625 to 165.04375 MHz
- ☐ **Band III** 177.20625 to 191.49375 MHz
- ☐ **UHF-2** 450.0 to 470.0 MHz

• Please note that assignments in UHF1 are subject to co-ordination with other users of the band. Also, duplex channels are only available in certain major conurbations

D.2 Please indicate if the proposed system is analogue or digital ☐ **Analogue** ☐ **Digital**

D.3 How many channels do you require? ☐ **No. of dual frequency channels** ☐ **No. of single frequency channels**

D.4 Please specify the channel bandwidth you require: ☐ **6.25 kHz** ☐ **12.5 kHz** ☐ **25 kHz** ☐ **Other**

D.5 How many signalling codes per channel do you require? ☐ **CTCSS** ☐ **DCS** ☐ **DMR access code**

OPTIONAL

D.6 Do you have a minimum channel separation requirement? ☐ **kHz**
(generally only applicable for trunked use – optional)

D.7 Do you have a preferred Base and/or Mobile transmit frequency?

	Base transmit frequency (MHz)	Mobile transmit frequency (MHz)	Channel Bandwidth (kHz) optional	Preferred CTCSS optional	Preferred DCS optional	DMR access code optional
Channel 1	165.04375	165.04375				
Channel 2	165.04375	165.04375				
Channel 3	165.04375	165.04375				
Channel 4	165.04375	165.04375				
Channel 5	165.04375	165.04375				

D.8 If you will be using IR2008 technology, please complete the following:

Timeslot type: ☐ **250 milliseconds** ☐ **500 milliseconds**

No. of base transmit timeslots ☐ **No. of mobile transmit timeslots** ☐

OPTIONAL – Please circle preferred timeslots:

Base 1 2 3 4 5 6 7 8 **Mobile** 1 2 3 4 5 6 7 8

E Remote Control Points (RCP)

This section should only be completed for RCPs using Reverse Frequency Working as the control method. RCPs using other control methods, e.g. landline, do not need to be captured

E.1 RCP location* (choose one of the following possibilities to input the data)

GB National Grid Reference
(1 metre accuracy, e.g. TQ 32284 80497)

T Q | 3 2 2 8 4 | 8 0 4 9 7

(2 Letters; 5-figure Easting; 5-figure Northing)

OR

Latitude 5 1 **°N** 3 0 | 2 8 | 5 4 0

Longitude 0 0 **°E/W** 0 5 | 4 3 | 0 0 5

51N:30:28.540 0W:5:43.005

(circle E or W as appropriate)

*It is vital that this information is accurate, as errors could lead to an application being declined.

E.2 RCP address

Address

Postcode

E.3 RCP contact name and address

Name

Address

Postcode

Tel

Fax

E-mail

E.4 RCP antenna height

0 0 1 **m** (in metres above ground level)

E.5 RCP antenna ERP

0 1 **W**

E.6 RCP antenna type

(RCP antennas must be directional antennas facing towards the main base station antenna)

Directional antenna type:

☐ **Offset Omni** ☐ **Yagi** ☐ **Cardioid** ☐ **Figure-of-Eight**

Azimuth 0 0 1 **degrees East of True North**

Angle of tilt (where applicable) 2 3 **° down/up** (delete where appropriate)

Gain 0 1 **dB** (relative to a half wave dipole)

F Payment details

For information on how to calculate your fees, please view the following webpage:
www.ofcom.org.uk/licensing/applications08/changes/Fees/

Please do not send payment until you receive an invoice from Ofcom

The quickest way to pay your licence fee(s) is online using a debit or credit card: **https://secure.ofcom.org.uk/payments**

Payments by this method are limited to £5,000.

Payments must include all bank charges. In the event that Ofcom does not receive full payment, it will return any partial payments received.

Ofcom accepts the following payment methods:

- **Direct Debit** (This option is not available for new applications, unless you have an existing direct debit agreement in place with Ofcom for the payment of other current live licence fees)
- **BACS** or **CHAPS** payment
- **Credit** or **debit card**
- **Cheque** (payable to Ofcom)

Why Ofcom cannot quote purchase order numbers on invoices

The grant of a licence by Ofcom is made pursuant to statutory powers and does not constitute the sale of a product or service.

New Application Payment Terms

If no payment is received before the due date specified in your invoice, Ofcom may consider that your application has been cancelled and you will have to reapply.

G Declaration

I understand and accept that:

- **I must keep all of my licence details, including contact information, up to date by notifying Ofcom of any changes.**
- **I am responsible for the payment of all licence charges and these must be paid within the time specified. This includes annual fees and any additional fees charged to me as a result of a variation to my licence.**
- **Ofcom may use or share my information to help:**
  - **a) issue, amend, validate and/or surrender a Wireless Telegraphy Act licence;**
  - **b) maintain and publish a register of licences under the Wireless Telegraphy Act;**
- **Ofcom will not give anyone my information except:**
  - **a) where Ofcom have my permission; or**
  - **b) where Ofcom are required or permitted to do so by law; or**
  - **c) to other companies or organisations who provide a service to Ofcom or me;**
- **Ofcom may transfer my information to other countries. If Ofcom does this you will ensure that anyone to whom Ofcom pass it provides an adequate level of protection;**
- **It is an offence to knowingly make a false statement in support of this application and may lead to the licence being refused or revoked as well as to possible prosecution under the Wireless Telegraphy Act.**

Signature of applicant		For self and partners (tick if applicable)	
Date of application		Full name	
		Position in organisation	

- **Partnerships must be applied for by one partner signing 'for self and partners'. A director or authorised person must sign for public limited companies, limited companies and other legal entities.**

Print name		Signature	
Print name		Signature	
Print name		Signature	
Print name		Signature	

- **If the number of partners exceeds the above space then additional partner details should be provided on a separate sheet of paper in the same format and attached with this application.**

H Where to send this application

Please send your completed application form to:

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

E-Mail spectrum.licensing@ofcom.org.uk Tel 020 7981 3131

Guidance notes

PLEASE ALSO READ THE KEY GUIDANCE NOTES ON PAGE 2 OF THIS APPLICATION FORM. IF THESE NOTES DO NOT ANSWER YOUR QUERY PLEASE CONTACT SPECTRUM LICENSING USING THE DETAILS AT THE BOTTOM OF PAGE 11.

The quality of the licence we issue to you, including all technical information of your base station/operational area as well as any antenna information, depends on the information you provide. Therefore in order to provide the very best service it is vital that you provide the most accurate information you can in this application form. If you are in any doubt or are unsure about any of the questions, please seek technical advice from your radio supplier or other technical expert.

It is also crucial to provide accurate contact information so that we can send you any licence documents successfully and contact you if required. Where possible, provide a valid email address as we can send you any letters automatically by this method.

General information

Under the terms of the Wireless Telegraphy Act 2006, it is an offence to install or use radio apparatus, unless:

- you do so under and in accordance with a licence issued by Ofcom (the Office of Communications); or
- the apparatus is specifically exempt from licensing.

Responsibility for obtaining and paying for a licence rests with the user of the system, not with the supplier of the equipment. Due to the technical nature of some of the sections of the application form it would be prudent to complete the application with assistance from your appointed radio supplier, engineer, or technician. Submitting a licence application does not permit you to use or even install any equipment until you have been issued with a fully authorised licence from Ofcom. Also it is the licensee's responsibility to confirm that the details in the licence are correct and accurate.

Ofcom can inspect base stations for compliance against the permitted licensing terms and conditions stated under the licence. Breaches against the terms and conditions are taken seriously and if you operate outside your terms and conditions you will invalidate your licence and be using your system unlawfully. This can lead to you being issued with a fixed penalty notice or being prosecuted in a criminal court, depending on the circumstances of the breach.

Radio Interference

Since the operation of a new system may cause interference to existing users, your supplier may consider it necessary to carry out compatibility tests before you apply for your licence. Once installed and operating, your system must operate at all times within the parameters of the terms and conditions of your licence and not cause undue interference to any other wireless telegraphy equipment. If it does, you may need to stop operating until the cause of the interference has been rectified. Ofcom cannot offer any protection against interference radiated by other authorised services; however, if you do experience interference, please contact the Spectrum Licensing Team on 0300 123 1000 who will be in a position to advise you.

Applying for multiple base stations or operational areas

If you wish to apply for multiple base stations or operational areas under the same licence, you can print off and complete multiple copies of the relevant section (Section B for multiple base stations and Section C for multiple operational areas. If you do this, please help us by writing the number of the base station/operational area at the top of each page, e.g. 'Base Station 1', 'Operational Area 1', etc. If each base station or operational area will use different channel details, please also add the corresponding base station/operational area number to the top of each copy of Section D.

For guidance on the use of infill or standby base stations please refer to the Technical Frequency Assignment Criteria (TFAC): **http://licensing.ofcom.org.uk/binaries/spectrum/business-radio/technical-information/tfac/ofw164.pdf**

Applying for multiple remote control points on the same base station

If you wish to apply for multiple remote control points on a base station, you can print off and complete multiple copies of Section E, following the same process of numbering the relevant copied section with the corresponding base station number.

The remainder of these guidance notes provide section by section guidance on the information requested within this application form:

Section A – Customer Details

Existing customers. If you already hold an Ofcom radio licence, you should write your customer reference number in the box provided. Your customer reference number will be quoted in licence documentation or correspondence that we have previously sent to you.

Technical Information when applying for a base station

Section B – Base station details

*Please note where the △ symbol is shown this indicates a **critical** parameter that will dramatically affect the modelling of your radio system and any errors could result in potential interference to your system and to other users. Please take care in ensuring that these details are as accurate as possible to mitigate this risk.*

B.1 – Base station location △

It is essential that the base station position is entered as accurately as possible so that it reflects the true location of the transmitting signal. This ensures that the predicted coverage is as accurate as possible to maximise the use of spectrum and minimise interference to other users. Positions must be accurate where possible to within at least 1m.

When submitting NGR's on the application, quoting the post code and building number that the base station is located at, may enable us to confirm the accuracy of you positional data.

The base station location refers to the location of your radio base station antenna measured to 1 metre accuracy. Please provide the information in the following format:

Latitude/Longitude (WGS84) 51:30:28.540N 0:5:43.005W

National Grid Reference – NGR (e.g. TQ 32284 80497)

This information can be checked using suitable GPS equipment (e.g. a Smartphone), a map or using online mapping tools.

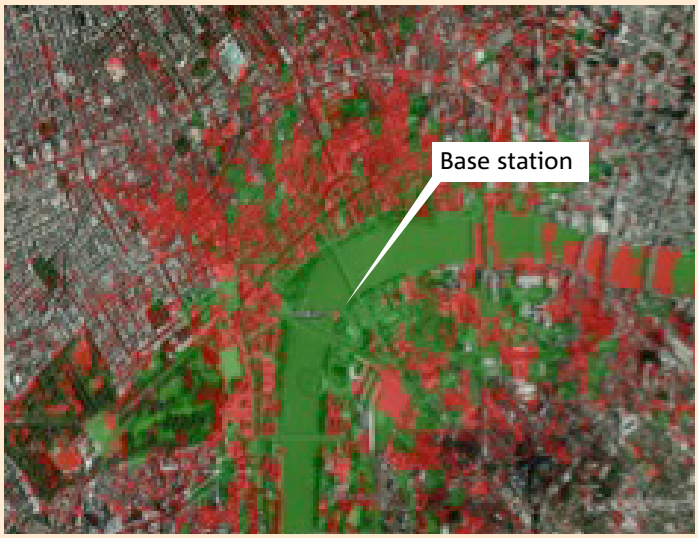
There are a number of online support tools that can assist you with the conversion of postal codes into NGRs.

A suggested method to improve location accuracy could be to utilise an online mapping tool that has satellite imagery and an ability to pin reference points to reflect the antenna position. Most applications with this facility also return latitude and longitude measurements, which can either be quoted on the application or converted to NGRs.

Some examples of good and bad positional data are reflected below.

An application supplied with a 6 digit base station NGR: TQ 322 804 returns accuracy to within 100m, which in this case resulted in the base station being mapped into the Thames.

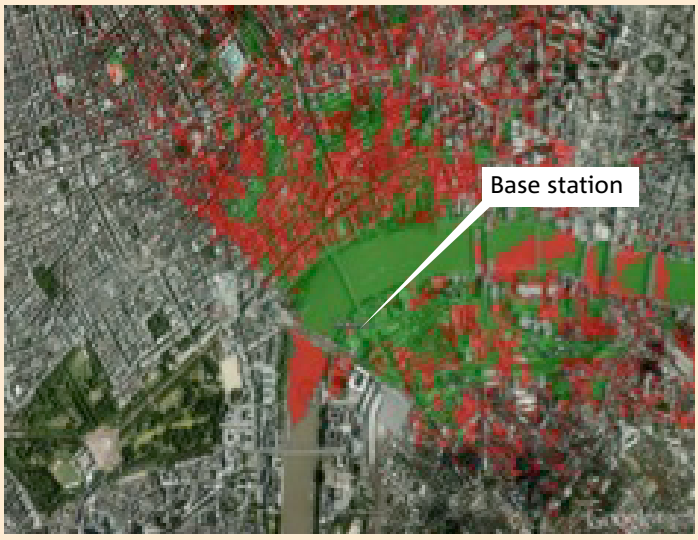
NB: The green shaded area depicts the wanted coverage area. The red shaded area depicts the unwanted sterilisation area.



Above is a representative example of poor positional data supplied, resulting in an inaccurate assignment and a need for increased coverage area protection. This reduces the availability for co-channel assignments and can result in unnecessary rejections in subsequent applications.

If the corresponding Latitude/Longitude positional data had been used it would have resulted in the following correct mapping of the base station.

Latitude/Longitude (WGS84) 51:30:28.540N 0:5:43.005W



Above is a representation of the correctly mapped base station position using Latitude and Longitude data.

B.2 – Site address

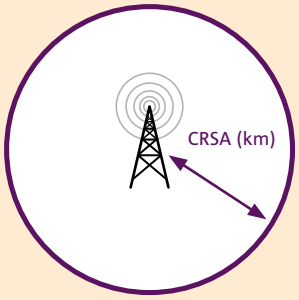
The site address is the full postal address for the base station location.

B.3 – Site contact name and address

The site contact is the person we would contact in the event that we need access to the base station antenna, e.g. in relation to interference investigations.

B.4 – Customer Requested Service Area △ (CRSA)

This is the area over which you wish to operate your radios (expressed as a radius distance) to meet your business needs (your system will need to be designed to cover this distance). Please define the maximum distance at which you need to operate your radios at from the base station antenna, in kilometres. Choosing a larger area may reduce your chances of receiving an assignment in some congested areas. There is a maximum permitted distance of 120km.



B.5 – Additional services

There are two additional services available: Talkthrough and Trunking.

- Talkthrough facilitates automatic communication between mobiles through a base station. If a base station is set to talkthrough mode, signals received at the base station from mobile stations are immediately retransmitted to all the other mobile units monitoring the base station's output. If you wish to use this facility, please tick the talkthrough box.
- Trunking is a spectrally efficient method of utilising a number of individual channels in a cohesive system of radio traffic management. In conventional radio systems, each mobile only has access to one radio channel.

However, with trunking, the mobiles operating on the system have access to a pool of channels. When a mobile becomes involved in communications, one of the unused channels is dynamically assigned for use. This assignment lasts for the duration of the call. After this time, the channel is returned to the pool for future use by another mobile.

If your radio system will use trunking, i.e. if it is a trunked radio system, please tick the trunking box. Please note that trunked systems are assumed to be exclusive (due to the dynamic control channel continuously transmitting).

If a static control channel is used then please advise with your application as this could increase your chances of assignment in congested areas and may provide a fee saving.

B.6 – Assignment type △

The assignment type indicates whether or not a channel is:

Shared	Sharing with other users ***Important to use CTCSS/ DCS/Digital Access Radio Codes***	Vast majority of current business radio systems are in this category Lower Fees	Assignment generally possible in more congested areas
Exclusive	No sharing within same geographical area	If your system is business/safety critical or is a trunked system. Higher Fees	Unlikely to be available in highly popular bands in major conurbations

A shared assignment refers to an assignment for which we expect that transmissions will be made up to 33% of the time in the busiest hour of operation.

An exclusive assignment refers to (a): an assignment for which we expect that transmissions will be made use of anything between 50% and 100% of the time in the busiest hour of operation, or (b): an assignment that requires extra protection because of either business or safety critical reasons.

For a technical explanation of how your assignment is calculated please refer to the Technical Frequency Assignment Criteria (TFAC):
http://licensing.ofcom.org.uk/binaries/spectrum/business-radio/technical-information/tfac/ofw164.pdf

B.7 – Callsign

Callsigns are a mandatory requirement for voice systems.

Callsigns are announced at the beginning of transmissions to enable identification of the user. This is especially useful in areas where frequencies are shared with other users. The callsign must not be more than 12 alphanumeric characters in length and should not be a place name.

Please note if you are using a data application (such as GPS) callsigns are not applicable.

B.8 – Mobile ERP △

Mobile ERP refers to the power output of the mobile radio. ERP is the abbreviation for Effective Radiated Power and is measured in Watts (W). Most handheld radios will have a mobile ERP of between 0.1 and 5 Watts. Mobile radios mounted in vehicles may have a mobile ERP of up to 25 Watts. To improve your chances of receiving an assignment in congested areas please keep this to a minimum.

B.9 – Antenna Location △

This identifies where the antenna will be located:

Outdoor	Antenna is located outside of any buildings	No attenuation considered No fee saving
Indoor	Antenna is located within a building. It is expected there will be some building shielding	Attenuation is considered Fee saving
Underground	Antenna is located completely underground	It is assumed minimal interference will be received from above the ground Fee saving

B.10 – Antenna height △

The antenna height selected will have a major effect on the coverage area for the proposed system. The antenna height is the height of the top of the antenna above ground level measured in metres (m). Please do not add in the height of the ground as our database takes care of this for you.

If you are unable to source the correct height of the antenna then a simple mathematical way of deriving an estimate of the height is provided below.

If you do not know the height of the building (installation) then there are a number of simple ways to estimate the height of a building:

Method 1: Taking a picture

You can take a picture of a building and include someone or something in the photo whose height is known. A metre ruler or person can work very well. Ensure that you place your known quantity as close to the building as possible and that you take the photo from a distance to minimise any vertical distortion. Then you can use a photo-editing program to estimate the height remembering to include the antenna height.

Method 2: Floor Estimation

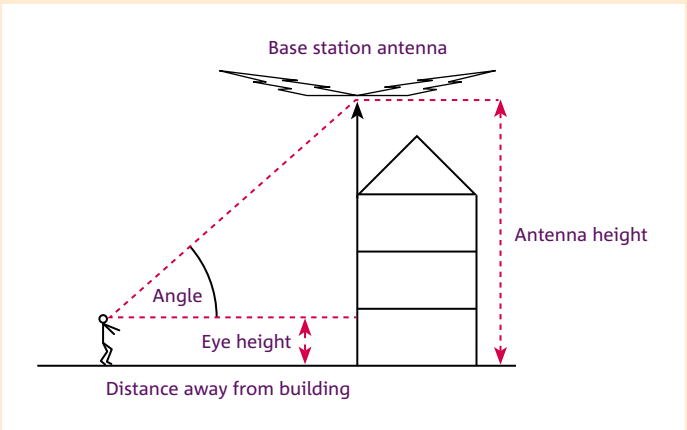
You can assume that each floor in a building is approximately 3 metres. Therefore multiply the number of floors by 3 metres to get an approximated height. Add a further 3 metres for a sloped roof or zero if flat. Again, remember to include the height of the antenna.

Method 3: Unit Estimation

Buildings are often constructed with bricks, blocks and other regular sized construction materials. Measure the height of a single unit and multiply this by the number on the face of the building for one level. When you have established this height then multiply this by the total number of levels to estimate the total building height. Again, don't forget to include the height of the antenna.

Method 4: Using simple trigonometry

A slightly more difficult approach but arguably more accurate is using trigonometry. What you will need to know is 1) your eye height, 2) your distance from the building and 3) the angle between the ground and the top of the antenna.



The height of the antenna can be calculated using the following:

Antenna Height = **(**tan (angle) x distance from building**)** + your eye height

An example: assume your eye height is 1.75 metres measured from the ground, the angle to the top of the antenna is 40° and you are standing 30 metres away from the building. The height would be:

Antenna Height = tan (40) x 30 + 1.75 metres

Antenna Height = 0.839 x 30 + 1.75 metres

Antenna Height = 25.17 + 1.75 metres

Antenna Height = 26.92 metres

B.11 – Antenna ERP △

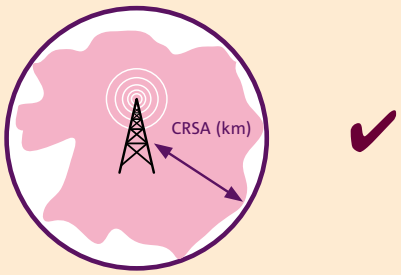
Antenna ERP refers to the power output of your base station antenna. ERP is the abbreviation for Effective Radiated Power and is measured in Watts (W). The following is provided as a guide:

Typical Customer Requested Service Area	Typical ERP
0 - 1 km	0.1 - 1 W
1 - 3 km	0.25 - 2 W
3 - 10 km	2 - 5 W
10 - 30 km	5 - 10 W higher power with justification
>30 km	25 W higher power with justification

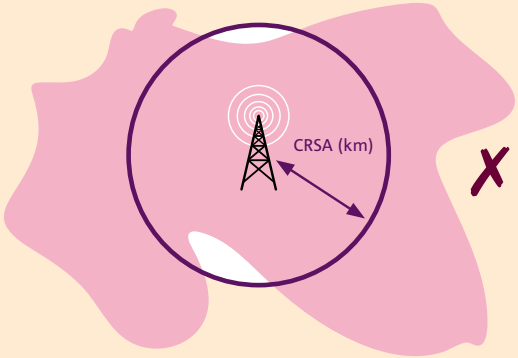
Details of the maximum ERP permitted are found in the TFAC:

http://licensing.ofcom.org.uk/binaries/spectrum/business-radio/technical-information/tfac/ofw164.pdf

Please note the ERP you wish to use must result in a radio coverage only enough to cover the areas you require to operate your radios (i.e. the Customer Requested Service Area). If it is not then you may be asked to provide justification. Examples of good and poor correlations are shown.



1. Good correlation between CRSA and ERP



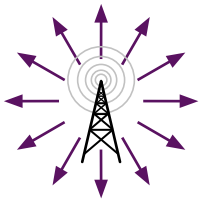
2. Bad correlation between CRSA and ERP could result in a decrease in the likelihood of a successful assignment

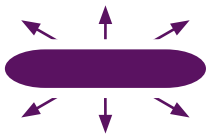
B.12 – Antenna Type △

The type of antenna that is used can have an effect on the coverage area of the proposed system. Your radio supplier should be able to advise you on the most suitable type of antenna for your radio system.

The four general antenna types that we record are described below:

NB: The below antenna patterns are for illustrative purposes only and do not reflect actual radiation patterns

Antenna Type	Summary	Diagram
Omni-directional (most common)	Provides uniform pattern of coverage in all directions	

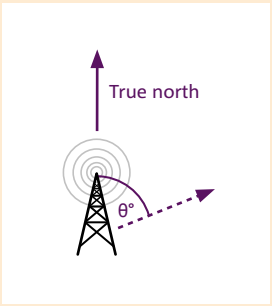
Antenna Type	Summary	Diagram
Directional	Provides greater power in one or more directions. There are four main types of directional antennas – cardioid, elliptical, figure of eight and offset-omni These ***must*** be used when appropriate	
Downfire	Provides greater power in a downward direction These ***must*** be used when appropriate **Can result in a fee discount**	
Radiating Cable	Also known as a leaky feeder is a special type of coaxial cable which acts as an antenna and is used to provide coverage in buildings and tunnels etc. **Can result in a fee discount**	

More details can be found in the TFAC:

http://licensing.ofcom.org.uk/binaries/spectrum/business-radio/technical-information/tfac/ofw164.pdf

B.13 – Directional antennas

This question should only be completed if you have ticked 'Directional antenna' in question 12. Antenna azimuth refers to the direction in which the antenna will be pointing and is measured in degrees east of true north (WGS84).



Antenna beamwidth, also known as the half-power beamwidth, is the angle of an antenna pattern or beam over which the relative power is at or above 50% of the peak power.

Antenna front to back ratio is the difference in dB between the level of the maximum radiation in the forward direction and the level of radiation at 180 degrees. This ratio indicates an antenna's ability to reject signals coming from the rear (rear rejection).

If you are unsure about any of these details, please contact your equipment supplier.

B.14 – Directional Antennas (Optional)

If you have a non-standard antenna or can provide more technical details – then in conjunction with your radio supplier and the TFAC please complete the advanced optional section.

Technical Information when applying for an operational area

Section C – Operational area details

This section should only be completed if you are not using a base station (i.e. mobile to mobile communication only).

C.1 – Operational area location △

The location refers to the Centre of usage.

Please provide the information in the following format:

The location refers to the location of the centre of the operational area measured to 1 metre accuracy. Please provide the information in the following format:

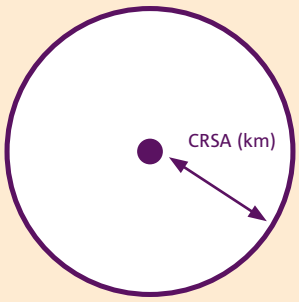
Latitude/Longitude (WGS84) 51:30:28.540N 0:5:43.005W

National Grid Reference – NGR (e.g. TQ 32284 80497)

This information can be checked using suitable GPS equipment (e.g. a Smartphone), a map or using online mapping tools. There are a number of online support tools that can assist you with the conversion of postal codes into NGRs.

C.2 – Radius of operational area

This is the distance from the centre to the edge of the area in which you use your mobiles. The permitted size of the radius of the operational area is limited to a maximum of 30km.



C.3 – Site address

The site address is defined by the location at the centre of the operational area location.

C.4 – Site contact name and address

The site contact is the person we would contact in the event that we need access to the site within which you operate your radios, e.g. in relation to interference investigations.

C.5 – C.7

Please see the guidance notes for questions B.6 to B.8 under the base station details section.

Section D – Spectrum details

D.1 – Frequency band

You can choose a first and second choice frequency band. This is optional. Please note that some frequency bands are more congested than others. The following is a guide and may slightly differ by geographical area:

Frequency Band	Congested
Band I	NO
VHF – Low	NO
VHF – Mid	YES (in some regions)
VHF – High	YES
Band III	NO
UHF-1	YES
UHF-2	YES

Please also note that assignments in UHF1 are subject to geographical limitations with other users of the band. For a full list of the areas available please refer to the TFAC:

http://licensing.ofcom.org.uk/binaries/spectrum/business-radio/technical-information/tfac/ofw164.pdf

D.2 – Analogue or digital

Please tick the appropriate box if the system will be analogue or digital.

D.4 – Channel bandwidth △

Channel bandwidth refers to the width of the radio frequency measured in kilohertz (kHz).

Bandwidth (kHz)	Typical Applications
6.25	DPMR Digital Services
12.5 (most common)	Analogue PMR DMR
25	TETRA Paging

If you intend to use a 2 x 12.5 kHz dual frequency channel, you should tick 12.5 kHz (Not 25kHz). Please refer to the TFAC for a definition of the various technologies:

http://licensing.ofcom.org.uk/binaries/spectrum/business-radio/technical-information/tfac/ofw164.pdf

D.5 – Signalling codes (Colour Codes)

For analogue systems CTCSS is an abbreviation for 'Continuous Tone Controlled Squelch System'. DCS is an abbreviation for 'Digitally Coded Squelch'. These tones/codes are used to reduce the annoyance of listening to other users on a shared two-way radio communications channel.

Where more than one user group is on the same channel, CTCSS/DCS filters out other users if they are using a different CTCSS tone/ DCS code or no CTCSS/DCS. Digital systems use access codes to manage different user groups using the same radio channel in the same geographical area.

D.6 – Minimum channel separation

Some trunked radio systems require a minimum frequency separation between each channel that they employ. This minimum frequency separation is measured in kilohertz. For example, if your trunked radio system requires a minimum frequency separation of 8 x 12.5 KHz channels, you should enter 100 in the box provided.

D.7 – Preferred frequencies

Please note, it will not always be possible to provide you with your preferred frequencies or signalling codes.

D.8 – IR2008

For IR2008 applications please contact Ofcom.

Section E – Remote Control Points (RCP)

This section need only be completed if you intend to use a remote control point in addition to your base station. This section should only be completed for RCPs using Reverse Frequency Working as the control method. RCPs using other control methods, e.g. landline, do not need to be captured.

A Remote Control Point is an auxiliary base station used to control the main base station from a separate location. RCPs must use directional antennas with maximum radiation in the direction of the main base station. The RCP must be located within the coverage of the main base station. In the case of a RCP using reverse frequency working the main base station is set to talkthrough mode.

The RCP transmits on the mobile transmit frequency and this signal is picked up by the main base station and automatically re-transmitted on the base station transmit frequency to other mobile radios.