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## **Enabling spectrum sharing in the upper 6 GHz band**

Shared licences for local, low-power indoor use of the  
upper 6 GHz band (6425-7070 MHz)

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### **CONSULTATION:**

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# Contents

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## Section

1. Overview	3
2. Background	6
3. Our proposal: authorising the 6425-7070 MHz band for licensed use	11
4. Our rationale for making upper 6 GHz Shared Access licences available now	16

## Annex

A1. Responding to this consultation	21
A2. Ofcom's consultation principles	24
A3. Consultation coversheet	25
A4. Consultation questions	26
A5. Technical analysis in the 6425-7070 MHz band	27
A6. Legal framework	39
A7. Draft licence	42
A8. Draft amendment to IR 2103	50

# 1. Overview

- 1.1 The radio spectrum is a limited resource crucial to delivering all wireless services, and Ofcom is responsible for ensuring that it is used in the best interests of people and businesses in the UK.
- 1.2 This document is a consultation on whether we should offer licences in the 6425-7070 MHz band (the 'upper 6 GHz band') for low-power communications indoors. We anticipate that such licences could be particularly suitable for industrial, business and research uses.

## What we are proposing – in brief

We are proposing to add the upper 6 GHz band (6425-7070 MHz) to Ofcom's [Shared Access licence framework for low-power, indoor use](#).

- Licences would cover the full band for an area within a 50m radius of a central point.
- Use would be limited to indoor-only, with a maximum power limit of 250mW EIRP.
- Potential users could apply for multiple licences to cover a larger indoor area – such applications would be considered on a case-by-case basis.
- Each licence would be subject to an annual fee of £320 and would be for an indefinite term, with Ofcom reserving the right to revoke licences for spectrum management purposes subject to a one-month minimum revocation notice period.

We believe that these proposals would enable greater access to the 6 GHz band without impacting incumbent users or precluding future uses.

## Our aim

- 1.3 One of the priorities in our spectrum management strategy is to increase opportunities for people and businesses to access spectrum for innovation. In particular, we wish to promote sharing as an effective way of maximising spectrum use.
- 1.4 The upper 6 GHz band has been made available in several countries on a licence-exempt basis for Wi-Fi, and a range of low-cost, low-power equipment, capable of high data speeds, is increasingly available as a result. Such equipment could support a wide variety of uses, bringing benefits to the UK.

## Potential uses for this band

- 1.5 We are aware of industry interest in the use of the upper 6 GHz band for licence-exempt consumer Wi-Fi or for licensed 5G mobile networks. Technical compatibility work to establish whether and how 5G mobile and licence-exempt Wi-Fi could share the band with each other or other incumbents is still ongoing. We are actively participating in the international preparations for the World Radiocommunication Conference 2023 (WRC-23) and separate work in CEPT, including technical compatibility activities for the upper 6 GHz

band, and gauging views from interested UK stakeholders. It may be some time before we can form a view on these uses – therefore they are out of scope of this consultation.

- 1.6 On the other hand, our proposals in this document for local, licensed use can be implemented now because they do not impact our ability to consider authorising these uses in the future:
- a) If we were to eventually authorise licence exempt Wi-Fi, the proposed licences are likely to be able to coexist.
  - b) If we were to eventually authorise 5G mobile, there is a risk we might need to revoke these licences – but it is likely to be some time before this materialises. This risk would be most relevant if there was 5G rollout in this band near the specific locations where these licences are deployed, and if technical coexistence in these circumstances was not possible.
- 1.7 Only a licensed approach makes revocation possible in scenario (b) above, and is therefore appropriate for this band given the uncertainty around future uses.
- 1.8 We anticipate that this licence would be particularly attractive for industrial and research applications, such as factory robots and sensors, Augmented Reality (AR), healthcare monitors, wireless medical equipment and private network connections.

## Our rationale for this proposal

- 1.9 We consider that adding the upper 6 GHz band to the Shared Access licensing framework is appropriate for the following reasons:
- a) The upper 6 GHz band is currently unused in many geographical locations, especially with respect to indoor use;
  - b) There is potential for either licence-exempt Wi-Fi or licensed 5G mobile to use this spectrum and bring benefits to consumers;
  - c) We will need further work to understand whether and how licence-exempt Wi-Fi or 5G mobile can share the band;
  - d) The Shared Access licences can bring added value to the band in both scenarios, and will not preclude our ability to authorise either use. For this reason, we do not need to wait for a resolution to (c) above, before adding benefits to the band;
  - e) This proposal is likely to bring benefits to the UK by enabling industrial, business and research users to make the most of existing low-cost equipment and chipsets. We believe that the licences proposed in this document would be more suited to, although not limited to, industrial and research users;
  - f) It would implement commitments made in our [2021 spectrum management strategy](#), to promote sharing, localised use, and innovation; and

g) It would not have a significant impact on present or future users: it is highly unlikely to cause interference to incumbent users or diminish our ability to authorise other potential future uses.

1.10 As we mentioned above, there is a possibility that, in the future, we would consider repurposing the band for alternative uses, which could lead in some cases to revocation of the proposed licences if ensuring coexistence is not possible. Shared Access licences are subject to a minimum revocation notice period of one month. In this scenario, however, we would take account of the impact of this decision in determining a reasonable notice period. This would not occur without us first conducting a formal consultation.

## Next steps

1.11 This consultation will be open until 11 April 2022. We intend to reach a final decision later in 2022.

## 2. Background

### Current use of the upper 6 GHz band

2.1 In the UK, the upper 6 GHz band is currently used for a variety of services, including fixed links, satellites, space science uses and short-range devices. Fixed links and Fixed Satellite Services (FSS) are licensed. Most of these services use the band outdoors.

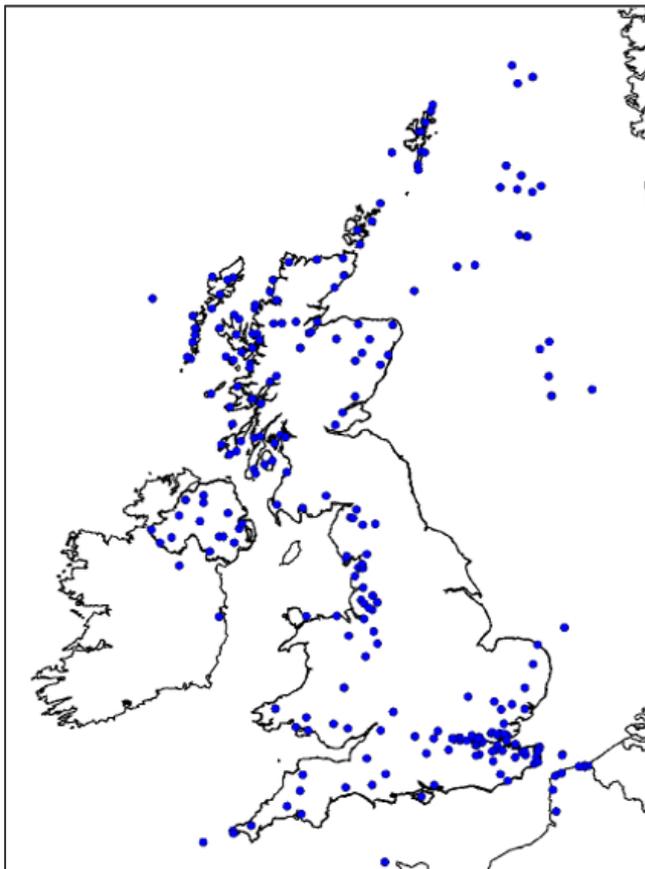
#### Fixed links

2.2 The spectrum between 6425-7125 MHz is available for fixed link services in the UK. As of January 2022, there are approximately 500 fixed links operating in this range, compared with around 370 links in the adjacent 5925-6425 MHz band.

2.3 Fixed links have highly directional point-to-point antennas, and therefore interference is generally only caused if devices are in or near the main beam.

2.4 Fixed links licensed in this band are located across the UK, as illustrated in Figure 2.1 below.

**Figure 2.1: Locations of fixed links in the upper 6 GHz band**



## Fixed Satellite Service (FSS)

- 2.5 The 5925-6700 MHz and 6700-7075 MHz bands are available for both permanent and transportable earth stations to communicate with satellites (uplink). In the 5925-6700 MHz band, there are 20 site licences for permanent earth stations covering a total of 73 earth station deployments and 220 frequency links in the UK. Twenty of the 220 frequency links are in the upper 6 GHz frequency band (6425-6700 MHz).
- 2.6 In 6700-7075 MHz, there is one licence for seven permanent earth station deployments with 40 frequency links. There are no holders of transportable Earth station licences in either band.
- 2.7 In the 6700-7075 MHz band, there is also a downlink allocation for non-geostationary mobile satellite systems, however there are no licensed earth stations operating in the UK. This band can also be used by unlicensed receive-only earth stations, but this is on a non-protection basis.

## Earth Exploration Satellite Services (EESS)

- 2.8 Passive microwave sensor measurements are carried out over the oceans in the 6425-7075 MHz band by EESS. Measurements include wave height, water temperature, salinity and ozone concentration and other data used for environmental and weather forecasting. The adjacent 7075-7250 MHz band is used for passive measurement over land.
- 2.9 EESS does not have primary allocation in this band, however a footnote in the ITU Radio Regulations (5.458) states that Administrations should bear in mind the needs of the Earth Exploration (passive) and space research (passive) services in their future planning of the 6425-7075 and 7075-7250 MHz bands.

## Radio Astronomy

- 2.10 In the UK, the 6668.518 MHz frequency is used by Radio Astronomy observatories for methanol spectral line measurements, for the study of star formation and the structure of our galaxy. In the UK, these measurements are made at the Cambridge, Darnhall, Defford, Jodrell Bank, Knockin and Pickmere sites.<sup>1</sup>
- 2.11 The Radio Astronomy Service does not have Recognised Spectrum Access in the upper 6 GHz band and already shares with high power outdoor fixed links and satellite earth stations with no requirement for coordination. However, a footnote to the Radio Regulations (5.149), advises that administrations should take all practicable steps to protect the Radio Astronomy service from harmful interference when making other assignments in the 6650-6675.2 MHz range.

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<sup>1</sup> [Space science and meteorology spectrum allocations in the UK](#)

## Short Range Devices

- 2.12 We have implemented various European Commission Decisions that make harmonised spectrum available for Short Range Devices.<sup>2</sup> The 6425-7100 MHz and 4500-7000 MHz bands are available for radio determination devices and radar level gauges (in 5150-7100 MHz).<sup>3</sup> Tank Level Probing Radar (TLPR) is a specific type of radiodetermination application used to measure the level of liquids or granulates for process control, liquid monitoring, spill prevention and other industrial processes. TLPR sensors are usually installed in metallic or reinforced concrete tanks and are required to have dedicated antennas with strict downwards orientation.
- 2.13 The 6000-8500 MHz band is also used by ultra-wideband (UWB) equipment for applications such as location tracking, vehicle access, consumer devices (IoT, smart home), sensors and building material analysis.

## This band has significant industry interest, and equipment availability

- 2.14 We are aware of industry interest in the use of this band for licence-exempt consumer Wi-Fi or for licensed 5G mobile networks. These and other uses are outside of the scope of this consultation document. Technical compatibility work to establish whether and how 5G mobile and licence-exempt Wi-Fi can share the band with each other or other incumbents is still ongoing, and it may be some time before we can form a view on these uses. On the other hand, our proposals in this document do not impact our ability to consider authorising these uses in the future.
- 2.15 We are actively participating in the international preparations for the World Radiocommunication Conference 2023 (WRC-23) and possible CEPT deliverables, including technical compatibility activities for the upper 6 GHz band and gauging views from interested UK stakeholders. We will be consulting separately later this year on our preparatory considerations for WRC-23, including our emerging view on the upper 6 GHz band.
- 2.16 To improve consumer and industrial Wi-Fi experience and reduce congestion in existing channels, last year we [made the lower 6 GHz \(5925-6425 MHz\) band](#) available for licence-exempt use by RLAN equipment, including Wi-Fi. We said that we anticipated that this would enable new technologies and improvements in equipment performance.
- 2.17 There is an increasing amount of low-power equipment and components, such as Wi-Fi routers, chipsets and terminals, available for both the lower and upper parts of the 6 GHz band (5925-7125 MHz). This is driven by a [growing number of countries](#) that have authorised use of the band, or part of the band, for licence-exempt RLAN use. Making the

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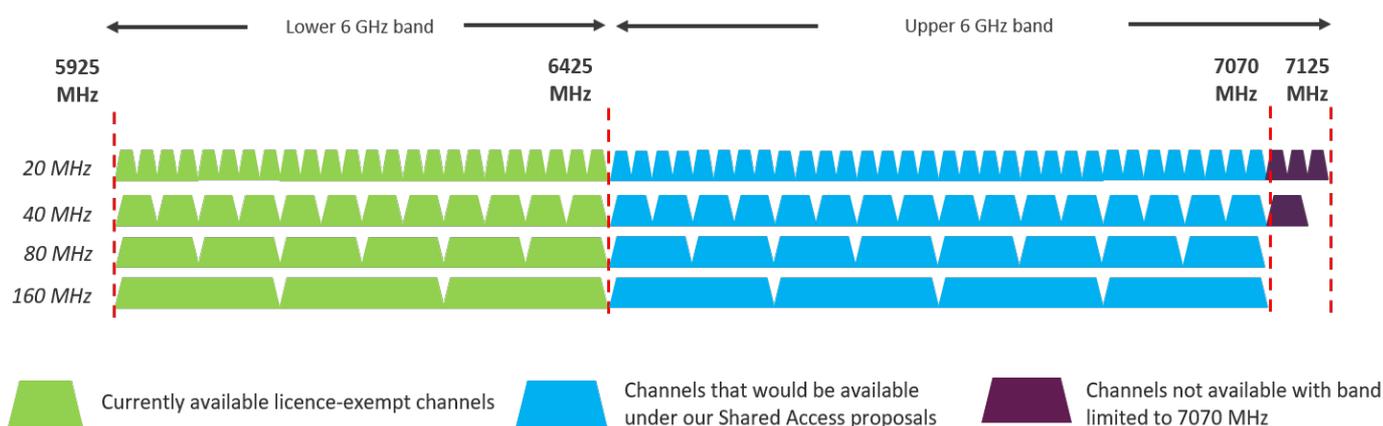
<sup>2</sup> Commission Decisions [2006/771/EC](#), [2008/432/EC](#), [2009/381/EC](#), [2010/368/EU](#), [2011/829/EU](#) and [2013/752/EU](#)

<sup>3</sup> [IR 2030 – Licence Exempt Short Range Devices \(ofcom.org.uk\)](#)

upper part of the band available in the UK would allow users to benefit from this growing market of inexpensive new equipment.

- 2.18 In addition to equipment availability, another benefit of the 6 GHz band is access to wide channels (up to 320 MHz in current and planned equipment). This could have significant benefits for high-capacity, high-reliability industrial uses.
- 2.19 Although this band extends to 7125 MHz in some existing equipment and in some other countries, in this proposal we have only considered authorising up to 7070 MHz. This is because we would need additional time to consider the impact on users of 7070-7125 MHz, including Earth Exploration Satellite Services (EESS) and Programme Making and Special Events (PMSE) applications, and we opted to expedite the potential release of most of the band, while retaining the ability to consider the remainder at a later date.
- 2.20 The upper 6 GHz band range we are considering (6425-7070 MHz, rather than going up to 7125 MHz) still retains all of the high-bandwidth channels as illustrated in Figure 1.1 (320 MHz channels would be provided by combining two adjacent 160 MHz channels).

**Figure 2.2: RLAN/Wi-Fi channels in current and planned equipment**



## Legal background

- 2.21 Our principal duties under the 2003 Act, when carrying out our functions and exercising our powers, are to further the interests of citizens and consumers, where appropriate by promoting competition. In doing so, we are also required (among other things) to secure the optimal use of spectrum and the availability throughout the United Kingdom of a wide range of electronic communications services. Ofcom is responsible for authorising use of the radio spectrum. We permit the use of the radio spectrum either by granting wireless telegraphy licences under the Wireless Telegraphy Act 2006 (the “WT Act”) or by making regulations exempting the use of particular equipment from the requirement to hold such a licence. It is unlawful and an offence to install or use wireless telegraphy apparatus without holding a licence granted by Ofcom, unless the use of such equipment is exempted. In Annex 7 we set out in more detail the relevant legal framework, which we

have taken into account in making the proposals set out in this document. This annex should be treated as part of this document.

## Impact Assessment

- 2.22 This document represents an impact assessment as defined in section 7 of the Communications Act 2003. Impact assessments provide a valuable way of assessing different options for regulation. They form part of best practice policy making.
- 2.23 In preparing this document, we have considered the citizen and consumer interests relating to Wi-Fi. We have also considered the impact on existing users, and on service providers, manufacturers and users of devices and applications.
- 2.24 Ofcom is an evidence-based organisation and welcomes responses to this consultation. Any comments about our assessment of the impact of our proposals should be sent to us by the closing date for this consultation. We will consider all comments before deciding whether to implement our proposals. For further information about our approach to impact assessments, see the guidelines 'Better policy making: Ofcom's approach to impact assessments' on our website.

## Equality Impact Assessment

- 2.25 Ofcom is separately required by statute to assess the potential impact of all our functions, policies, projects and practices on the following equality groups: age, disability, gender, gender reassignment, pregnancy and maternity, race, religion or belief, and sexual orientation. Equality impact assessments also assist us in making sure that we are meeting our principal duty of furthering the interests of citizens and consumers regardless of their background or identity. We consider that our proposals would not be detrimental to any of these equality groups.
- 2.26 We have not carried out separate equality impact assessments in relation to the additional equality groups in Northern Ireland: religious belief, political opinion and dependants. This is because we anticipate that our proposals would not have a differential impact in Northern Ireland compared to consumers in general. We welcome any stakeholder views on this assessment.

## 3. Our proposal: authorising the 6425-7070 MHz band for licensed use

### What we propose to make available

- 3.1 We are proposing to make the 6425-7070 MHz band available under Ofcom’s Shared Access licence. We propose to enable use on a technology-neutral basis, but we expect RLAN, including Wi-Fi, to be the most likely technology to be used. We do not propose to mandate polite protocols (such as Listen Before Talk), but we anticipate they would be used with most deployments to minimise the potential for interference between devices.<sup>4</sup>
- 3.2 Outdoor use would not be permitted, and indoor use<sup>5</sup> would be limited to 250mW EIRP (with maximum mean EIRP density of 12.6mW/MHz in any 1 MHz band). We propose this power because:
- a) It is sufficient to enable the majority of RLAN devices in practice.<sup>6</sup>
  - b) It aligns with the technical parameters for the existing RLAN allocation in the lower 6 GHz band (5925-6425 MHz), which may facilitate compatibility of equipment that uses the whole band.
  - c) It will ensure minimal impact on incumbent users or potential future use cases.
- 3.3 We are consulting on adding the band to our Shared Access framework. Licensees will be assigned one licence per deployment allowing use of a defined area (a 50m radius around a central coordinate).<sup>7</sup> Base stations can be located anywhere within the area; terminals can be located outside the area covered by the licence but must be indoors and connected to the base station. There will be no limit to the number of devices per licence, but licensees will need to keep a record of their terminals and base stations for inspection by Ofcom if required.
- 3.4 The licence will permit use of any channel in the upper 6 GHz band (6425-7070 MHz).

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<sup>4</sup> We reserve the right to mandate these at a later date if we consider it to be necessary and proportionate.

<sup>5</sup> “Indoor” means inside premises which have a ceiling or a roof; and except for any doors, windows or passageways, are wholly enclosed.

<sup>6</sup> [ECC Report 302](#), Table 6, illustrates that less than 10% of RLAN devices use power levels of 250mW or higher, with the majority using lower powers.

<sup>7</sup> No other Shared Access users would be authorised to deploy within the 50m radius area of an existing user, however, we cannot guarantee geographically exclusive use with regards to other incumbent users.

## We propose to add the band to the Shared Access framework

### The Shared Access licence

- 3.5 The Shared Access licence is part of a framework for enabling shared use of spectrum. This framework was set up to support innovation and enable new use of spectrum by providing localised access to spectrum bands. Currently the licence is available in four bands.<sup>8</sup>
- 3.6 The licence allows users to apply to Ofcom for coordinated, local access to the bands covered on a per location, first come, first served basis. Successful applicants have the right to use their designated frequency and bandwidth in a specific location and pay a licence fee that reflects the costs of issuing the licence.
- 3.7 There are two types of Shared Access licence, distinguished primarily by permitted power levels, to cater for different types of potential uses: low-power and medium-power licences. As medium-power licences are for outdoor use only, we will look at low-power licences in the context of the 6 GHz band.
- 3.8 Low-power indoor Shared Access licences authorise any number of indoor base stations, in an area with a 50m radius around a given point provided to Ofcom by the user. Users may add or move base stations within the area without needing to inform Ofcom of the changes.
- 3.9 The low power indoor licence also authorises all terminals connected to transmitters covered by the licence, which do not have to be located within the licensed area but must also be indoors. For large sites, people can apply for multiple licence areas to achieve the required coverage area, which can be contiguous and overlapping, or spaced out around a larger site. Applications are assessed on a case-by-case basis.
- 3.10 Indoor-only licences are not subject to detailed technical coordination before they are issued, as building attenuation provides sufficient protection to other users. However, we ensure that there is a short minimum distance (100m) between the centre points of any licences in the same channel to ensure that there is no overlap and to minimise interference risk between Shared Access users.<sup>9</sup> There is a small exclusion zone around Radio Astronomy sites in the 26 GHz band,<sup>10</sup> but no further coordination is required on the basis of the low interference risk with incumbent users.
- 3.11 In Ofcom's consultation on introducing the Shared Access licence in December 2018, we said we intended to add other bands to our spectrum sharing framework as appropriate. Considering the above factors, we propose to add the upper 6 GHz band to the Shared Access licence for **low-power, indoor-only** use.

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<sup>8</sup> 1800 MHz; 2300 MHz; 3.8-4.2 GHz; and 26 GHz (indoor only).

<sup>9</sup> Overlapping licences from the same user can be authorised, for example, to cover a wider area.

<sup>10</sup> This may be removed for indoor-only use, pending the outcome of the [consultation](#) on protecting passive services from out-of-band emissions from 26 GHz users.

## Proposed licence conditions

### Technical licence conditions

3.12 We summarise our proposed technical licence conditions in the table below.

**Table 3.2: Proposed technical conditions for the upper 6 GHz low power Shared Access licence**

Parameters	6425-7070 MHz band
Permitted deployment	Indoor only
Authorised bandwidth	Licences to cover full 6425-7070 MHz band <sup>11</sup>
Maximum device power (EIRP)	250mW
Maximum mean EIRP density	12.6mW/MHz in any 1 MHz band

3.13 We also propose a 100-metre minimum separation distance between the centre points of any two users' licences. This means that we would not authorise a licence application if another user is located nearby and the centre coordinates of the two licences would be less than 100m apart.<sup>12</sup> This is to minimise the risk of interference between licensees.

### Non-technical licence conditions

3.14 The standard non-technical licence conditions for the Shared Access framework would apply to the 6 GHz licence. We have outlined these below, in addition to the conditions which are specific to this band.

#### Licence duration

3.15 Shared Access licences are for an indefinite duration, subject to the payment of an annual licence fee. We would also allow short-term licences for less than one year, charged on a pro-rata basis subject to a minimum fee of £32 per licence.

3.16 The licence would be subject to a minimum revocation notice period of one month. We can revoke licences for spectrum management purposes, or if licensees are in breach of their licence conditions.

3.17 In practice, should we consider repurposing the band for alternative use, we would give a reasonable notice period. This is likely to be longer than one month and would not occur

<sup>11</sup> In practice, we expect that users would use Wi-Fi channelisation rather than making constant use of the full bandwidth. However, we are not proposing to formally restrict use to this effect.

<sup>12</sup> As noted above, there is an exceptions process for when the same user applies for overlapping licences to create a larger coverage area.

without us first conducting a formal consultation, of which Shared Access users would be notified.

- 3.18 We expect that Shared Access users would be able to coexist with other potential future uses identified for this band. In the event that it is not possible to enable coexistence, we may revoke these licences. Implementing a future approach could in practice take several years, meaning that licensees could continue to use this band in the medium term.

### Access and Inspection

- 3.19 In accordance with our standard spectrum licence conditions, the licence would include a condition that reserves to Ofcom the right to access and inspect the licensee's radio equipment. This is so we can check the licensee's compliance with the terms of its licence, should we decide that it is appropriate.

### Modification, Restriction and Closedown

- 3.20 In accordance with our standard spectrum licence conditions, the licence would include a condition that gives Ofcom the right to require the licensee to modify, restrict or close down the use of its radio equipment, should we have reasonable grounds to believe that the licensee has breached the terms of its licence, or we consider this necessary in the event of a national or local state of emergency being declared.

### Geographical boundaries

- 3.21 The licence would allow use of equipment within the United Kingdom and territorial seas. The proposed authorisation could also extend to the Channel Islands and the Isle of Man, subject to further discussions with the relevant authorities.

### Provision of information to facilitate optimal spectrum use

- 3.22 In line with our duty to manage the spectrum efficiently, the licence would include standard conditions to require licensees to provide us – on request – with general information regarding their equipment and use of frequencies, or the rollout of their network.
- 3.23 As per the standard Shared Access licence requirement, licensees would be required to maintain a record of the address and transmitter type of all deployments.

### Requirement to commence and maintain transmission within six months

- 3.24 Licensees would be required to start transmission within six months of the issue of their licence and remain operational thereafter.

### Licence fee

- 3.25 Given that we are extending access to this band under our spectrum sharing framework, we consider it appropriate to set a cost-based fee for this licence, as we have done for other bands in the framework.

- 3.26 As we are proposing that licences will cover the full band and that there will not be options for different bandwidths, we propose a flat annual fee per low power licence for all users. In line with the other Shared Access bands, which also use a cost-based fee, and particularly noting similarities between this product and the existing 26 GHz indoor licence, we consider it appropriate to charge **£320 per annum per licence** for this product.

## Process for considering applications

- 3.27 We have published [guidance](#) setting out the approach Ofcom generally expects to take when assessing and issuing Shared Access licences. We consider applications on a case-by-case basis and retain the discretion to amend our approach, and to disapply the guidance if it is appropriate to do so in the particular circumstances.
- 3.28 For the upper 6 GHz band, applications would be made for a specific location but not for a required bandwidth or channel as we are proposing that licences cover the full band. The licence would therefore be granted if the centre point of the area in the licence application is not less than 100 metres from the centre point of an existing licence in the same band.
- 3.29 If, following the consultation process, we decide to add the upper 6 GHz band to the Shared Access licence, we will amend the guidance to reflect this.

## 4. Our rationale for making upper 6 GHz Shared Access licences available now

4.1 We consider that adding the upper 6 GHz band to the Shared Access licensing framework is appropriate at this time for the following reasons:

- a) As shown in section 2, the upper 6 GHz band is currently unused in many geographical locations, especially with respect to indoor use;
- b) There is potential for either licence exempt Wi-Fi or 5G mobile to use this spectrum and bring benefits to consumers, as shown in section 2.
- c) We will need further work to understand whether and how licence exempt Wi-Fi or licensed 5G mobile can share the band.
- d) The Shared Access licences can enable additional value to the band in either scenario, and will not preclude either use. For this reason, we do not need to wait for a resolution to (c) above, before adding benefits to the band.
- e) There is a risk we might need to revoke some or all of these proposed licences, some years into the future, in particular if we were to decide to authorise 5G mobile, and there was rollout near the specific locations where these licences are deployed, and if technical coexistence in these circumstances was not possible. Therefore, a licensed approach is appropriate.
- f) This proposal is likely to bring benefits to the UK by enabling industrial, business and research users to make the most of existing low-cost equipment and chipsets. We believe that the licences proposed in this document would be more suited to, although not limited to, industrial and research users;
- g) It would implement commitments made in our [2021 spectrum management strategy](#), to promote sharing, localised use, and innovation; and
- h) It would not have a significant impact on present or future users (i.e., it is highly unlikely to cause interference to incumbent users or preclude our ability to authorise other potential future uses).

4.2 Due to uncertainties explained above around future sharing, we do not consider that this band meets the criteria set out in the WT Act that would require us to implement licence exemption at this time.

### **We will need further work to decide on authorising Wi-Fi or mobile – but we do not need to wait for this work to conclude**

4.3 We understand that there is interest among manufacturers of consumer equipment such as mobile phones, tablets and VR headsets in incorporating these band in their products for the mass market. We also note that the 6425-7025 MHz band (Region 1) and the 7025-

7125 MHz band (globally) are on the Agenda for WRC-23 (Agenda Item 1.2) for possible allocation to International Mobile Telecommunications (IMT) in the Radio Regulations.

- 4.4 Ofcom, under Ministerial direction, is actively participating in the international preparations for WRC-23, including technical compatibility activities for the upper 6 GHz band and gauging views from interested UK stakeholders. We will consult shortly on our preparatory considerations for WRC-23, including our emerging view on this band.
- 4.5 We do not need to wait for these decision-making processes (on Wi-Fi and mobile) to conclude before implementing the proposal in this document, and obtaining its benefits.
- 4.6 This is because the proposal will not impact our ability to authorise other uses in the future. We will use our existing Shared Access framework, which was designed to enable shared use of various bands. In particular, our proposal in applying the framework ensures that:
- a) Licences are local – promoting geographical sharing. We anticipate the uses will be specialist and industrial and therefore likely to be deployed in warehouses or research centres, rather than covering a significant share of the UK territory. This can make coexistence more achievable with other services.
  - b) We are only authorising indoor, low power use – minimising risk of interference with current or future uses.
  - c) We anticipate that the equipment deployed for this band will use chipsets made for Wi-Fi use. This is because manufacturers are producing equipment and chipsets to sell to markets where Wi-Fi use has been authorised, including the US. Wireless equipment produced for large markets such as the US benefit from economies of scale, being therefore much cheaper than they would otherwise be. Wi-Fi equipment is generally very efficient at intelligently managing interference with other RLAN/Wi-Fi equipment.
  - d) As in other licences, we are able to provide a notice of revocation to licensees for spectrum management purposes if required and proportionate. We recognise that there is a risk that we would need to revoke Shared Access licences in this band to enable another authorisation in future. In our current view, this risk would arise if we decide that the band should be used for mobile services, rather than for licence-exempt Wi-Fi. Implementing this approach could in practice take several years, meaning that licensees could continue to use this band in the medium term.
  - e) If we eventually authorise this band for licence-exempt Wi-Fi use in future, we anticipate that equipment operating under the licences proposed here could coexist with such use, because the technical parameters in the proposed licences would be similar to those of Wi-Fi equipment. In this case, licensees can continue their use either under the licence exemption, or under the licence, in a scenario where the licence exemption conditions are less permissive than these licences.
  - f) If we eventually authorise this band for 5G mobile networks, there are two possibilities:

- i) It might be possible for licensees to coexist with future mobile networks on a geographical basis. We consider this to be the most likely scenario.
- ii) If it is not possible or practical to enable geographical coexistence, it is likely that awarding the band for mobile and making any preparations required for deployment would take several years. In this scenario, we might eventually revoke these licences – therefore there is some risk to deployments in the medium term.

4.7 For the reasons above, we consider that these proposals are likely to have minimal impact on our ability to consider and authorise any other future uses of the band.

## **This proposal implements commitments in our Spectrum Strategy**

4.8 This work follows on from our commitments, in our 2021 [spectrum management strategy statement](#) to:

- g) consider further options for localised spectrum access when authorising new access to spectrum;
- h) promote spectrum sharing; and
- i) support innovation, by making more spectrum available for innovation before its long-term future use is certain; by making spectrum available in a variety of ways; and by making it as easy as possible for different types of organisations to access the right spectrum to meet their needs.

## **We believe our proposals will have minimal impact on incumbent users of the band**

4.9 In the UK the 6 GHz band is used for a variety of services including fixed links, satellite, space science and short range devices. Fixed link and satellite use is licensed and has a primary allocation.

4.10 When we made the lower part of the 6 GHz band (5925-6425 MHz) available for licence-exempt use by RLAN equipment in 2020, we undertook a detailed technical analysis to ensure incumbent users would not be impacted. The types of use in the upper 6 GHz band are very similar and we have considered whether our earlier analysis can be applied to our new proposals.

4.11 In the table below we present a high-level summary of our conclusions. A more detailed summary of our analysis can be found in Annex A5.

**Table 4.1: Protection of incumbent users in the upper 6 GHz band**

Incumbent service	Our conclusions on sharing
<b>Fixed Links</b>	<p>Sharing between RLANs and fixed links in the upper 6 GHz band is feasible, based on previous analysis we undertook for sharing in the lower 6 GHz band. We have compared the technical parameters in the lower and upper 6 GHz band contained in our licence database and refreshed some of our earlier analysis. Furthermore, we will not permit outdoor RLAN use and we anticipate the density of RLAN deployment in upper 6 GHz will be much lower than in the lower 6 GHz band due to the requirement for a licence, which should significantly reduce the chances of any interference occurring.</p>
<b>Fixed Satellite Service</b>	<p>When we made the lower 6 GHz band available, we reviewed existing studies carried out within CEPT on sharing between RLANs and the Fixed Satellite Service (FSS), published in ECC Report 302. The studies concluded that sharing between FSS satellite receivers and RLANs is feasible with limitations on higher power outdoor use.</p> <p>FSS operation in the upper 6 GHz band is very similar to operation in the lower 6 GHz band and we believe the assumptions and analysis presented in ECC Report 302 can be applied.</p>
<b>Earth Exploration Satellites</b>	<p>Passive microwave sensor measurements are carried out over the oceans in the 6425-7075 MHz band as part of Earth Exploration Satellite Services (EESS). Although these measurements are co-channel with the band which we are proposing to make available, in most cases there will be a high degree of geographic separation where measurements are made over ocean regions.</p> <p>Limiting the upper frequency of the 6 GHz band to 7070 MHz will protect adjacent channel EESS measurements over land. We have therefore concluded that detailed technical studies into sharing between RLAN and EESS are not needed.</p>
<b>Radio Astronomy</b>	<p>The Radio Astronomy Service does not have a primary allocation or Recognised Spectrum Access (RSA) in the upper 6 GHz. RAS already shares with much higher power outdoor fixed links and satellite earth stations without any co-ordination and to date we are not aware of any reports of interference.</p>

Incumbent service	Our conclusions on sharing
	<p>In contrast, our proposal will limit devices to indoor use only, and at a low power level. We do not anticipate mass consumer adoption for this licence, which additionally constrains the overall risk of interference. We therefore do not anticipate a material risk of interference to RAS.</p>
<p><b>Short Range Devices</b></p>	<p>The current Short Range Device use in the upper 6 GHz band is very similar to the lower 6 GHz band. We have reviewed the CEPT studies in the lower 6 GHz band for Ultra Wide Band (UWB) applications that show, in the worst-case scenario, a 3 dB reduction in UWB sensitivity may occur for up to 3.3% of the time. We consider that the probability of interference in the upper 6 GHz band will be much lower due to the lower density of RLAN deployment and limitations on the maximum EIRP.</p> <p>Other short range devices in the band include tank level probing radar (TLPR) and radar level gauges. TLPR have strict installation requirements regarding the downward orientation of their antennas and are typically installed in tanks that provide a reasonable level of shielding attenuation, which will help mitigate any interference from indoor RLAN devices.</p>

## Consultation questions

### Consultation questions

1. Do you agree with our proposals to add the 6425-7070 MHz band to the Shared Access framework?
2. Do you have any comments on potential uses for this licence?
3. Do you have any comments on our proposed licence conditions, licence fee or minimum separation distance?
4. Do you have any comments on our technical analysis?

# A1. Responding to this consultation

## How to respond

- A1.1 Ofcom would like to receive views and comments on the issues raised in this document, by 5pm on 11 April 2022.
- A1.2 You can download a response form from <https://www.ofcom.org.uk/consultations-and-statements/category-2/spectrum-sharing-upper-6-ghz-band>. You can return this by email or post to the address provided in the response form.
- A1.3 If your response is a large file, or has supporting charts, tables or other data, please email it to [SharedAccess6GHz@ofcom.org.uk](mailto:SharedAccess6GHz@ofcom.org.uk), as an attachment in Microsoft Word format, together with the [cover sheet](#). This email address is for this consultation only.
- A1.4 Responses may alternatively be posted to the address below, marked with the title of the consultation:
- Spectrum Management & Authorisation  
Ofcom  
Riverside House  
2A Southwark Bridge Road  
London SE1 9HA
- A1.5 We welcome responses in formats other than print, for example an audio recording or a British Sign Language video. To respond in BSL:
- Send us a recording of you signing your response. This should be no longer than 5 minutes. Suitable file formats are DVDs, wmv or QuickTime files. Or
  - Upload a video of you signing your response directly to YouTube (or another hosting site) and send us the link.
- A1.6 We will publish a transcript of any audio or video responses we receive (unless your response is confidential)
- A1.7 We do not need a paper copy of your response as well as an electronic version. We will acknowledge receipt if your response is submitted via the online web form, but not otherwise.
- A1.8 You do not have to answer all the questions in the consultation if you do not have a view; a short response on just one point is fine. We also welcome joint responses.
- A1.9 It would be helpful if your response could include direct answers to the questions asked in the consultation document. The questions are listed at Annex 4. It would also help if you could explain why you hold your views, and what you think the effect of Ofcom's proposals would be.
- A1.10 If you want to discuss the issues and questions raised in this consultation, please contact Jessica Foster by email to [SharedAccess6GHz@ofcom.org.uk](mailto:SharedAccess6GHz@ofcom.org.uk).

## Confidentiality

- A1.11 Consultations are more effective if we publish the responses before the consultation period closes. In particular, this can help people and organisations with limited resources or familiarity with the issues to respond in a more informed way. So, in the interests of transparency and good regulatory practice, and because we believe it is important that everyone who is interested in an issue can see other respondents' views, we usually publish all responses on [the Ofcom website](#) as soon as we receive them.
- A1.12 If you think your response should be kept confidential, please specify which part(s) this applies to, and explain why. Please send any confidential sections as a separate annex. If you want your name, address, other contact details or job title to remain confidential, please provide them only in the cover sheet, so that we don't have to edit your response.
- A1.13 If someone asks us to keep part or all of a response confidential, we will treat this request seriously and try to respect it. But sometimes we will need to publish all responses, including those that are marked as confidential, in order to meet legal obligations.
- A1.14 Please also note that copyright and all other intellectual property in responses will be assumed to be licensed to Ofcom to use. Ofcom's intellectual property rights are explained further in our [Terms of Use](#).

## Next steps

- A1.15 Following this consultation period, Ofcom plans to publish a statement in June 2022.
- A1.16 If you wish, you can [register to receive mail updates](#) alerting you to new Ofcom publications.

## Ofcom's consultation processes

- A1.17 Ofcom aims to make responding to a consultation as easy as possible. For more information, please see our consultation principles in Annex 2.
- A1.18 If you have any comments or suggestions on how we manage our consultations, please email us at [consult@ofcom.org.uk](mailto:consult@ofcom.org.uk). We particularly welcome ideas on how Ofcom could more effectively seek the views of groups or individuals, such as small businesses and residential consumers, who are less likely to give their opinions through a formal consultation.
- A1.19 If you would like to discuss these issues, or Ofcom's consultation processes more generally, please contact the corporation secretary:

Corporation Secretary  
Ofcom  
Riverside House  
2a Southwark Bridge Road  
London SE1 9HA  
Email: [corporationsecretary@ofcom.org.uk](mailto:corporationsecretary@ofcom.org.uk)

## A2. Ofcom's consultation principles

### Ofcom has seven principles that it follows for every public written consultation:

#### Before the consultation

- A2.1 Wherever possible, we will hold informal talks with people and organisations before announcing a big consultation, to find out whether we are thinking along the right lines. If we do not have enough time to do this, we will hold an open meeting to explain our proposals, shortly after announcing the consultation.

#### During the consultation

- A2.2 We will be clear about whom we are consulting, why, on what questions and for how long.
- A2.3 We will make the consultation document as short and simple as possible, with a summary of no more than two pages. We will try to make it as easy as possible for people to give us a written response. If the consultation is complicated, we may provide a short Plain English / Cymraeg Clir guide, to help smaller organisations or individuals who would not otherwise be able to spare the time to share their views.
- A2.4 We will consult for up to ten weeks, depending on the potential impact of our proposals.
- A2.5 A person within Ofcom will be in charge of making sure we follow our own guidelines and aim to reach the largest possible number of people and organisations who may be interested in the outcome of our decisions. Ofcom's Consultation Champion is the main person to contact if you have views on the way we run our consultations.
- A2.6 If we are not able to follow any of these seven principles, we will explain why.

#### After the consultation

- A2.7 We think it is important that everyone who is interested in an issue can see other people's views, so we usually publish all the responses on our website as soon as we receive them. After the consultation we will make our decisions and publish a statement explaining what we are going to do, and why, showing how respondents' views helped to shape these decisions.

## A3. Consultation coversheet

### BASIC DETAILS

Consultation title:

To (Ofcom contact):

Name of respondent:

Representing (self or organisation/s):

Address (if not received by email):

### CONFIDENTIALITY

Please tick below what part of your response you consider is confidential, giving your reasons why

Nothing

Name/contact details/job title

Whole response

Organisation

Part of the response

If there is no separate annex, which parts? \_\_\_\_\_

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If you want part of your response, your name or your organisation not to be published, can Ofcom still publish a reference to the contents of your response (including, for any confidential parts, a general summary that does not disclose the specific information or enable you to be identified)?

### DECLARATION

I confirm that the correspondence supplied with this cover sheet is a formal consultation response that Ofcom can publish. However, in supplying this response, I understand that Ofcom may need to publish all responses, including those which are marked as confidential, in order to meet legal obligations. If I have sent my response by email, Ofcom can disregard any standard e-mail text about not disclosing email contents and attachments.

Ofcom seeks to publish responses on receipt. If your response is non-confidential (in whole or in part), and you would prefer us to publish your response only once the consultation has ended, please tick here.

Name

Signed (if hard copy)

## A4. Consultation questions

### Consultation questions

1. Do you agree with our proposals to add the 6425-7070 MHz band to the Shared Access framework?
2. Do you have any comments on potential uses for this licence?
3. Do you have any comments on our proposed licence conditions, licence fee or minimum separation distance?
4. Do you have any comments on our technical analysis?

## A5. Technical analysis in the 6425-7070 MHz band

### Summary

#### Background and conclusions from our analysis

- A5.1 We are proposing to make the upper 6 GHz band (6425-7070 MHz) available for indoor-only, technology-neutral use on a licensed basis.<sup>13</sup> Given the technical parameters we are proposing, we expected most use to be by RLANs and other related wireless technologies. We have decided to limit the top of the band in the licence to 7070 MHz to expediate access to the spectrum.
- A5.2 Outdoor use would not be permitted, and the maximum EIRP of indoor Access Points (APs) and their client devices would be limited to 250mW (with maximum mean EIRP density of 12.6mW/MHz in any 1 MHz band), consistent with our limits for the lower 6 GHz band (5925-6425 MHz). Mobile/nomadic client device use must be under the control of a licensed indoor AP.
- A5.3 We would make the band available on a technology-neutral basis but expect that RLANs would be the most likely use given the proposed technical parameters. A licence will permit the use of any channels in the upper 6 GHz band by licensed indoor APs and their client devices. The use of polite protocols is not required; however, in our coexistence analysis we have assumed that they will be used within most deployments, based on the equipment that is currently available for the band.
- A5.4 We would expect that there would be a lower density of use of the upper 6 GHz Shared Access band compared to the lower 6 GHz licence-exempt band. This is because, due to the requirement to obtain a licence, use is more likely to be for industrial or research purposes, rather than for mass-market consumer equipment. ECC Report 302, Table 33: Summary of WAS/RLAN deployment model, estimated that 90% of devices operate in licence-exempt spectrum compared to licensed spectrum.
- A5.5 The upper 6 GHz band is used for a range of different communications services including fixed links, fixed satellites, space science and short range devices (for example Ultra Wide Band, radio determination devices and radar level gauges). To understand the potential risks of interference to other services we have reviewed and, where necessary, refreshed the previous analysis we undertook when we made the lower 6 GHz band (5925-6425 MHz) [available for RLAN/Wi-Fi use](#) in July 2020. We have concluded that, due to the similarity in use between the lower and upper 6 GHz band, where applicable, our previous analysis is still valid for sharing scenarios in the upper 6 GHz band.

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<sup>13</sup> We refer to potential RLAN use in this annex, this should not be taken to exclude other types of wireless technologies.

A5.6 The results of our analysis suggest that opening the upper 6 GHz band for RLANs on a licensed basis is possible for indoor, low-power use (maximum EIRP 250mW) with minimal risk to incumbent users. We believe that opening the band will help facilitate new and innovative RLAN use cases.

## Coexistence with incumbent services

### Fixed links

#### Our conclusions on sharing with fixed links

A5.7 We have concluded that sharing between indoor only RLAN use and fixed links in the upper 6 GHz band is feasible, based on previous analysis we undertook for sharing in the lower 6 GHz band.

A5.8 Fixed Service operation and technical parameters in the upper 6 GHz band are similar to those in the lower 6 GHz band and we believe the assumptions and detailed analysis that we have previously done on sharing between RLANs and fixed links for the lower band is applicable. Furthermore, we will not permit outdoor RLAN use, and we anticipate that the density of licensed RLAN deployment in the upper 6 GHz band will be much lower than licence-exempt use in lower 6 GHz band (for the reasons explained in paragraph A5.4), which should significantly reduce the chances of any interference occurring. In the following sections we outline our reasoning and assumptions behind our conclusions.

#### Background

A5.9 In the UK the spectrum between 6425-7125 MHz is available for fixed link services. This is directly adjacent to the fixed link use in the lower 6 GHz band, 5925-6425 MHz.

A5.10 In July 2020, we made the lower 6 GHz band available on a licence-exempt basis for both indoor RLAN use with an EIRP up to 250mW and mobile/nomadic outdoor use with EIRP up to 25mW. In making the band available we carried out a detailed technical analysis of sharing between RLANs and fixed links based on the methodology proposed by CEPT and published in ECC Report 302.<sup>14</sup> Our analysis, published in our [2020 consultation](#) on making the lower 6 GHz band available, broadly aligned with the CEPT conclusions that the long-term protection criteria for fixed links would not be exceeded with the introduction of RLANs into the band.

A5.11 There are two main criteria to protect fixed links, long-term protection criteria and short-term protection criteria:

- Long-term interference degrades the bit error performance and availability of a system by reducing the fade margin<sup>15</sup> that is available to protect the fixed service system against fading. In sharing and compatibility studies, long-term interference

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<sup>14</sup> [ECC Report 302: Sharing and compatibility studies related to Wireless Access Systems including Radio Local Area Networks in the frequency band 5925 - 6425 MHz](#)

<sup>15</sup> A fade margin is an additional margin to compensate for changes in the propagation environment.

is usually characterised as the interference power that is not to be exceeded for more than 20% of the time, at the victim receiver input.

- Short-term interference is the term used to describe the highest levels of interference power that occur for less than 1% of the time at the victim receiver input.

A5.12 We have considered the similarities between the upper and lower 6 GHz bands and the applicability of existing studies done. We have also supplemented these studies with an additional minimum coupling loss analysis.

### Comparison of fixed links in the lower and the upper 6 GHz band

A5.13 The lower 6 GHz band and the upper 6 GHz band are managed by Ofcom and assigned for fixed links in accordance with our technical assignment criteria given in TFAC OFW 446.<sup>16</sup> They have similar assignment criteria. The main difference between the bands is the minimum fade margin. A fade margin is calculated on the basis of the propagation availability requirement specified by the link operator and take into account fades attributable to rain and clear-air effects. A minimum fade margin is specified for each frequency band, taking account of performance requirements (beyond radio propagation availability) and in some cases accounting for inter-service interference issues. For the lower 6 GHz band, as a result of decisions at the World Radiocommunication Conference 2003, the assignment criteria in the UK includes a minimum fade margin value of 35 dB to minimise the risk of undue interference from earth stations on board vessels. For the upper 6 GHz band the minimum fade margin value is 10 dB.

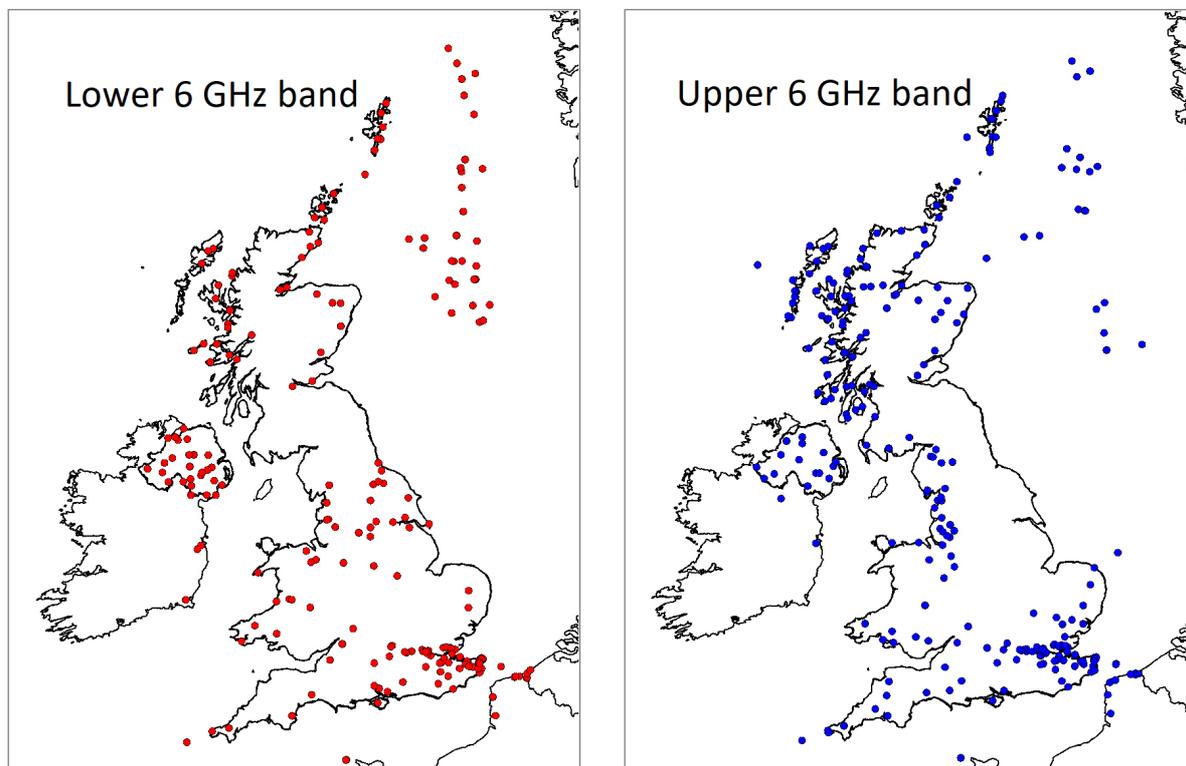
A5.14 As of January 2022, there are around 360 fixed links in the lower 6 GHz band compared with around 500 in the upper 6 GHz band. There is a slightly higher number of fixed links in the upper 6 GHz band that are partially or completely (either one or both ends of the link) in high density population areas<sup>17</sup> (113 compared to 79 in the lower band). The number of fixed links partially or completely in mid density population areas is also higher within upper 6 GHz spectrum (101 compared to 67 within the lower band).

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<sup>16</sup> [OfW 446: Technical Frequency Assignment Criteria for Fixed Point-to-Point Radio Services with Digital Modulation](#)

<sup>17</sup> We define population density according to the 2011 Census data for the UK, where “mid” densely populated areas refer to local authorities where up to 50% of the cumulative population of the UK lives and “high” densely populated areas are where 50% to 80% of the cumulative population of the UK lives.

Figure A5.1: Locations of fixed links in the lower and upper 6 GHz bands



A5.15 We compared the technical parameters of fixed links in the lower and upper 6 GHz bands, summarised below in Table A5.1, and did not find any significant difference between the bands.<sup>18</sup> It can be seen that the average link fade margin in the upper 6 GHz band is 23 dB, this is higher than the minimum coordinated fade margin of 10 dB given in TFAC OFW 446.

**Table A5.1: Summary comparison of technical characteristics of the fixed links in the lower and upper 6 GHz band**

Parameter	Average value in Lower 6 GHz	Average value in Upper 6 GHz
Antenna Height (m)	40	32
Antenna gain (dBi)	41	41
Bandwidth (MHz)	31	37
Link Fade margin (dB)	35	23

<sup>18</sup> A bandwidth of 31 MHz compared to 37 MHz has a thermal noise difference of 0.8 dB, so the average noise floor is not significantly different between the bands.

## Review of existing studies

- A5.16 When we made the lower 6 GHz band available, we undertook some technical analysis<sup>19</sup> in which the results were broadly aligned with the analysis in ECC Report 302<sup>20</sup>. In our analysis we used the long-term protection criteria only. We are of the view that this metric gives enough information about how likely it is that a service provided by a fixed link operating anywhere in the 6 GHz band would be degraded as a result of interference from RLAN systems. We would not expect the signals from low power indoor systems to vary significantly over time and therefore the long-term interference metric is more applicable over a short-term interference metric.
- A5.17 Results from our previous analysis for the lower 6 GHz band, showed that sharing was feasible when the deployment scenarios are limited to very low power (VLP) devices outdoors (with EIRP up to 25mW) and RLAN indoors (EIRP up to 250mW). We noted that there could still be some scenarios where the interference threshold could be exceeded, but the likelihood of such scenarios arising in practice was very low and the associated risk was manageable.
- A5.18 Previously, we performed some minimum coupling loss calculations looking at the risk of interference from RLANs into some real fixed links from our licence database. In summary, we found that exclusion areas increase with higher RLAN height and EIRP, but due to the topology and geometry of the fixed links (we would expect the fixed links to be higher than local clutter), only a few locations within the areas are likely to be used for RLAN. For the most common RLAN types (low to medium EIRP and low height), exclusion areas become very small in size, or even negligible. The results from analysing an example link (1126335/1) from our licensing database showed that the maximum potential interference area around the link would include the line-of-sight path between both ends (approximately 21km), with a maximum area of approximately 38km<sup>2</sup>. This area greatly reduced when the RLAN height is decreased; it would only extend a few meters when the interferer is at height of 3m or 6m.

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<sup>19</sup> [Consultation: Improving spectrum access for Wi-Fi – spectrum use in the 5 and 6 GHz bands.](#)

<sup>20</sup> Noting that the ECC Report also uses the same ITU recommendation for calculating building penetration loss, but applies different attenuation values for two types of buildings: 17 dB loss for traditional buildings and 32 dB loss for thermally efficient buildings. Our approach to entry losses, was to assume a more conservative 12 dB.

**Figure A5.2: Our previous<sup>21</sup> analysis showing potential long-term interference areas for indoor RLAN transmitting at the maximum allowed 250mW**



A5.19 The results from our previous Monte Carlo analysis suggested that where the aggregate I/N was exceeded or was close to the internationally<sup>22</sup> recognised interservice sharing criteria for the FS (I/N of -10 dB), this was due to a single dominant interferer in the majority of cases. The results showed that, when considering clutter losses along the path, there were only a very small percentage of cases where the aggregate I/N could exceed the long-term interference protection criteria of -10 dB, and less than 0.1% of cases where a threshold of -6 dB I/N could be exceeded. When additional clutter losses at the fixed link receiver were considered, there were no cases where the I/N protection criteria was exceeded. We noted that the two most sensitive link receivers which show higher values of aggregated I/N are both located in densely populated areas, in which the possible locations where a single interferer could be located are higher than in less built-up areas. However, we noted that we do not exclude any locations within the first Fresnel zone<sup>23</sup> that we would usually assume to be clear when planning a fixed link.

#### Update to our earlier technical analysis

A5.20 We believe that the existing studies are sufficient to assess that there is also a low risk of interference to fixed links in the upper 6 GHz band. For completeness we have repeated the minimum coupling loss analysis for an example link (1170900/1) in the upper 6 GHz band assuming the RLAN is transmitting at 250mW<sup>24</sup>. Similar to the analysis done for the lower 6 GHz band, we assumed a building entry loss of 12 dB, this compares to the 17 dB loss for traditional buildings and 32 dB loss for thermally efficient buildings assumed within ECC Report 302.

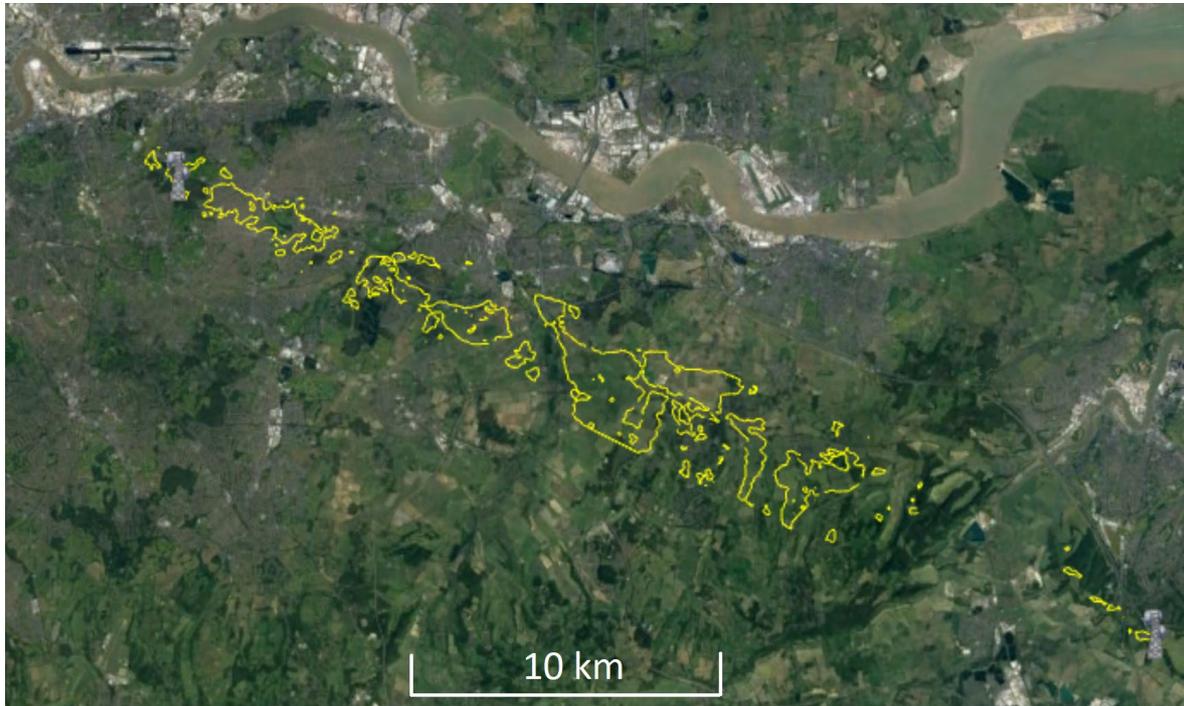
<sup>21</sup> Figure A7.9:2, [Consultation: Improving spectrum access for Wi-Fi – spectrum use in the 5 and 6 GHz bands.](#)

<sup>22</sup> [ECC Report 302: Sharing and compatibility studies related to Wireless Access Systems including Radio Local Area Networks in the frequency band 5925 - 6425 MHz](#)

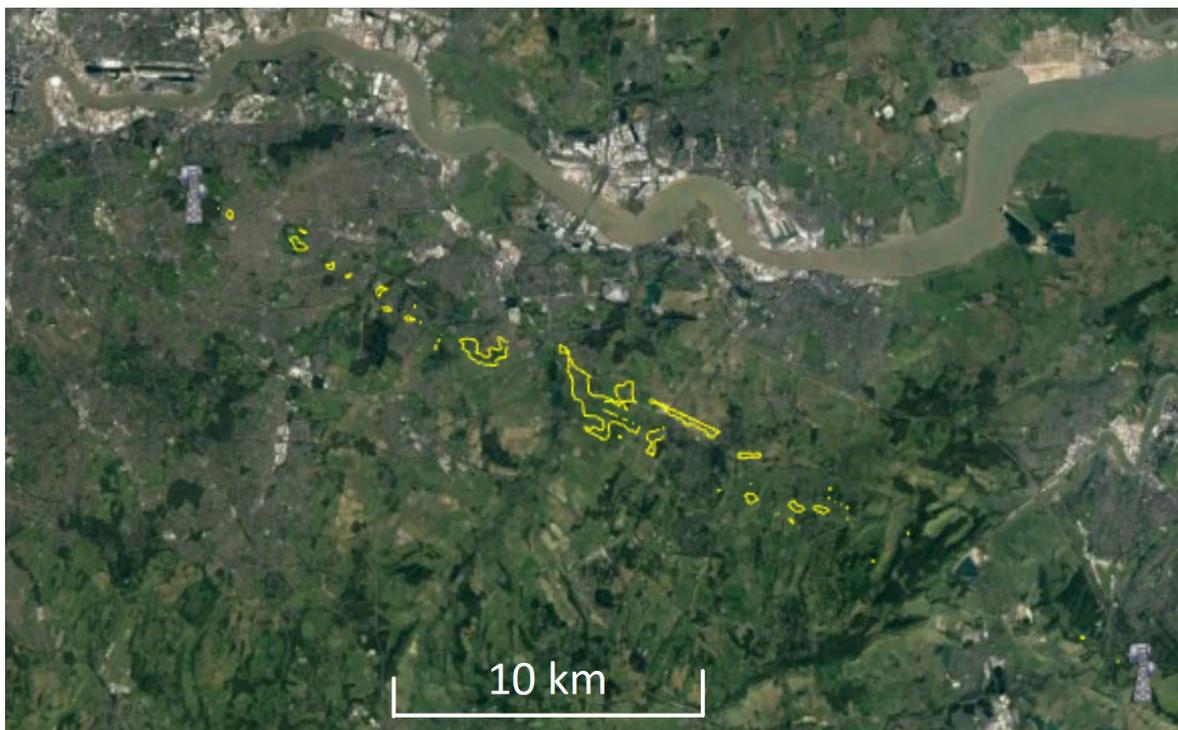
<sup>23</sup> The Fresnel Zone is an ellipsoid in the line of sight path between the transmit and receive antenna. For fixed links planning there needs to be sufficient Fresnel zone clearance, i.e. an absence of obstacles or buildings in the direct beam path.

<sup>24</sup> Within ECC Report 302, Table 6: Power distributions of WAS/RLAN devices less than 10% of RLAN devices use 250mW, with the vast majority using lower powers.

**Figure A5.1: Updated analysis showing potential long-term interference areas for indoor RLAN transmitting at the maximum allowed 250mW at 9m transmit height**



**Figure A5.4: Updated analysis showing potential long-term interference areas for indoor RLAN transmitting at the maximum allowed 250mW at 6m transmit height**



- A5.21 The results from analysing fixed link 1170900/1,<sup>25</sup> with a RLAN height of 9 m<sup>26</sup>, showed that the maximum potential interference area around the link would include the line-of-sight path between both ends (approximately 35 km), with a maximum area (see Figure A5.3) of approximately 28 km<sup>2</sup>. The potential interference area reduces down to 11 km<sup>2</sup> with a RLAN height of 6 m (see Figure A5.4 and the potential interference area reduces down further to less than 0.2 km<sup>2</sup>, if we additionally assume the building entry loss is 27 dB<sup>27</sup>.
- A5.22 In summary, similar to the lower 6 GHz analysis, exclusion areas increase with higher RLAN height and EIRP, but due to the topology and geometry of the fixed links, only a few locations within the areas are likely to be used for RLAN. For the most common RLAN deployments (where we would expect a lower EIRP, lower height and higher building entry losses), areas become very small in size, or even negligible.

## Fixed Satellites

### Our conclusions on sharing with the Fixed Satellite Service

- A5.23 We have concluded that our proposals for RLANs in the upper 6 GHz band should have no detrimental impact on the Fixed Satellite Service. FSS operation in the upper 6 GHz band (6425-7075 MHz) is very similar to operation in the lower 6 GHz band (5925-6425 MHz) and we believe the assumptions and analysis presented in ECC Report 302 for the lower band can equally be applied to sharing in the upper 6 GHz band. Furthermore, we anticipate the density of licensed RLAN deployment in upper 6 GHz will be much lower than unlicensed use in lower 6 GHz, which should significantly reduce the chances of any interference occurring.

### Background

- A5.24 The 5925-6700 MHz and 6700-7075 MHz bands are available for both permanent and transportable earth stations in the Earth-space (uplink) direction to communicate with satellites. As of January 2022, in 5925-6700 MHz there are 20 site licences for permanent earth stations covering a total of 73 earth station deployments<sup>28</sup> and 220 frequency links in the UK. Of the 220 frequency links, there are 20 which are in the upper 6 GHz frequency band (6425-6700 MHz). In the 6700-7075 MHz there is one licence for 7 Permanent earth station deployments with 40 frequency links. There are no holders of transportable Earth station licences in either bands.

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<sup>25</sup> The fixed link 1170900/1 connects from South London to Kent and is around 35 km long.

<sup>26</sup> In our [analysis for the lower 6 GHz band](#), less than 10% of buildings were above 9m.

<sup>27</sup> Using a single building entry loss assumption from ECC Report 302 in a 70/30% split between traditional and thermally efficient building entry loss value.

<sup>28</sup> For licensing purposes, an earth station 'deployment' is a unique path between an earth station and satellite.

A5.25 In the 6700-7075 MHz band there is also a space-Earth (downlink) allocation limited to feeder links for non-geostationary (NGSO) satellite systems of the mobile satellite service<sup>29</sup>, there are however no licensed earth stations operating in the UK. This band can also be used by unlicensed receive only earth stations, but we do not offer any protection from interference for this type of use.

### Review of existing studies

A5.26 When we made the lower 6 GHz band available for RLANs we reviewed existing studies carried out within CEPT on sharing between RLANs and the Fixed Satellite Service (FSS), published in ECC Report 302. These studies assumed a representative set of FSS satellites with coverage over Europe and assumed different RLAN deployments (high, medium, low) forecast to 2025. The studies concluded that sharing between FSS satellite receivers and RLANs is feasible with limitations on higher power outdoor use.

## Radio Astronomy

### Our conclusions on sharing with Radio Astronomy

A5.27 The Radio Astronomy Service does not have a primary allocation or Recognised Spectrum Access (RSA) in the upper 6 GHz. We note that RAS already shares with much higher power outdoor fixed links and satellite earth stations without any co-ordination and to date we are not aware of any reports of interference.

A5.28 In contrast, our proposal as described earlier will limit devices to indoor use only, and at a low power level (maximum 250 mW). As explained earlier, we do not anticipate mass consumer adoption for this licence, which additionally constrains the overall risk of interference. Therefore we do not anticipate a material risk of interference to RAS.

### Background

A5.29 In the UK the frequency 6668.518 MHz is used by Radio Astronomy observatories for methanol (CH<sub>3</sub>OH) spectral line measurements, for the study of star formation in its earliest stages and for the determination of the structure of our galaxy. The methanol line is widely observed in Europe using single dishes, Multi-Element Radio-Linked Interferometer Network (MERLIN) and Very Long Baseline Interferometry (VLBI). In the UK, e-MERLIN measurements are made at Cambridge, Darnhall, Defford, Jodrell Bank, Knockin and Pickmere.<sup>30</sup>

A5.30 The Radio Astronomy Service does not have a primary allocation or Recognised Spectrum Access (RSA) in the upper 6 GHz band and already shares with high power outdoor fixed links (with EIRP up to +50 dBW<sup>31</sup>) and satellite earth stations with no requirement for

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<sup>29</sup> Permitted under footnote 5.458B of the ITU Radio Regulations.

<sup>30</sup> [Space science and meteorology spectrum allocations in the UK](#)

<sup>31</sup> See Table 2 of [OfW 446: Technical Frequency Assignment Criteria for Fixed Point-to-Point Radio Services with Digital Modulation](#)

coordination. However, a footnote to the Radio Regulations (footnote 5.149), advises that “in making assignments to stations of other services to which the frequency bands 6650.0-6675.2 MHz are allocated, administrations are urged to take all practicable steps to protect the radio astronomy service from harmful interference.” Our proposal will limit devices to indoor use only, and at a low power level. We do not anticipate mass consumer adoption for this licence, which additionally constrains the overall risk of interference.

## Earth Exploration Satellites

### Our conclusions on sharing with EESS

A5.31 We have concluded that passive sensor measurements undertaken by Earth Exploration Satellite Services (EESS) would not be materially impacted by our proposals. Measurements in the 6425-7075 MHz band are carried out over the oceans. We are limiting the upper frequency of the band we are making available to 7070 MHz, which avoids any potential impact on EESS use over land in the 7075-7250 MHz band. As such, detailed technical studies are not needed.

### Background

A5.32 Passive microwave sensor measurements are carried out over the oceans in the 6425-7075 MHz band by EESS. Measurements include wave height, water temperature, salinity and ozone concentration and other types of data that are used to predict the behaviour of our environment and our weather patterns.<sup>32</sup> The adjacent band, 7075-7250 MHz, is used for passive measurement over land. The EESS does not have primary allocation, however a footnote in the Radio Regulations (5.458) says that Administrations should bear in mind the needs of the Earth exploration (passive) and space research (passive) services in their future planning of the 6425-7075 and 7075-7250 MHz bands.

A5.33 We are making the spectrum available for low power indoor use, which is expected to be of a low density across the UK. The co-channel EESS takes measurements over the ocean regions which, in most cases, will provide a high degree of geographic separation. Adjacent channel EESS measurements over land will not be impacted due to the frequency separation. We have therefore concluded that, by limiting the upper frequency of the band we are making available to 7070 MHz, it will protect EESS use over land in the 7075-7250 MHz and detailed technical studies are not needed.

## Short Range Devices

### Our conclusions on sharing with Short Range Devices

A5.34 We conclude that tank level probing radar and radar level gauges will not be impacted by our proposals. TLPR have strict installation requirements regarding the downward orientation of their antennas and are typically installed in tanks that provide a reasonable

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<sup>32</sup> <https://www.itu.int/pub/R-HDB-56-2011>

level of shielding attenuation, which will mitigate any interference from indoor RLAN devices.

- A5.35 We have reviewed the CEPT studies in the lower 6 GHz band that show, in the worst-case scenario, a 3 dB reduction in UWB sensitivity may occur for up to 3.3% of the time. We consider that the probability of interference in the upper 6 GHz band will be much lower due to the lower density of RLAN deployment and limitations on the maximum EIRP.

### Background

- A5.36 The current Short Range Device use for the upper 6 GHz band is very similar to the lower 6 GHz use and we believe the analysis for the lower band can equally be applied to sharing in the upper 6 GHz band. We consider that the probability of interference in the upper 6 GHz band will be much lower due to the lower density of RLAN deployment.
- A5.37 In the UK we have implemented various European Commission Decisions that make harmonised spectrum available for Short Range Devices.<sup>33</sup> The 6425-7100 MHz and 4500-7000 MHz bands are available for radio determination devices and radar level gauges in 5150-7100 MHz.<sup>34</sup> Tank Level Probing Radar (TLPR) is a specific type of radiodetermination application used to measure the level of liquids or granulates for process control, liquid monitoring, spill prevention and other industrial processes. TLPR sensors are usually installed in metallic or reinforced concrete tanks, or similar structures made of material with comparable attenuation characteristics that typically provide shielding attenuation of 10 dB or more in the 6 GHz band.<sup>35</sup> TLPR devices are required to have dedicated/integrated antennas with strict downwards orientation which will further mitigate the potential for interference from RLANs.
- A5.38 The 6000-8500 MHz band is also used by ultra-wideband (UWB)<sup>36</sup> equipment for applications such as location tracking, vehicle access, consumer devices (IoT, smart home), sensors and building material analysis.
- A5.39 There are some existing studies in ECC Report 302 for the lower 6 GHz band that considered compatibility of WAS/RLANs transmitting up to 1 Watt with UWB. The aggregate interference evaluation with Monte Carlo simulations showed that when taking the WAS/RLAN RF activity factor into account, the probability that the sensitivity reduction to UWB communications and location tracking devices exceeds 3 dB ranges from 0.0024% to 3.3%. For sensing devices, the probability that the sensitivity reduction is more than 3 dB varies from 0.042% to 1.7%.
- A5.40 In the upper 6 GHz band, we anticipate that typical RLAN applications might include industrial use and for Research and Development. We do not envisage widescale consumer adoption in the near term. Therefore, we would expect a lower density of use in the upper

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<sup>33</sup> Commission Decisions [2006/771/EC](#), [2008/432/EC](#), [2009/381/EC](#), [2010/368/EU](#), [2011/829/EU](#) and [2013/752/EU](#)

<sup>34</sup> [IR 2030 – Licence Exempt Short Range Devices \(ofcom.org.uk\)](#)

<sup>35</sup> 90% of devices are expected to be installed in indoors (e.g. in tanks) providing at least 10 dB of attenuation. See ECC Report 139: <https://docdb.cept.org/document/247>

<sup>36</sup> [The Wireless Telegraphy \(Ultra-Wideband Equipment\) \(Exemption\) Regulations 2015 \(legislation.gov.uk\)](#)

## Enabling spectrum sharing in the 6 GHz band

6 GHz band compared to the lower 6 GHz band and consequently we would expect a Monte Carlo analysis to produce a much lower probability of interference for the upper 6 GHz band.

## A6. Legal framework

### The legislative framework

A6.1 Ofcom is responsible for authorising use of the radio spectrum. We permit the use of the radio spectrum by granting wireless telegraphy licences under the WT Act or by making statutory regulations exempting users of particular equipment from the requirement to hold such a licence. It is unlawful and an offence to install or use wireless telegraphy apparatus without holding a licence granted by Ofcom, unless the use of such equipment is exempted.

### **Duties under the Communications Act 2003 and the Wireless Telegraphy Act 2006**

A6.2 Ofcom's statutory powers and duties in relation to spectrum management are set out primarily in the Communications Act 2003 (the "2003 Act") and the WT Act. Amongst our functions are the making available of frequencies for use for particular purposes and the granting of rights of use of spectrum through wireless telegraphy licences and licence-exemptions.

A6.3 Our principal duties under the 2003 Act, when carrying out our functions and exercising our powers, are to further the interests of citizens and consumers, where appropriate by promoting competition. In doing so, we are also required (among other things) to secure the optimal use of spectrum and the availability throughout the United Kingdom of a wide range of electronic communications services.

A6.4 We must also have regard to: (i) the desirability of promoting competition in relevant markets; (ii) the desirability of encouraging investment and innovation in relevant markets; (iii) the different needs and interests, so far as the use of the electro-magnetic spectrum for wireless telegraphy is concerned, of all persons who may wish to make use of it; and (iv) the different interests of persons in the different parts of the United Kingdom, of the different ethnic communities within the United Kingdom and of persons living in rural and in urban areas.

### **Duties under the Wireless Telegraphy Act 2006**

A6.5 Additionally, in carrying out our spectrum functions we have a duty under section 3 of the WT Act to have regard in particular to: (i) the extent to which the spectrum is available for use, or further use, for wireless telegraphy; (ii) the demand for use of that spectrum for wireless telegraphy; and (iii) the demand that is likely to arise in future for such use.

A6.6 We also have a duty to have regard to the desirability of promoting: (i) the efficient management and use of the spectrum for wireless telegraphy; (ii) the economic and other benefits that may arise from the use of wireless telegraphy; (iii) the development of innovative services; and (iv) competition in the provision of electronic communications services.

- A6.7 Under section 8(1) of the WT Act, it is unlawful to establish or use a wireless telegraphy station or install or use wireless telegraphy apparatus except under and in accordance with a wireless telegraphy licence granted under the WT Act.
- A6.8 Under sections 8(3) – 8(3B) of the WT Act, Ofcom may make regulations exempting from the licensing requirements under section 8(1), the establishment, installation or use of wireless telegraphy stations or wireless telegraphy apparatus of such classes or description as may be specified in the regulations, either absolutely or subject to such terms, provisions and limitations as may be specified.
- A6.9 Under section 8(4) of the WT Act, we must make regulations to exempt equipment if its installation or use is not likely to:
- a) involve undue interference with wireless telegraphy;
  - b) have an adverse effect on technical quality of service;
  - c) lead to inefficient use of the part of the electromagnetic spectrum available for wireless telegraphy;
  - d) endanger safety of life;
  - e) prejudice the promotion of social, regional or territorial cohesion; or
  - f) prejudice the promotion of cultural and linguistic diversity and media pluralism.
- A6.10 In accordance with the requirements of section 8(3B) of the WT Act, the terms, provisions and limitations specified in the regulations must be:
- a) objectively justifiable in relation to the wireless telegraphy stations or wireless telegraphy apparatus to which they relate;
  - b) not such as to discriminate unduly against particular persons or against a particular description of persons;
  - c) proportionate to what they are intended to achieve; and
  - d) transparent in relation to what they are intended to achieve.
- A6.11 We make exemption regulations by means of a statutory instrument. Before making any such regulations, we are required by section 122(4) of the WT Act to give notice of our proposal to do so. Under section 122(5), such notice must state that we propose to make the regulations in question, set out their general effects, specify an address from which a copy of the proposed regulations or order may be obtained, and specify a time period of at least one month during which any representations with respect to the proposal must be made to us.
- A6.12 We have formulated our proposals by reference to our statutory duties. For the reasons set out in this Notice, our provisional assessment is that they are consistent with those duties and the terms, provisions and limitations would meet the requirements of section 8(4) of the WT Act.
- A6.13 In our view, the proposals set out in this document are:

- **objectively justified** in that they address the risks of undue interference that might otherwise arise from the use of SRD;
- **not unduly discriminatory** against particular persons or against a particular description of persons in that they would apply to all users of relevant SRDs;
- **proportionate** to what they are intended to achieve, in that they would be necessary to ensure that use of the relevant equipment would not be likely to have relevant adverse effects; and
- **transparent** in relation to what they are intended to achieve, in that they are described and explained in this Notice.

## A7. Draft licence

### WIRELESS TELEGRAPHY ACT 2006

## Shared Access Low Power 6 GHz Indoor Licence

#### Licensee Details and Validity

Sector/Class/Product	Shared Access Low Power
Licence number	[Licence number]
Licensee	[Licensee name]
Company Registration	
Licencee address	[Licensee address line(s)]
Email	
Date of Issue	[Date licence first issued]
Valid from	[Licence valid date]
Payment Interval	1 year

1. The Office of Communications (Ofcom) grants this wireless telegraphy licence ("the Licence") to **<Licensee name>** to establish, install and use wireless telegraphy stations and/or wireless telegraphy apparatus as described in the schedules to this Licence (together "the Radio Equipment") subject to the terms set out below.

#### Licence Term

2. This Licence shall continue in force until revoked by Ofcom or surrendered by the Licensee or if it is a Short Term Licence, when it reaches its expiration date.

#### Licence Revocation

3. Pursuant to schedule 1 paragraph 8 of the Wireless Telegraphy Act 2006 ("the Act"), Ofcom may not revoke this Licence under schedule 1 paragraph 6 of the Act except:
  - a) at the request, or with the consent, of the Licensee;
  - b) if there has been a breach of any of the terms of this Licence;
  - c) in accordance with schedule 1 paragraph 8(5) of the Act;
  - d) if it appears to Ofcom to be necessary or expedient to revoke the Licence for the purpose of complying with a direction by the Secretary of State given to Ofcom under section 5 of the Act or section 5 of the Communications Act 2003; and
  - e) for reasons related to the management of the radio spectrum provided that in such a case the power to revoke may only be exercised after at least one month's notice is given in writing.

4. Ofcom may only revoke this Licence by notification in writing to the Licensee and in accordance with schedule 1 paragraphs 6, 6A and 7 of the Act.

### **Licence Variation**

5. Ofcom may only vary this Licence by notification in writing to the Licensee and in accordance with schedule 1 paragraphs 6, 6A and 7 of the Act.

### **Requirement to Commence and Maintain Transmission within 6 Months**

6. The Licensee must establish, install and use the Radio Equipment to commence regular wireless telegraphy transmissions in accordance with the provisions of this Licence within six months of the date that this Licence is issued, and maintain such transmissions thereafter.

### **Transfer**

7. This Licence may not be transferred. The transfer of rights and obligations arising by virtue of this Licence may however be authorised in accordance with regulations made by Ofcom under powers conferred by section 30 of the Act.<sup>37</sup>

### **Changes to Licensee Details**

8. The Licensee shall give prior notice to Ofcom in writing of any proposed changes to the Licensee's name, email address and/or address as recorded in paragraph 1 of this Licence.

### **Fees**

9. The Licensee shall pay to Ofcom the relevant fee(s) as provided in section 12 of the Act and the regulations made thereunder on or before the fee payment date shown above, or on or before such dates as are notified in writing to the Licensee.
10. If the Licence is surrendered, revoked or varied, no refund, whether in whole or in part, of any amount which is due under the terms of this Licence, may be payable in accordance with any regulations made by Ofcom under sections 12 and 13(2) of the Act will be made, except at the absolute discretion of Ofcom.

### **Radio Equipment Use**

11. The Licensee shall ensure that the Radio Equipment is established, installed and used only in accordance with the provisions specified in the schedules to this Licence. Any proposal to amend any detail specified in any of the schedules to this Licence must be agreed with Ofcom in advance and implemented only after this Licence has been varied or reissued accordingly.
12. The Licensee shall ensure that the Radio Equipment is operated in compliance with the terms of this Licence and is used only by persons who have been

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<sup>37</sup> See Ofcom's website for the latest position on spectrum trading and the types of trade which are permitted.

authorised in writing by the Licensee to do so and that such persons are made aware of, and of the requirement to comply with the terms of this Licence.

### **Access and Inspection**

13. The Licensee shall permit any person authorised by Ofcom:
- a) to have access to the Radio Equipment;
  - b) and to inspect this Licence and to inspect, examine and test the Radio Equipment, at any and all reasonable times or, when in the opinion of that person an urgent situation exists, at any time, to ensure the Radio Equipment is being used in accordance with the terms of this Licence.

### **Modification, Restriction and Closedown**

14. Any person authorised by Ofcom may require the Radio Equipment or any part thereof, to be modified or restricted in use, or temporarily or permanently closed down immediately if in the opinion of the person authorised by Ofcom:
- a) a breach of this Licence has occurred; and/or
  - b) the use of the Radio Equipment is, or may be, causing or contributing to undue interference to the use of other authorised radio equipment.
15. Ofcom may require any of the Radio Equipment to be modified or restricted in use, or temporarily closed down either immediately or on the expiry of such period as may be specified in the event of a national or local state of emergency being declared. Ofcom may only exercise this power after a written notice has been served on the Licensee or a general notice applicable to holders of a named class of licence has been published.

### **Geographical Boundaries**

16. Subject to the requirements of any coordination procedures notified to the Licensee pursuant to the schedules to this Licence, the Licensee is authorised to establish, install and use of base station equipment in the authorised base station deployment area set out the schedules to this Licence and any terminals connecting to it.

### **Future Dynamic Spectrum Approach**

17. On 25 July 2019, Ofcom published a statement called *Enabling wireless innovation through local licencing* containing a spectrum management decision to enable shared access to spectrum supporting mobile technology. In that decision, Ofcom stated that it will assess whether it is appropriate to transition towards a Dynamic Spectrum Approach in order to provide users more access to spectrum by means of automatic database frequency assignment. The Licensee is therefore notified that Ofcom currently intends to vary this Licence in accordance with paragraph 5 from time to time in future, or may re-issue the Licence, to give effect to that decision.

### **Notification in Electronic Form**

18. The Licensee shall accept notifications and other related documents under this Licence to the preferred communication method and/or electronically to the designated email address as recorded on the front page of this Licence. The Licensee must update Ofcom about changes to the preferred communication method and/or the designated email address, in accordance with paragraph 8.

### Interpretation

19. In this Licence:

- a) the establishment, installation and use of the Radio Equipment shall be interpreted as establishment and use of wireless telegraphy stations and installation and use of wireless telegraphy apparatus for wireless telegraphy as specified in section 8(1) of the Act;
- b) the expression “interference” shall have the meaning given by section 115 of the Act;
- c) the expressions “wireless telegraphy station” and “wireless telegraphy apparatus” shall have the meanings given by section 117 of the Act;
- d) the schedule(s) form part of this Licence together with any subsequent schedule(s) which Ofcom may issue as a variation to this Licence; and
- a) the Interpretation Act 1978 shall apply to the Licence as it applies to an Act of Parliament.

## **Shared Access Low Power Indoor**

### **SCHEDULE 1 TO LICENCE**

#### **Description of Radio Equipment**

1. References in this schedule(s) to the Radio Equipment are references to any wireless telegraphy station or wireless telegraphy apparatus that is established, installed and/or used under this schedule(s).

#### **Interface Requirements for the Radio Equipment**

2. Use of the Radio Equipment shall be in accordance with the following Interface Requirement:

IR 2103

#### **Special conditions relating to the Radio Equipment**

3. This Licence authorises the use of the Radio Equipment within the Permitted Frequency Band and the Licensee warrants that the Radio Equipment is capable of transmitting across the Permitted Frequency Band.
4. However, the Licensee is only authorised to transmit on the Permitted Channel Centre Frequency within the Permitted Frequency Band, as set in Schedule 2 to this Licence or as notified to the Licensee by Ofcom from time to time.
5. The Licensee must comply with any change to the Permitted Channel Centre Frequency notified by Ofcom within the timescale indicated in the notification.
6. During the period that this Licence remains in force, unless consent has otherwise been given by Ofcom, the Licensee shall compile and maintain accurate written records of the following details relating to the Radio Equipment:
  - a) For all base stations the:
    - i. Postal address (including post code); and
    - ii. Antenna height (above ground level) and type; and
  - b) For all fixed/ installed terminals the:
    - i. Postal address (including post code);
    - ii. National Grid Reference (to 1m resolution); and
    - iii. Antenna height (above ground level), type, and boresight bearing east of true north (if applicable).
7. The Licensee shall submit to Ofcom in such manner and within such period as specified by Ofcom, such other information in relation to the Radio Equipment, or any wireless telegraphy station or wireless telegraphy apparatus, which the Licensee is planning to use, as Ofcom may from time to time request. Such information may include, but is not limited to, information in relation to the radio frequency, transmitted power and date of first use for wireless telegraphy stations

or wireless telegraphy apparatus to be established, installed or used within such timeframe and in such areas as Ofcom may reasonably request.

8. The use of the Radio Equipment is not permitted airborne.

### **Coordination at frequency and geographical boundaries**

9. The Licensee shall ensure that the Radio Equipment is operated in compliance with such coordination procedures as may be notified to the Licensee by Ofcom from time to time.

### **Cooperation between Licensees**

10. In addition to complying with the specific transmission terms, conditions and limitations set out in this Licence, the Licensee must liaise and co-operate with other holders of other Shared Access 26 GHz licences (if necessary adjusting transmission power and other technical parameters of transmission) in such a way that harmful interference is not caused by one network deployment to that of another Licensee within the band.

### **Interpretation of terms in this schedule**

11. In this schedule:
  - a) "IR" means a United Kingdom Radio Interface Requirement published by Ofcom in accordance with the Radio Equipment Regulations 2017, as amended by the e Product Safety and Metrology etc. (Amendment etc.) (EU Exit) Regulations 2019); and
  - b) "indoor" or "indoors" means inside premises which have a ceiling or a roof; and except for any doors, windows or passageways, are wholly enclosed.

**Shared Access Low Power Indoor  
SCHEDULE 2 TO LICENCE xxxxx**

<b>Transmitter(s)</b>	
Authorised Base Station Deployment Area	Area of 50 m radius from the following location: xxxxx
Station Name/Address	Ref Address
Deployment Location	Indoor Deployment or use of outdoor base stations and terminals is not permitted.
Permitted Frequency Band	6425 – 7070 MHz
Permitted Channel Centre Frequency Tx	N/A
Permitted Channel Centre Frequency Rx	N/A
Permitted Channel Frequency Bandwidth	N/A

**Maximum power (EIRP) / Maximum power within the Permitted Frequency Channel**

Upper 6 GHz shared spectrum

1. When transmitting, the licensee must transmit within the limits set out below.

<b>Radio Equipment</b>	<b>Maximum mean EIRP</b>	<b>Maximum mean EIRP density</b>
Base Station	250 mW	12.6 mW/MHz in any 1 MHz band
Mobile or nomadic terminal station	250 mW	12.6 mW/MHz in any 1 MHz band
Fixed / installed terminal station	250 mW	12.6 mW/MHz in any 1 MHz band

**Interpretation of terms in this schedule**

2. In this schedule:

- a) “dBm” means the power level in decibels (logarithmic scale) referenced against 1 milliwatt (i.e. a value of 0 dBm is 1 milliwatt);
- b) “EIRP” means the equivalent isotropically radiated power. This is the product of the power supplied to the antenna and the antenna gain in a given direction relative to an isotropic antenna (absolute or isotropic gain), measured during the “on” part of the transmission;
- c) “Fixed or installed” means used or installed at specific fixed points;
- d) “Indoor” or “indoors” means inside premises which have a ceiling or a roof; and except for any doors, windows or passageways, are wholly enclosed;
- e) “mobile or nomadic” means intended to be used while in motion or during halts at unspecified points;
- f) “NGR” means National Grid Reference;
- g) “outdoor” or “outdoors” means anywhere that is not indoor;
- h) “Permitted Channel Centre Frequency” means the frequency assigned by Ofcom that is the midpoint between the upper and lower channel edge frequencies;
- i) “Permitted Channel Frequency Bandwidth” means the total amount of spectrum assigned to the channel;
- j) “Permitted Frequency Band” means the frequency range within which Ofcom will assign the Permitted Channel Centre Frequency; and

## A8. Draft amendment to IR 2103

**Table 3.4: Minimum requirements for the use of: Low Power Shared Access equipment operating in the 6.425-7.070 GHz band**

Mandatory (1-10)		
1	Radiocommunication Service	Fixed or Mobile Service
2	Application	TRA-ECS (Terrestrial radio applications capable of providing electronic communication services)
3	Frequency band(s)	6.425-7.070 GHz
4	Channelling	
5	Modulation / Occupied bandwidth	
6	Direction / Separation	Time-division duplex (TDD)
7	Maximum Transmit Power / Power Density	Maximum mean EIRP of 250mW Maximum mean EIRP density of 12.6mW/MHz in any 1 MHz band
8	Channel access and occupation rules	
9	Authorisation regime	WT Act licence for all equipment.
10	Additional essential requirements	None
Informative (11-13)		
11	Frequency Planning	Indoor use only “Indoor” or “indoors” means inside premises which have a ceiling or a roof; and except for any doors, windows or passageways, are wholly enclosed.
12	Planned changes	-
13	Reference	-
14	Notification	
15	Remarks	

The overview section in this document is a simplified high-level summary only. The proposals we are consulting on and our reasoning are set out in the full document.