Expanding access to the 6 GHz band for mobile and Wi-Fi services

Proposals for AFC in Lower 6 GHz and mobile / Wi-Fi sharing in Upper 6 GHz

Consultation

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1. Overview

1.1 Ofcom is committed to enabling wireless services in the wider economy. This means making spectrum available to enable the communication industry to meet anticipated growth and innovation, including for wireless broadband services delivered by **commercial mobile**[1] **and Wi-Fi**.[2]

1.2 The 6 GHz band has attracted the interest of both the Wi-Fi and commercial mobile industries to support future growth and enable innovative applications. In this document, we set out plans to enable both industries to access spectrum to the benefits of consumers and businesses in the UK.

What we are proposing – in brief

Lower 6 GHz (5925–6425 MHz)

We are consulting on making standard power Wi-Fi (up to 4 Watts) available in the Lower 6 GHz band provided it is under the control of an AFC database (this would include outdoor use). This would be subject to a clear expression of demand from industry and an indication that industry parties are willing to provide AFC database services.

Upper 6 GHz (6425–7125 MHz)

We are consulting on a phased approach to maximise the use of spectrum by enabling commercial mobile and W-Fi to share the Upper 6 GHz band. We include detailed proposals to make Wi-Fi available in the band in phase 1. We provide an overview of our expected approach for enabling shared use by mobile in phase 2, including measures that may be needed to facilitate coexistence between mobile and incumbents.

Phase 1 – Initial Wi-Fi access: We are proposing to authorise low power indoor Wi-Fi (up to 250 milliwatts) across the whole band on a licence exempt basis. We intend to do this as early as feasible, ideally before end 2025.

Phase 2 – Adding mobile access: We intend to propose the specific sharing mechanism between mobile and Wi-Fi, once the European harmonisation is clear. We are currently leaning towards a prioritised spectrum split as our preferred outcome with between 160 and 400 MHz prioritised for Wi-Fi. We expect the remainder (a minimum of 300 MHz) would be prioritised for mobile, enabling high power mobile deployments while still allowing Wi-Fi access to the full band where there is no mobile deployment.

We understand demand for this spectrum might be greater in high traffic areas, we therefore intend to authorise mobile use of the band in high density areas (possibly by award) and will decide on the authorisation approach for mobile outside high density areas in due course (possibly through local or smaller area-based licences).

[1] Where we refer to mobile in this document, we mean commercial mobile services typically offered by the mobile network operators (MNOs).

[2] Where we refer to Wi-Fi in this document, we mean any radio local area network (RLAN) or similar equipment that would be capable of meeting the conditions of the licence exemption regulations we would implement. In addition to Wi-Fi, other technologies that are likely to be capable of meeting these conditions would include 5G New Radio-Unlicensed (NR-U), a version of the 5G mobile standard developed specifically for unlicensed (licence exempt) spectrum.

Lower 6 GHz

1.3 The Lower 6 GHz band has been available for low power indoor Wi-Fi since 2020. However, at the time we introduced Wi-Fi, we restricted its use to low power indoor (LPI) and very low power (VLP) indoor and outdoor Wi-Fi configurations. This approach was to protect incumbent services such as fixed links and fixed satellite earth stations from harmful interference.

1.4 We are now seeing increasing use of the band by low power indoor Wi-Fi. Additionally, some Wi-Fi stakeholders have indicated demand for spectrum in the 6 GHz band for Wi-Fi services at higher power, especially outdoors – up to 4 Watts, referred to as standard power Wi-Fi.

1.5 Enabling standard power Wi-Fi in the Lower 6 GHz band, in addition to the existing low power indoor Wi-Fi, and VLP outdoors, could help address this demand.

1.6 Coexistence with incumbent services (including fixed links and fixed satellite earth stations) would be managed by Automated Frequency Coordination (AFC) database systems. AFC database systems have already been introduced in other countries (in particular the USA and Canada) and we would intend to leverage these existing systems as much as possible to accelerate implementation in the UK.

Upper 6 GHz

1.7 The Upper 6 GHz band currently supports a number of existing services including fixed links, programme making and special events (PMSE) equipment, fixed satellite and radio astronomy. This band can also be used to deliver both Wi-Fi and commercial mobile services, including 5G. It has the potential to deliver significant benefits by increasing data capacity and speeds for both sectors.

1.8 Stakeholders representing both sectors have told us they need access to Upper 6 GHz.

1.9 By committing to allowing both Wi-Fi and commercial mobile to access the band on a shared basis in a phased approach, we aim to:

- provide both industries with as much certainty as possible about their future access to this spectrum;
- enable investment in faster, better-quality services and innovation; and
- provide us with flexibility to respond to uncertainty in demand.

1.10 We believe shared use will maximise the use of this 700 MHz of spectrum, bringing the greatest overall benefits to citizens and consumers, rather than the alternative of allocating the spectrum exclusively for either mobile or for Wi-Fi.[3]

1.11 In Europe, CEPT[4] has started work on a harmonised approach to shared use of Upper 6 GHz by mobile and Wi-Fi (likely either a prioritised spectrum split or an indoor/outdoor split) and we have been actively contributing to this. We expect this to be finalised during 2027.

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[3] See our previous publications (notably our Vision for the future of the Upper 6 GHz band published in May 2024 and our consultation Hybrid sharing: Enabling both licenced mobile and Wi-Fi users to access the Upper 6 GHz band published in June 2023).

[4] CEPT is a European body made up of 46 national administrations. Among other things, it is responsible for developing measures to harmonise the efficient use of the radio spectrum across Europe.

European harmonisation will help manufacturers, operators and users to have the confidence to invest in equipment and services for the band. We want to encourage that investment.

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.

2. Background and international context

Our previous work on the 6 GHz band

2.1 The proposals we are outlining today are the latest step in our work to make the 6 GHz band available for wireless broadband growth and innovation. In 2020, we first made the Lower 6 GHz band (5925–6425 MHz) available for low power indoor (LPI) Wi-Fi and very low power (VLP) outdoor devices.

2.2 In February 2022 we consulted on a proposal to make the Upper 6 GHz band available through our Shared Access Licence framework for low-power, indoor use. However, after considering stakeholder feedback, we decided not to proceed with that proposal.

2.3 In our subsequent July 2023 consultation we outlined our thoughts on sharing between mobile and Wi-Fi, to maximise use of the spectrum and offer greater benefits to citizens and consumers. We published a summary of responses in October 2023, covering stakeholders' views on both the principle of sharing and the practicalities, and we also outlined planned next steps.

2.4 We have engaged extensively with industry stakeholders in developing our position on sharing between Wi-Fi and mobile in this band. We have held two stakeholder workshops in November 2023 and March 2024, bringing together industry leaders, regulators, and academics to discuss the possibilities and challenges of allowing both Wi-Fi and mobile to share the Upper 6 GHz band.

2.5 Most recently, our May 2024 vision document for hybrid sharing in Upper 6 GHz developed our thinking further, and outlined our two preferred options for hybrid sharing: an **indoor/outdoor split** and a variable spectrum split, which we are now referring to as a **prioritised spectrum split**.

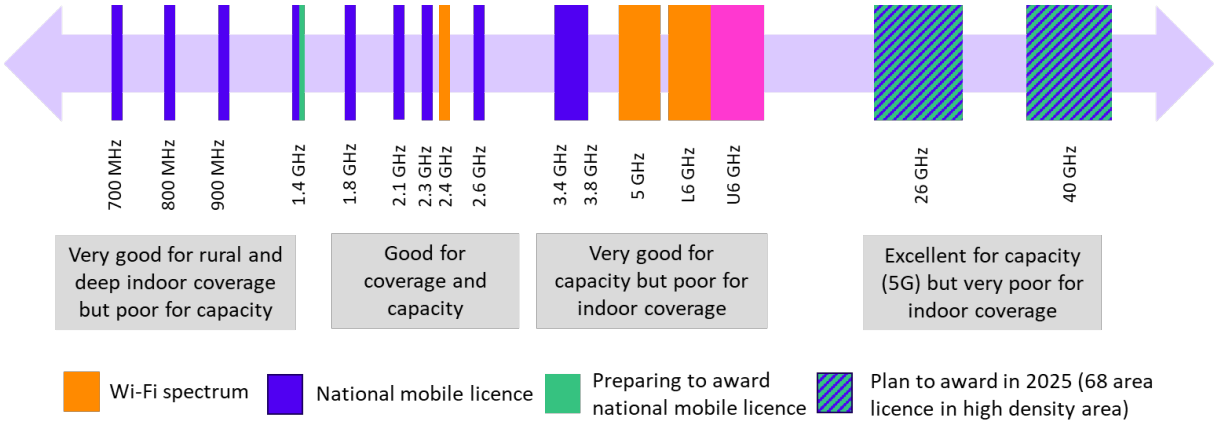
How mobile and Wi-Fi currently use spectrum

2.6 Both Wi-Fi and mobile have access to roughly 1150 MHz of spectrum. All of the bands available for Wi-Fi are shared with other users, whereas the commercial mobile bands tend to only be available to whichever operator holds the licence.[5]

2.7 The bands currently available to mobile and Wi-Fi are shown in Figure 2.1 below, together with bands where awards are planned and bands that are under consideration.

[5] Noting that Local Access Licences may be available in locations where the MNOs have not rolled out.

Figure 2.1: Current and planned spectrum allocations for mobile and Wi-Fi



Source: Ofcom

Mobile spectrum

2.8 The spectrum currently available for commercial mobile in the UK has been assigned through nationwide licences to the mobile network operators (MNOs).[6] As shown in Figure 2.1 above:

- Lower frequency mobile spectrum (≤1.4 GHz) is most suitable for wide area and indoor coverage but the capacity this can provide is limited by the relatively small bandwidths available.
- Higher frequency spectrum (particularly the 3.4–3.8 GHz band) can provide greater capacity, but signals in this range are less capable of penetrating into buildings and are less well suited to providing coverage over wide areas than lower frequency spectrum.
- Spectrum from 1.4 GHz to 2.6 GHz can provide a good balance between the coverage of lower frequency bands and the capacity of higher frequency mobile spectrum.

2.9 The characteristics of the 6 GHz band are similar to those of the 3.4–3.8 GHz band, although we would expect the ability of signals to penetrate into buildings would be worse in this band. However, in their responses to our July 2023 consultation, Ericsson, Three and Vodafone stated that the Upper 6 GHz band could achieve similar coverage to the 3.4–3.8 GHz band (using higher radiated powers).

Wi-Fi spectrum

2.10 Wi-Fi uses the 2.4 GHz, 5 GHz and Lower 6 GHz bands under licence exemption. Indoor use is allowed in all of this spectrum but outdoor use is limited in some bands; outdoor access points are not allowed in parts of 5 GHz and all of Lower 6 GHz. The 2.4 GHz band is relatively small in terms of bandwidth and is shared with other users, including microwave ovens, Bluetooth and other devices which may cause some interference with Wi-Fi.

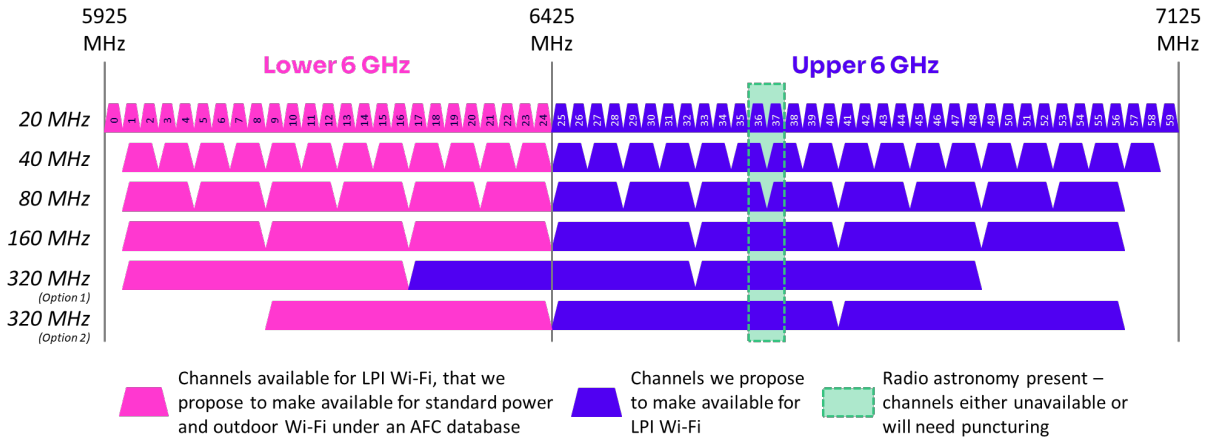
2.11 The 5 GHz band has more bandwidth available and can provide greater capacity, however, the band is somewhat fragmented with different restrictions on different parts of the band to manage the interference environment with other users. This limits the size of available

[6] Note: the Competition and Markets Authority has cleared a merger between UK operators Vodafone and Three; see Vodafone/CK Hutchison JV merger inquiry for more details. The merger is expected to formally complete during the first half of 2025, which will reduce the number of UK MNOs from four to three.

channels and in turn limits the performance of equipment using the band. The use of some channels in the 5 GHz band is limited by the need for access points to implement Dynamic Frequency Selection (DFS) measures that can detect co-frequency radar and move to an alternative channel.

2.12 Wi-Fi can also operate in the Lower 6 GHz band. However, to protect incumbent services, it is currently limited to LPI and VLP use only. Figure 2.2 below shows the current Lower 6 GHz channel plan, along with the proposed channel plan for Wi-Fi use of Upper 6 GHz.

Figure 2.2: 6 GHz band Wi-Fi channel plan



Source: Ofcom

Demand for 6 GHz spectrum

Lower 6 GHz

2.13 The Wi-Fi industry wants access to the Lower 6 GHz band for higher power Wi-Fi, especially outdoors.

2.14 In response to our 2020 consultation proposals, Wireless Broadband Alliance (WBA) and Hewlett Packard Enterprise (HPE) indicated that there was demand for higher power outdoor use of the Lower 6 GHz band for use cases such as high-capacity venues, municipal outdoor hotspots and rural connectivity. WBA, HPE and Federated Wireless also suggested using a geolocation database, such as Automated Frequency Coordination (AFC), to enable higher power use of the band.

2.15 In several countries, standard power outdoor Wi-Fi (up to 4 Watts) has already been authorised in all (or nearly all) of the 6 GHz band. In the USA and Canada, outdoor Wi-Fi use of the band is authorised under the control of an AFC database.

2.16 In response to our 2022 consultation on Upper 6 GHz, Cellnex suggested that standard power Wi-Fi would be required to deliver enterprise-grade private networks across large indoor settings (e.g., factories) and outdoor Wi-Fi would be required to cover certain industry locations, such as manufacturing campuses and ports.

Upper 6 GHz

2.17 Both the mobile and Wi-Fi industries want access to the Upper 6 GHz band. They see it as critical spectrum to support future growth in demand for, as well as to drive innovation in their services for consumers and enterprises. This was recognised internationally when

WRC-23 identified it for mobile in ITU Region 1[7] while acknowledging its importance for Wi-Fi.

Demand for mobile

2.18 The MNOs have indicated that mobile deployments in this band would most likely be concentrated in urban areas and used on a subset of existing macro sites with the highest traffic demand. Deployments in rural areas would likely be much more sparse. This is consistent with Ofcom's Connected Nations 2024 report which shows mobile data consumption largely mirrors population distribution (around 82% of traffic is generated in urban and suburban areas).[8]

2.19 This supports the responses to the July 2023 consultation from Ericsson, Nokia, VMO2 and Three which said MNOs need access to the band to increase capacity on already congested sites. All of this suggests that, outside high density areas, mobile demand for Upper 6 GHz spectrum will be relatively low.

2.20 The GSMA stated in its 2023 consultation response that access to the Upper 6 GHz band for mobile is required to reduce the cost and energy consumption of public mobile networks. BT's response shared its own analysis which supports this claim, adding that allocating a share of Upper 6 GHz to mobile could reduce the level of densification and investment needed to meet future demand for mobile capacity and maintain network performance.

Demand for Wi-Fi

2.21 Other respondents to the July 2023 consultation, including Apple, Samsung and Sky, stated that Wi-Fi will require access to the Upper 6 GHz band. Many of these respondents said that Wi-Fi is better suited to indoor coverage and highlighted that people spend the large majority of their time indoors. HPE referred to Ofcom's Connected Nations reports which indicate that far more data traffic in the UK is carried via fixed networks than via mobile networks.

2.22 Several respondents made the case that Wi-Fi access to the entire 6 GHz band would complement the expanding number of fibre to the home connections. HPE stated that 10 Gbps home broadband is already available in the UK, and the Upper 6 GHz band will allow these speeds to be available wirelessly.

2.23 In response to our 2023 consultation, Amazon, HPE and Meta referenced reporting from DSA/ASSIA which claims that congestion in the 2.4 GHz and 5 GHz bands has been impacting quality of service.

2.24 Stakeholders from the Wi-Fi industry have suggested that, at a minimum, seven to nine 80 MHz channels will be required to operate an enterprise Wi-Fi network with gigabit speeds. They also suggested that at least 320 MHz of clean Upper 6 GHz spectrum is required to meet the demand for Wi-Fi services.

2.25 Respondents also raised the demand for VLP use of the band for device-to-device communications which do not travel via a Wi-Fi access point and can be particularly efficient. Amazon, HPE and Meta argued that there are no alternative bands for expanding

[7] The identification in the Radio Regulations is for "International Mobile Telecommunications (IMT)," the ITU standard encompassing 3G, 4G and 5G mobile technologies.

[8] Connected Nations UK Report 2024, p. 40

Wi-Fi spectrum access. Shure and the Wi-Fi Alliance suggested that this band has the potential for innovation which is not possible in lower bands (2.4 GHz and 5 GHz).

Traffic growth

2.26 Data which directly measures Wi-Fi traffic volume is hard to come by. However, traffic over fixed networks can be considered a proxy for Wi-Fi traffic because a significant proportion of fixed traffic travels over Wi-Fi to reach user devices. The Dynamic Spectrum Alliance estimates that around 90% of fixed broadband traffic is delivered over Wi-Fi.[9]

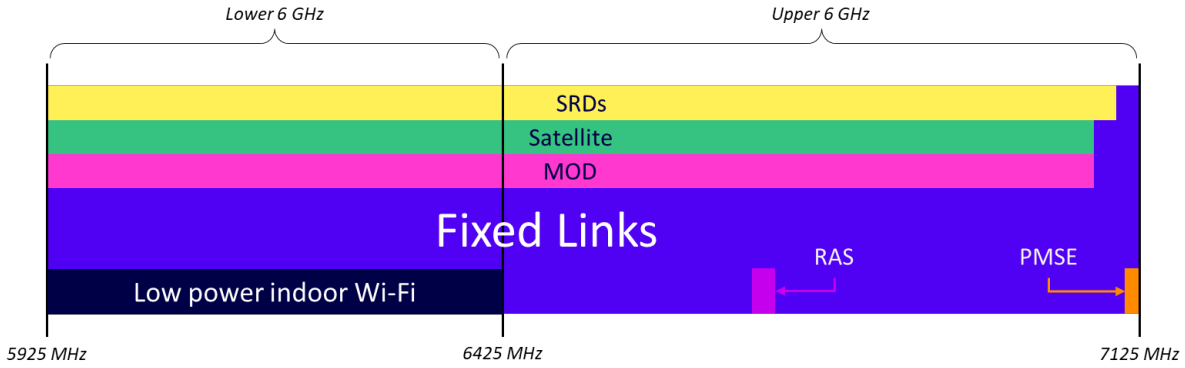
2.27 Data published through our Connected Nations reports suggests that, in absolute terms, fixed traffic volume is roughly ten times that of mobile. While both have reliably grown year-on-year, the growth rate for mobile traffic has been consistently higher than fixed traffic. However, the annual growth rate in traffic over both fixed and mobile networks has slowed in the last five years, with the current annual growth rate for mobile down to less than 20% and for fixed networks less than 10%. This is in line with Ericsson's November 2024 Mobility Report which shows slowing global mobile traffic growth rates, including forecasted annual mobile traffic growth rates for Western Europe (2024–2030) dropping from 17% to 14%.

Current use of the band

2.28 The 6 GHz band is currently used by a range of different services. Across both Lower and Upper 6 GHz the principal licensed users are fixed links and the fixed satellite service, and both bands are also used by licence exempt short-range devices (SRDs) and the MOD. However, use of Lower and Upper 6 GHz does differ, as shown in Figure 2.3 below.

2.29 Lower 6 GHz is also authorised for use by LPI (and VLP) Wi-Fi on a licence exempt basis. Upper 6 GHz is also used by programme making and special events (PMSE) equipment and the radio astronomy service (RAS).

Figure 2.3: 6 GHz band plan



Source: Ofcom

[9] In line with previous Ofcom publications, such as our 2022 Update on the Upper 6 GHz band, we use fixed traffic as a proxy for Wi-Fi traffic.

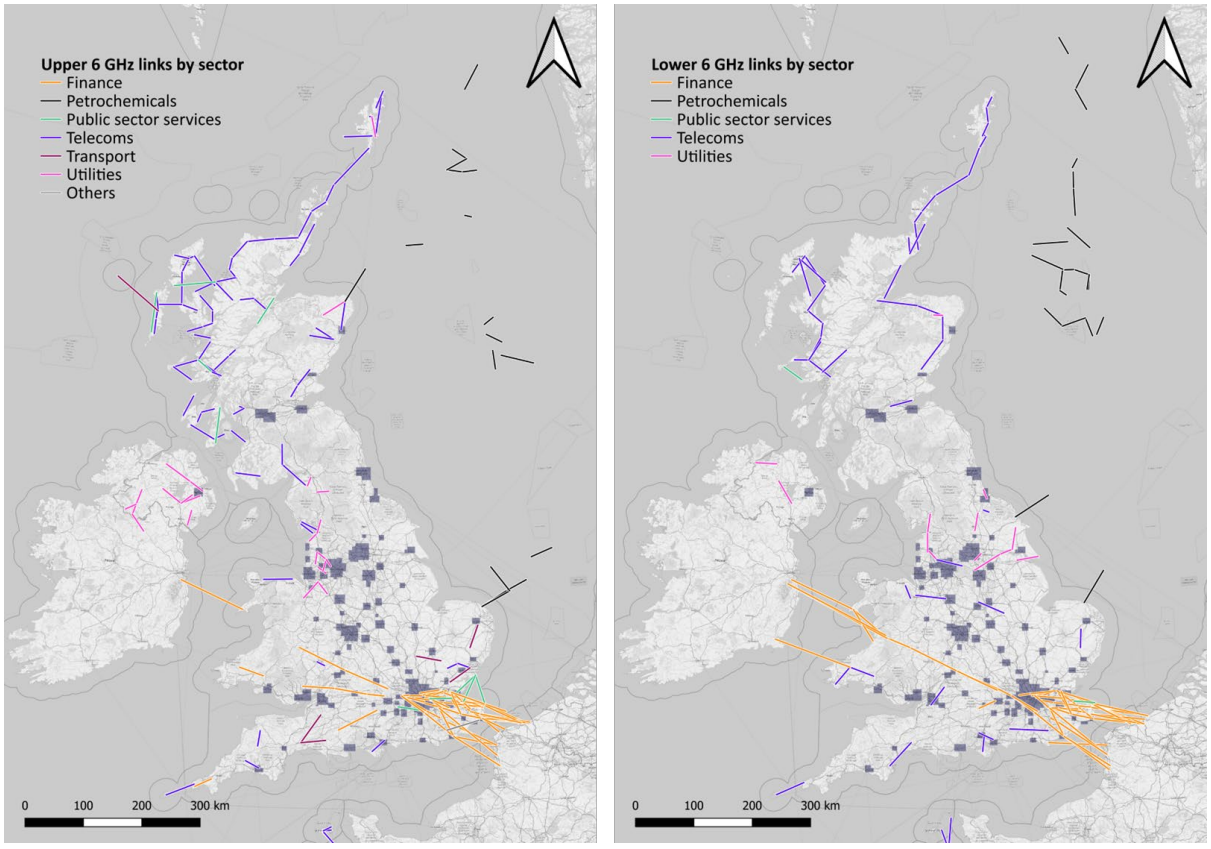
Fixed links

2.30 Fixed point-to-point links in both the Lower and Upper 6 GHz bands are used by a range of industries including telecoms, financial services, the oil and gas sector, utilities, transport and public sector services.

2.31 As of 12 September 2024, there were around 350 fixed link licences issued in the Lower 6 GHz band and just over 500 in the Upper 6 GHz band in the UK. Fixed links in the band are distributed across the whole of the UK but they are most concentrated in London and the southeast of England, owing to heavy use in this area by financial services.

2.32 Around 100 of the links in Upper 6 GHz overlap with the high density areas defined for our upcoming mmWave spectrum auction, which we consider to be a reasonable proxy for high density areas we might define for the authorisation of mobile in this band (see Section 5). The majority of these links are operated by companies in the finance sector involved in high frequency trading.

Figure 2.4: Fixed links in Lower and Upper 6 GHz, and high density areas



Source: Ofcom; base map © OpenStreetMap contributors

PMSE

2.33 As set out in the PMSE strategy we published in 2014, there is a PMSE allocation at 7110–7425 MHz in the UK, used mainly for wireless video links, including cordless camera link and

portable video link applications.[10] Specifically, the PMSE allocation is 7110–7250 MHz and 7300–7425 MHz. This means that the Upper 6 GHz overlaps with the PMSE allocation between 7110–7125 MHz.

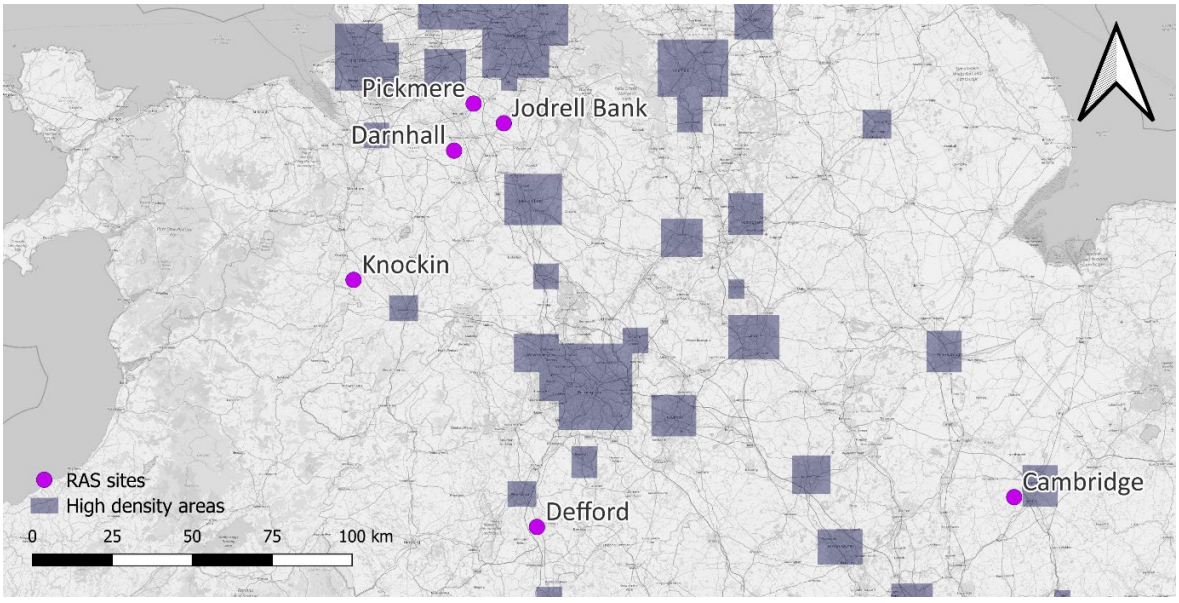
2.34 Some events have exceptional demand for spectrum. In these instances, additional spectrum can be "borrowed" from other bands, including from the Upper 6 GHz band. These events are typically one-off or infrequent events lasting a few days, such as F1 at Silverstone, the NFL games in London, the Eurovision Song Contest, the Commonwealth Games, state events such as the late Queen's funeral and the King's coronation, etc. Of these events, Silverstone is by far the heaviest and most regular user, with typically around 300 MHz of non-contiguous spectrum from Upper 6 GHz used annually over approximately 6 days across the whole F1 race meeting.

Radio astronomy

2.35 The frequency band 6650.0–6675.2 MHz is used by the radio astronomy service (RAS) for methanol spectral line measurements. In the UK these measurements are made using the e-MERLIN (enhanced Multi-Element Radio-Linked Interferometer Network) radio telescope array which consists of radio astronomy antenna dishes at the Cambridge, Darnhall, Defford, Jodrell Bank, Knockin and Pickmere radio astronomy observatories (see Figure 2.5 below). These sites are primarily outside residential areas, in locations where interference from other radio spectrum use is less likely.

2.36 RAS does not have a primary allocation or recognised spectrum access (RSA) in the Upper 6 GHz band and already shares with high power fixed links and satellite earth stations. However, we recognise the importance of the band for methanol line observations using the e-MERLIN array.

Figure 2.5: Map showing RAS sites comprising the e-MERLIN array, and high density areas



Source: Ofcom; base map © OpenStreetMap contributors

[10] A cordless camera link is a type of handheld camera with integrated or clip-on transmitter, power pack and antenna for carrying broadcast-quality video together with sound signals over short ranges (line-of-sight). A portable video link is a small transmitter for deployment over greater ranges, typically up to 2 km.

Satellite

2.37 The 6 GHz band is used by the fixed satellite service (FSS) in the Earth-to-space direction. The band 6700–7075 MHz is also allocated for feeder links for non-geostationary satellite systems of the mobile satellite service in the space-to-Earth direction. There are only a limited number of receiving earth stations operating across Europe, and none operating in the UK (nor do we have any plans to introduce them).

2.38 In the UK there is also a frequency allocation for Transportable Earth Station (TES) satellite uplinks in the band 5925–7075 MHz. TES licenses are typically issued for short durations up to one month (extendable on application), but the band has not seen any TES use since May 2019.

Short-range devices

2.39 The 6 GHz band is used for Tank Level Probing Radar (TLPR) systems. TLPR is a specific type of radar application used to measure the level of liquids or fluids in industrial tanks and vats. TLPR sensors are usually installed in metallic or reinforced concrete tanks (with typical shielding of 10–25 dB).[11]

2.40 The band is also used by some ultra-wideband (UWB) devices, for example iPhones and AirTags have 6 GHz UWB chips for "spatial awareness". CEPT has recently agreed[12] an extension to the use of UWB including for fixed outdoor usage for location tracking applications, general vehicular applications and higher-power indoor-only applications. UWB devices are authorised on a non-interference, non-protection basis, and they operate at extremely low power over a very wide frequency range.

Earth exploration satellite service

2.41 Although the Earth exploration satellite service (EESS) does not have a frequency allocation in the 6 GHz band, its operation in Upper 6 GHz is acknowledged in footnote 5.458 in the Radio Regulations.[13] The band is used mainly for sea surface temperature (SST) measurements which are important for weather and climate change prediction models.

MOD use

2.42 The Ministry of Defence uses spectrum across the 6 GHz band, but generally at select, isolated locations. We expect there would be more risk of MOD causing interference to other users of the band than for this to occur the other way around, but we would not expect this to be a significant risk due to the locations and time periods involved.

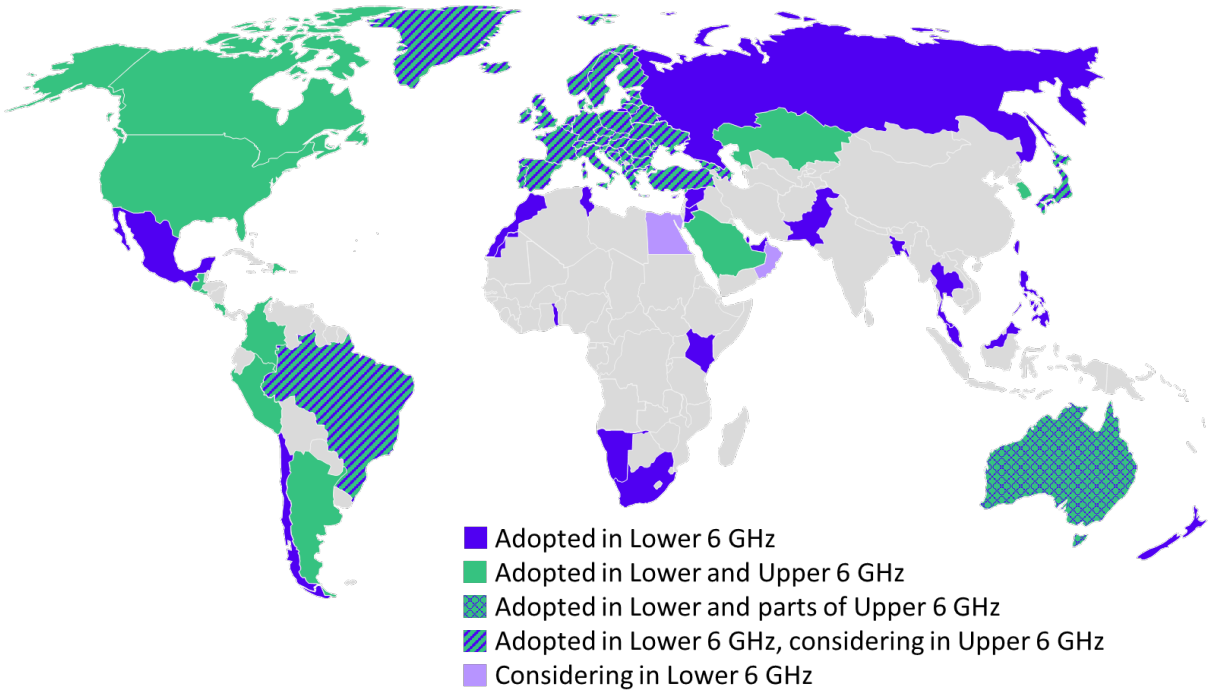
International developments

2.43 Several countries have already assigned or are moving towards assigning the entire 6 GHz band for licence exempt (Wi-Fi) use. These include the USA, Canada, Argentina, Saudi Arabia and South Korea. On the other hand, China has already assigned the Upper 6 GHz

[11] Technical conditions are set out in IR 2030.
[12] Commission Implementing Decision (EU) 2024/1467, 27 May 2024
[13] Footnote 5.458 states that Administrations should bear in mind the needs of the Earth exploration satellite (passive) and space research (passive) services in their future planning of the bands 6425–7075 MHz and 7075–7250 MHz.

band to mobile for 5G and 6G services and others, such as India, are leaning this way. Countries within Europe are yet to decide how to authorise Upper 6 GHz, though the CEPT and European Union are working on a shared approach.

Figure 2.6: Adoption of Wi-Fi in 6 GHz around the world



Source: Ofcom, adapted from Wi-Fi Alliance

2.44 WRC-23 identified the Upper 6 GHz band for IMT (mobile) in ITU region 1 while recognising use of the band for Wi-Fi. This decision leaves open the potential for both technologies to make use of the band.

Table 2.1: Use of 6 GHz across different administrations and regions

Countries	Lower 6 GHz (5925–6425 MHz)	Upper 6 GHz (6425–7125 MHz)
USA, Canada, Argentina, Saudi Arabia, South Korea	Authorised for Wi-Fi	
Hong Kong	Authorised for Wi-Fi	Awarded for mobile (300 out of 400 MHz allocated)
Europe	Authorised for Wi-Fi	Considering for Wi-Fi + mobile
India	Considering for Wi-Fi	Considering for mobile
China	Allocated for public and private mobile	
Africa	Mostly undecided	

Countries	Lower 6 GHz (5925–6425 MHz)	Upper 6 GHz (6425–7125 MHz)
Australia	Authorised for Wi-Fi	6425–6585 MHz assigned to Wi-Fi. 6585–7100 MHz reserved for mobile inside metro areas and individually licensed to mobile outside metro areas.

Source: Ofcom, adapted from Wi-Fi Alliance

CEPT

2.45 CEPT[14] has been studying technical aspects of future use of the Upper 6 GHz band for some time. In November 2021, it began studies on coexistence between Wi-Fi and existing services in the Upper 6 GHz band. In early 2023, following a request from eight CEPT countries (including the UK), it also began looking at the potential shared use of Upper 6 GHz between Wi-Fi and mobile networks.

2.46 The SE45 group of CEPT has studied aggregate interference from Wi-Fi into satellite uplinks, local coexistence with the small number of satellite downlink receiving sites, separation distances from radio astronomy observatories, and separation distances from fixed links. The public consultation on the SE45 report ran during October and November 2024, and SE45 reviewed the responses in December. The final report (ECC Report 364) was published on 24 January 2025.

2.47 ECC PT1 has investigated possible options for enabling both mobile and Wi-Fi access to the Upper 6 GHz band. It has studied a range of Wi-Fi and mobile network deployment scenarios, which include studies of medium power mobile base stations intended to provide outdoor coverage only and of higher power mobile base stations providing outdoor coverage and some indoor coverage. The technical analysis has been provided by mobile equipment vendors, Wi-Fi equipment vendors, chipset vendors, mobile network operators, companies providing internet services and national spectrum regulators.

2.48 Studies assumed that Wi-Fi will prioritise mobile use of the channel at the time and location when Wi-Fi detects a mobile signal. The amount of spectrum access available for indoor Wi-Fi is further reduced when lower mobile signal levels can be detected. This reduces the potential for interference to nearby mobile users as well as the amount of degradation from mobile signals suffered by the Wi-Fi which remains. This has been quantified based on the existing ways that Wi-Fi detects other users' signals and for proposed new mechanisms which could detect mobile signals at lower signal levels.

2.49 Studies also looked at the performance of mobile services based on the different base station power levels and the potential interference from Wi-Fi, highlighting the potential challenges for deploying medium power base stations on existing macro site grids.

2.50 The resulting draft ECC Report does not provide a preferred solution as that will depend on the demand for spectrum from each application, which is not in scope of the current report. However, the report considers an indoor/outdoor split for Wi-Fi and mobile respectively as

[14] The European Conference of Postal and Telecommunications Administrations - Background

well as a prioritised band split option. It is scheduled to be approved as a draft for public consultation in March, followed by publication in July.

European Union

2.51 The EU also has an interest in the Upper 6 GHz band. In July 2024, its Radio Spectrum Policy Group (RSPG) asked stakeholders for their views on the demand for Wi-Fi and mobile across the 6 GHz band and an RSPG working group is actively considering policy options for the EU, with a focus on long-term scenarios.[15] RSPG are likely to issue a draft Opinion for public consultation on their views by mid-2025 and issue a final Opinion towards the end of 2025.

2.52 In December 2024, the Radio Spectrum Committee issued a mandate to CEPT to investigate coexistence between existing services in the band with potential new Wi-Fi (which SE45 has worked on) and mobile (which PT1 is working on), to investigate the possibility of sharing between the two and to propose harmonised technical conditions for the band with a focus on enabling both Wi-Fi and mobile uses. Along with various interim milestones, the mandate requests that final reports should be published in July 2027.

[15] RSPG – Questionnaire on long-term vision for the Upper 6 GHz band

3. Legal framework

3.1 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 Wireless Telegraphy Act 2006 (the "**WT Act**").

Duties under the Communications Act 2003

3.2 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.

3.3 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 desirability of ensuring the security and availability of public electronic communications networks and services; (iv) 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 (v) 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.

3.4 In performing our duties, we are required under section 3(3) of the 2003 Act to have regard in all cases to the principles under which regulatory activities should be transparent, accountable, proportionate, consistent and targeted only at cases in which action is needed, and any other principles appearing to Ofcom to represent the best regulatory practice.

3.5 In carrying out certain regulatory functions, including Ofcom's spectrum management functions, section 4 of the 2003 Act requires Ofcom to act in accordance with the following requirements: a) to promote competition in communications markets; b) to promote the interests of all members of the public in the United Kingdom; c) to act in a manner which, so far as practicable, is technology neutral;[16] d) to encourage, to the extent Ofcom considers it appropriate, the provision of network access and service interoperability for the purpose set out in s.4(8);[17] e) to encourage such compliance with certain international standards as is necessary for the purposes set out in s.4(9);[18] and f) to promote connectivity and access to very high capacity networks by members of the public and businesses in the United Kingdom.

[16] According to s.4(6A) of the 2003 Act, this requirement does not apply to the imposition, in relation to a wireless telegraphy licence, of a limitation of a kind falling within section 9ZA(1) of the WT Act; or (b) the review, variation or removal of such a limitation.

[17] The purpose of securing: (i) efficiency and sustainable competition, (ii) efficient investment and innovation, and (iii) the maximum benefit for the customers of communications providers and of persons who make associated facilities available.

[18] For facilitating service interoperability, end-to-end connectivity, the changing by end-users of their communications provider, the retention by end-users of their telephone numbers after a change of communications provider; and securing freedom of choice for the customers of communications providers.

Duties under the Wireless Telegraphy Act 2006

3.6 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.

3.7 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.

3.8 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.

3.9 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.

3.10 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.

3.11 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.

3.12 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.

4. Expanding Wi-Fi access in Lower 6 GHz through AFC

Summary

4.1 We are consulting on making standard power Wi-Fi (36 dBm / 4W EIRP) available in the Lower 6 GHz band, including outdoors, provided it is under the control of an Automated Frequency Coordination (AFC) database.

4.2 Control via the AFC database should ensure adequate protection of incumbent services such as fixed links. In essence, this would entail:

- Wi-Fi access points geolocating themselves and contacting the database periodically to request or renew permission to transmit.
- The AFC database running interference analysis and returning a list of channels and power levels at which the access point may transmit.

4.3 We are not proposing that the AFC database would deal with the coordination between Wi-Fi installations, or the protection of Wi-Fi from other users in the band. This would be consistent with the way AFC databases operate in other countries.

4.4 We do not anticipate that Ofcom would provide or manage an AFC database ourselves. We believe that this is a function best provided by industry, in line with the approach taken in the USA and Canada.

4.5 We are interested in stakeholders' views on the demand for standard power and outdoor Wi-Fi controlled via an AFC database, as well as interest from industry in providing AFC database services in the UK.

4.6 Subject to demand for outdoor and standard power Wi-Fi, as well as interest in providing AFC databases, we will consult further on the detailed implementation.

Introduction

4.7 In our 2020 consultation and statement on improving spectrum access for Wi-Fi, we made the Lower 6 GHz band (5925–6425MHz) available for Wi-Fi and other RLAN devices on a licence exempt basis, enabling low power indoor (up to 24 dBm EIRP) and very low power (VLP) use.

4.8 We previously discussed the prospect of using managed databases in our 2023 consultation on enabling sharing between mobile and Wi-Fi. We now consider that for Lower 6 GHz, AFC could facilitate access for outdoor and standard power licence exempt Wi-Fi, enabling greater use of the spectrum than low power indoor deployments alone.

4.9 We are aware of ongoing work within the SE45 group of CEPT, looking at sharing between Wi-Fi up to 36 dBm and incumbent users. This work is scheduled to lead to a revised ECC Report 302 being published around September 2025. In parallel with this work, we are consulting on the principles behind how we would manage this expansion of access in the UK, and gauging industry interest in outdoor and standard power Wi-Fi in this band. We will

proceed with our proposals on the Lower 6 GHz band, taking account of any relevant output from SE45 at the time.

How does an AFC system work?

4.10 AFC is a spectrum use coordination system which, in this case, enables operation of Wi-Fi access points (and other licence exempt services) while protecting incumbent users in the same frequency band. The AFC system uses a database which holds information on the location and frequencies of incumbent services. It is used by Wi-Fi access points to obtain location, power and frequency specific permission to transmit without causing interference to those incumbent services.

4.11 Before transmitting, outdoor and standard power Wi-Fi access points would have to geolocate themselves and contact the database to request permission to transmit. The AFC database would then run interference analysis and return a list of channels and power levels at which the access point may transmit. This check has to be renewed periodically.

4.12 AFC developments globally are focused on the 6 GHz band, and we understand that AFC capability would likely be included in future Wi-Fi chipsets covering the whole 6 GHz band, regardless of whether that functionality is enabled in the device.

Existing implementation of AFC systems

4.13 Standard power outdoor Wi-Fi use of the Lower 6 GHz band under the control of an AFC system has already been authorised in the USA by the Federal Communications Commission (FCC)[19] and in Canada by Innovation, Science and Economic Development Canada (ISED).[20]

4.14 We intend to, for the most part, harmonise our approach with that of the FCC and ISED to benefit from the existing ecosystem of AFC operators and to promote equipment compatibility.

4.15 The FCC and ISED both chose to allow multiple separate AFC systems operated by private organisations, rather than running the system themselves. This approach is intended to foster competition and innovation between AFC system operators and provide Wi-Fi users with choice. In line with the USA and Canada, we are also proposing to allow multiple AFC systems operated by private organisations. We are not proposing that Ofcom will provide an AFC database.

Existing use of the Lower 6 GHz band in the UK

4.16 Aside from the licence exempt Wi-Fi we authorised in 2020, the Lower 6 GHz band is currently primarily used by fixed links and satellite permanent earth stations. These are licensed users who expect a level of protection from interference, and the approach we are proposing would use the AFC functionality to manage the necessary protections. The band

[19] On 23 April 2020 the FCC authorised unlicensed standard-power access points in the 5925–6425 MHz and 6525–6875 MHz bands under the control of an AFC system (FCC, Report and Order: Unlicensed Use of the 6 GHz Band, 26 May 2020).

[20] ISED has authorised standard-power access points across the whole 5925-6875 MHz frequency range, also under the control of an AFC system (ISED, Decision on the Technical and Policy Framework for Licence-Exempt Use in the 6 GHz Band, May 2021).

is also used by some short-range devices (SRDs) and ultra-wideband (UWB) applications on a licence exempt basis. The Ministry of Defence (MOD) also uses the band.

Fixed links

4.17 We outlined in Section 2 the current state of use of the Lower 6 GHz band by fixed links, with some 350 links present in the band across the country. Links are most densely deployed in London and the southeast of England.

4.18 As outlined above, we would expect any future AFC system to take into account the protection criteria needed to prevent harmful interference from standard power Wi-Fi into fixed links. We would not expect to clear any fixed links, or to close the band to new links.

Satellite earth stations

4.19 Satellite services use this band for uplink transmissions (Earth-to-space) only. To protect satellite receivers, some constraints may be needed on the radiated power (EIRP) above a certain elevation of outdoor Wi-Fi access points. To protect similar users of this band in the USA, the FCC adopted a rule requiring outdoor access points to limit the maximum EIRP above a 30-degree elevation angle to 21 dBm.

4.20 There is a risk that outdoor Wi-Fi users of the band may experience interference from satellite permanent earth stations. In a case of interference, outdoor Wi-Fi access points should be able to detect that the channel they are using is busy (via Wi-Fi's energy detect mechanism) and move to operate on a different Wi-Fi channel (subject to its availability via the AFC database). Below we provide maps indicating spectrum availability across the UK, including areas where spectrum in the band may be limited due to potential interference from permanent earth stations and other incumbent users.

Short-range devices

4.21 The main short-range devices using the band are tank level probing radar (TLPR) and some ultra-wideband (UWB) devices. These services are licence exempt, and we do not consider that they require any specific protection. The isolation inherent to TLPR should avoid any interference between Wi-Fi and TLPR, and we also do not expect UWB devices to create any interference issues with other incumbent users or Wi-Fi. In both cases we expect users to continue to have sufficient capacity to operate as normal.

MOD

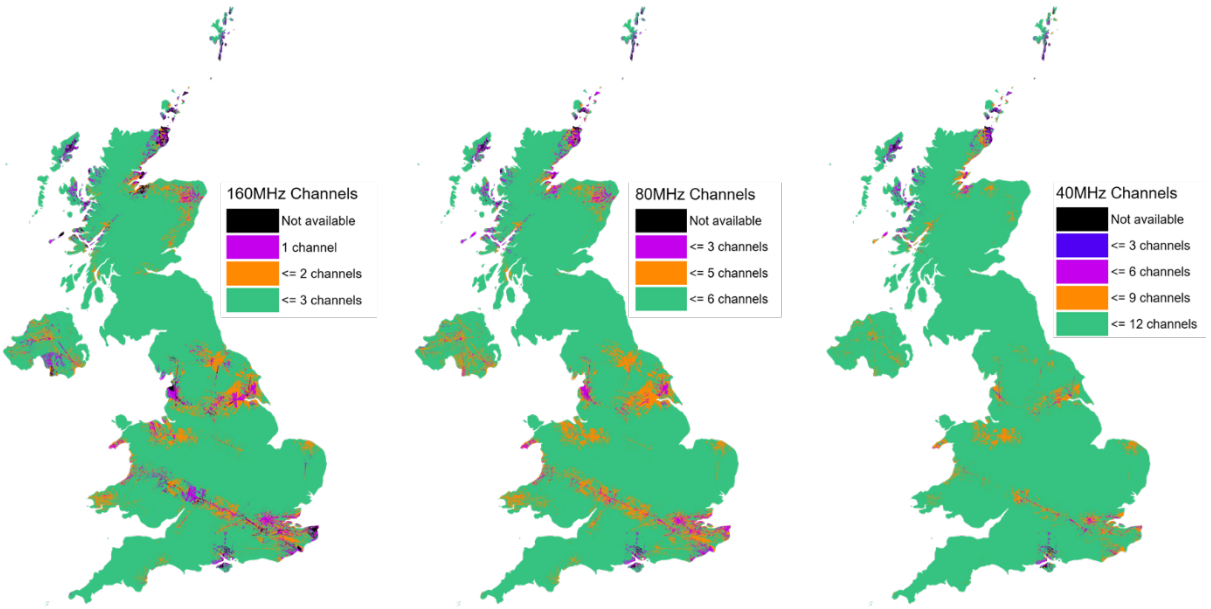
4.22 The Ministry of Defence (MOD) uses the Lower 6 GHz on an occasional and geographically varied basis. While we do not expect standard power Wi-Fi devices to cause harmful interference to the MOD’s operations in the Lower 6 GHz band, it is possible that MOD operations could cause interference to outdoor Wi-Fi use of the band, however we would expect this to be only occasional. This is in line with normal licence exempt operation which is not guaranteed protection.

Spectrum availability analysis

4.23 To provide an indication of how much of the Lower 6 GHz band is likely to be available for outdoor standard power Wi-Fi use, we have looked at likely spectrum availability based on a Wi-Fi access point power level of 36 dBm EIRP and a height of 3 metres.[21]

4.24 The maps in Figure 4.1 below show the availability that an AFC database might indicate for three different channel bandwidths (160 MHz, 80 MHz and 40 MHz). The AFC database will only account for the protection of incumbent fixed links and permanent Earth stations (it will not account for interference from incumbent use into Wi-Fi).

Figure 4.1: Indicative availability of outdoor standard power Wi-Fi channels (36 dBm EIRP at 3m height above ground) when protecting incumbent users



Source: Ofcom

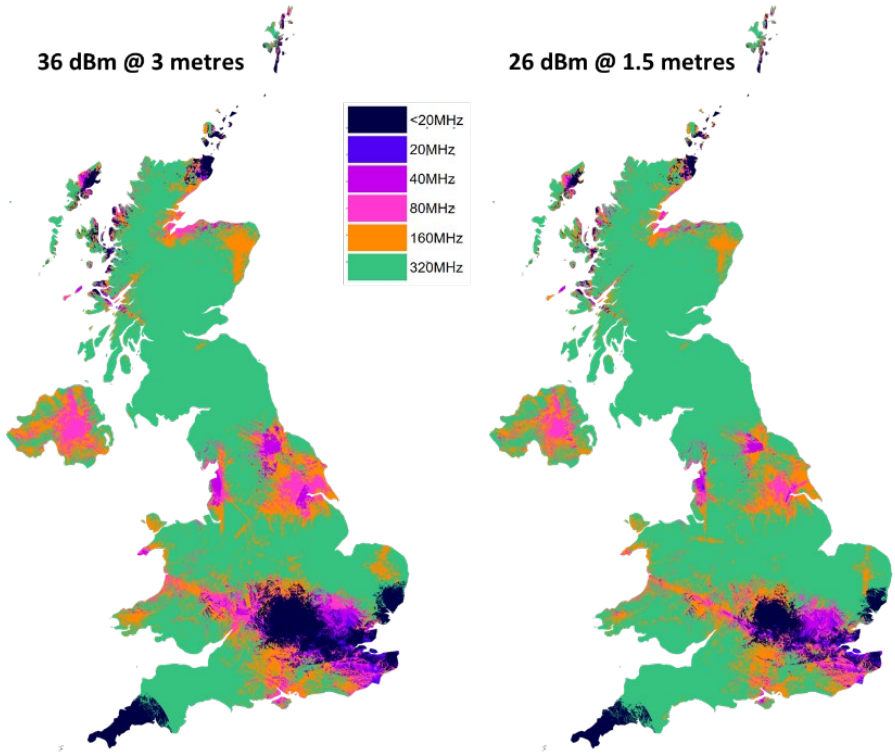
4.25 These maps indicate that almost all Wi-Fi channels should be available outdoors in most parts of the country (green and orange areas) with constrained availability limited to specific areas (purple and blue areas). In only a very small set of areas would there be no availability at all (black areas). Overall, availability for outdoor 160 MHz, 80 MHz and 40 MHz channels looks very good.

4.26 These maps are only indicative of the spectrum availability users might expect from an AFC database in an area, based on current spectrum use by other users and typical assumptions around the implementation of the AFC database.

4.27 The results shown in Figure 4.1 do not take into account any potential interference from incumbent fixed links and permanent earth stations into Wi-Fi. Figure 4.2 below therefore illustrates the potential **worst-case** impact on total spectrum availability for outdoor Wi-Fi taking into account interference from these incumbents.

[21] We have not specifically looked at indoor use, as we consider that in general the addition of building entry loss would mean that indoor availability will be higher but following the same overall pattern.

Figure 4.2: Worst-case total availability of outdoor Wi-Fi spectrum in the Lower 6 GHz band when also accounting for interference from incumbent users



Source: Ofcom

4.28 The map on the left shows worst-case total spectrum availability for outdoor Wi-Fi operating at 36 dBm EIRP at 3 metres above ground level. The map on the right shows the worst-case total spectrum availability for outdoor Wi-Fi operating at 26 dBm EIRP at 1.5 metres (which might be more representative of urban deployments). We have assumed that satellite earth stations are continuously transmitting at full power on all spectrum available to them. This is likely to be very pessimistic, as it is unlikely that the earth stations would transmit continuously on all available frequencies at full power, and we would expect that Wi-Fi could detect any interference and may be able to mitigate the impact of this using techniques such as puncturing.

4.29 We would expect real-world availability to lie somewhere between what is shown in Figure 4.1 and Figure 4.2.

4.30 As can be seen, in the worst case, usable spectrum could be constrained in certain areas. Potentially, even for smaller channel bandwidths, availability may be limited in some parts of the country (for example in parts of London, Oxfordshire, Cornwall, Suffolk and Kent). However, we consider that there is likely to be reasonable availability of outdoor standard power Wi-Fi channels across large parts of the country, including for wider 80, 160 and 320 MHz channels.

Our proposal

4.31 We propose to enable standard power (up to 36 dBm / 4W EIRP) Wi-Fi, both indoor and outdoor on a licence exempt basis. Use outdoors or above 24 dBm indoors will need to be under the control of an AFC system to avoid causing interference to incumbent users.

4.32 We intend, where appropriate for the UK, to harmonise our approach with countries that have already authorised unlicensed access to the 6 GHz band through AFC systems, namely the USA and Canada. We consider that this will best allow us to leverage existing equipment available for the North American market and limit the amount of additional work that would need to be done by industry to adapt to an AFC approach in the UK.

4.33 We are seeking views on:

a) The demand for standard power Wi-Fi for use both indoors and outdoors in the 5925–6425 MHz band.
b) The level of interest from industry in providing AFC systems in the UK.

Question 1: What interest do you have in deploying outdoor or standard power Wi-Fi or other licence exempt RLANs in the Lower 6 GHz band? Please provide details of the types of expected deployments.

Question 2: Are you interested in providing or developing AFC databases for use in the Lower 6 GHz band in the UK?

Question 3: Do you have any views on the operational considerations of setting up and running AFC databases?

What an AFC system might look like in the UK

AFC system specifications

4.34 As outlined above, we aim to follow the approach set out by existing AFC systems, in particular the approach taken by the FCC. Where possible, we expect we would use the same parameters used by existing AFC databases in the USA, however there may need to be some amendments to take account of UK-specific regulatory and interference conditions.

4.35 Subject to industry interest, we would consult further on the detailed technical parameters of any UK AFC systems. Below we set out an initial list of what we consider would be likely conditions for the AFC databases and connected access points, based on the FCC's AFC approach.

- **Geolocation**: All standard power Wi-Fi access points required to provide geolocation data to the database.
- **Interval for re-checking frequency availability**: Once per day.
- **Information required from access points**: Latitude, longitude, antenna height, device ID,[22] manufacturer's serial number.
- **Number of AFC databases**: Multiple databases, provided by industry.
- **EIRP range**: 36 dBm (maximum)–18 dBm (minimum).

4.36 We would not expect that the AFC system would provide coordination between Wi-Fi access points, aggregate interference modelling, or any adjacent band protections.

[22] We are considering if we should adopt the same device ID as the FCC.

AFC operator approval process

4.37 We will need to develop a system for the approval of prospective AFC operators, the details of which we will consult on if we decide to proceed with our proposals. We note that the FCC has developed its own process[23] which involve the following steps:

- Public consultation
- Lab testing
- Public trial

4.38 We could adopt a similar process, adapted for a UK regulatory environment (it is possible that we could wholly rely on aspects of the FCC process if they adequately encompass our requirements, rather than requiring the whole process to be re-run in the UK).

4.39 We are seeking views on whether we should follow a similar approval process for AFC systems to that used by the FCC and if there is any opportunity for streamlining the FCC process.

Question 4: Do you have any views on how we should manage the approval process for AFC databases and, in particular, whether we should rely on parts of the FCC process rather than requiring the whole process to be re-run in the UK?

Question 5: Please provide any other comments on our proposals for extending access to standard power Wi-Fi and outdoor use, including the overall approach, any details on technical parameters and the running of the AFC databases in this band.

[23] Federal Communications Commission, Public notice: OET announces commencement of the 6 GHz band automated frequency coordination systems, 24 August 2023

5. Our approach to sharing between mobile and Wi-Fi

Introduction

5.1 We propose sharing the Upper 6 GHz band between Wi-Fi and commercial mobile. We are inviting input on all aspects of our thinking, but some of the next steps will depend on the progress of European harmonisation work.

5.2 In this section:

- We explain why we believe sharing the band between Wi-Fi and mobile is likely to bring benefits to the UK and invite input on our rationale.
- We present our view of emerging sharing options, reflecting those being considered as part of ongoing European harmonisation work. We welcome feedback on these possible future sharing options but will return with more detailed proposals once harmonisation work is more mature.
- We are consulting on a "phased" approach to making the spectrum available, whereby we would initially authorise Wi-Fi, and proceed to authorise mobile use once European harmonisation is mature. We are also considering an alternative approach where we would wait for European harmonisation to be resolved first. We will take into account the outcome of this consultation when considering our next steps.

Why a shared approach?

5.3 As set out in our previous Vision for the future of the Upper 6 GHz band document, we believe that shared use of Upper 6 GHz will bring the greatest overall benefits to citizens and consumers, rather than the alternative of allocating the spectrum exclusively for either mobile or for Wi-Fi. We also aim to preserve as much as possible of the benefits already provided by existing uses of the band.

5.4 Both the mobile and Wi-Fi industries want access to the band to help them to cope with the future growth in demand for advanced wireless broadband services (see Section 2 for a fuller discussion on traffic growth). However, there are some differences in where and how mobile and Wi-Fi would like to use the band, and there is a good deal of uncertainty over both the exact level and exact locations of future demand for both.

5.5 An appropriate framework for sharing the band could open the possibility of combining the best of what mobile and Wi-Fi can offer, optimising use of the band and adapting to changes in relative levels of future demand at a localised level. However, to achieve this, industry and regulators must cooperate in developing a harmonised approach to shared use and accept that this should support sharing on an equitable basis, optimised to the needs of specific environments.

5.6 MNOs would like to use the Upper 6 GHz band to provide extra capacity from their existing outdoor macro sites, in locations with the highest density of users. We expect Upper 6 GHz to be especially needed to provide Wi-Fi capacity in the busiest indoor and enterprise environments and to support new use cases.

5.7 For most users, it is connectivity itself that matters, more than whether wireless broadband is delivered over mobile or Wi-Fi specifically. There will be places where both mobile and Wi-Fi would be likely to use the spectrum intensely, especially in dense urban areas like central London. Sharing mechanisms will be essential to manage these "overlaps", and these mechanisms should also take into account coexistence with existing uses of the band.

5.8 We consider it likely that the benefit from shared use of the band between both mobile and Wi-Fi would be larger than the benefit provided from either alone. In assessing possible mechanisms to provide for this shared approach, we are looking for options which will:

- **ensure the greatest possible overall benefits** for consumers and citizens from the use of the band;
- **be commercially attractive to operators (both Wi-Fi and mobile)**, leveraging international harmonisation and existing technical standards wherever possible; and
- **allow, where possible, for coexistence with existing users**, who may continue to provide the greatest overall value from the use of this spectrum in some areas.

Options for sharing

5.9 There are two broad options for shared use of the band by mobile and Wi-Fi under consideration in Europe, which we described in our May 2024 Vision document.

Prioritised spectrum split

5.10 The first option is a prioritised spectrum split[24] with Wi-Fi having priority in the lower portion of the Upper 6 GHz band and mobile having priority in the upper portion (see Figure 5.1). Each set of users (Wi-Fi and mobile) would be able to access the other's priority portion where it would not cause interference, i.e., it was aware that the other application was not present in the area.

5.11 The exact location of the split is still to be decided but we anticipate a range between:

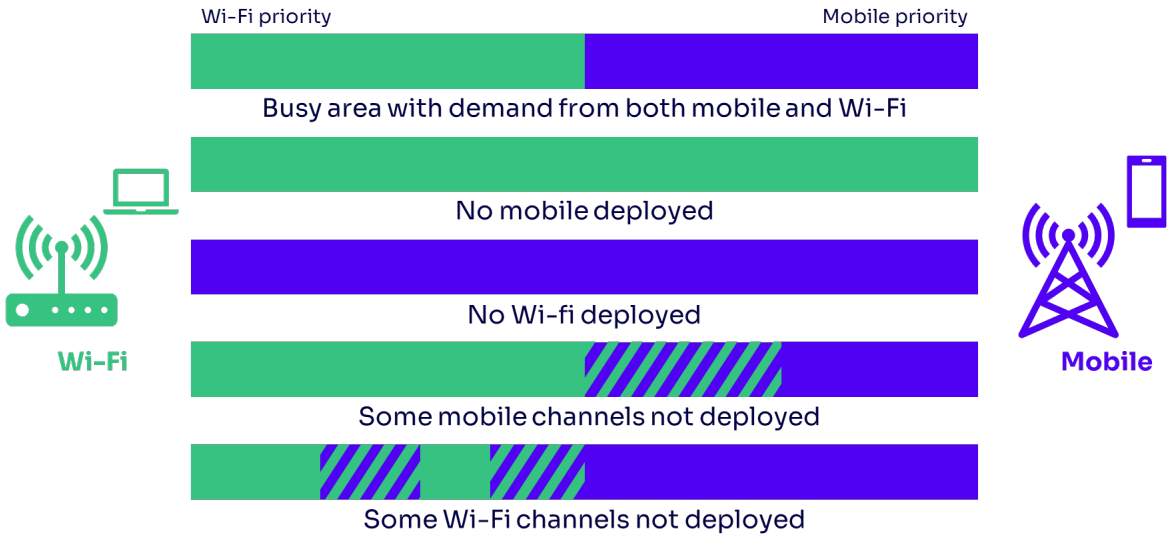
- as a minimum, an additional **160 MHz** prioritised for Wi-Fi (which, in combination with Lower 6 GHz, would allow for an additional 320 MHz channel, as well as a single 160 MHz or two more 80 MHz channels), leaving up to 540 MHz prioritised for mobile; and
- as much as **320–400 MHz total** prioritised for Wi-Fi (providing a total of two more 160 MHz channels, and four or five more 80 MHz channels), leaving up to 300–380 MHz prioritised for mobile.

5.12 We remain open to any quantity of spectrum between 160 and 400 MHz to prioritise for Wi-Fi, but note that evidence we have seen could point to 320 MHz with the remainder prioritised for mobile, and that European harmonisation discussions will be a significant consideration in our decision.

5.13 We note that the adjacent 7125–7250 MHz band is the subject of a WRC-27 agenda item considering its potential future use for mobile. This could potentially lead to an additional 125 MHz of mobile spectrum contiguous with Upper 6 GHz (making between about 400 and 600 MHz of contiguous spectrum prioritised for mobile, depending on the scenario).

[24] We previously called this a variable spectrum split in our Vision for the future of the Upper 6 GHz band document.

Figure 5.1: Prioritised spectrum split

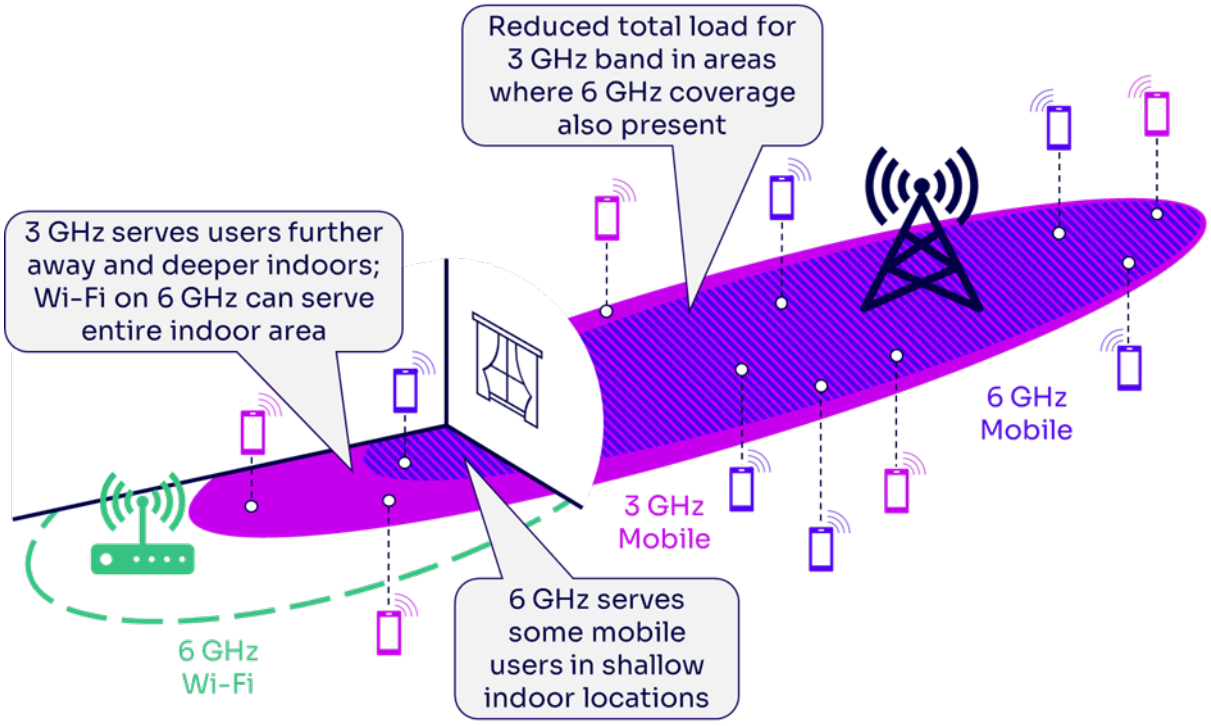


Source: Ofcom

Indoor/outdoor split

5.14 The second sharing option is an indoor/outdoor split with Wi-Fi intended to provide coverage indoors and mobile intended to provide coverage outdoors (see Figure 5.2), freeing up capacity in other mobile bands to serve indoor users. In this scenario mobile power would need to be limited, while still being sufficient to allow good outdoor coverage from existing macro sites (our initial analysis shows that levels of around 58 dBm/100 MHz EIRP could achieve this).

Figure 5.2: Indoor/outdoor split



Source: Ofcom

Our view of the sharing options

5.15 The mobile industry, as part of the ongoing CEPT work, have said they would like to use high power (greater than 80 dBm/100 MHz EIRP) to allow MNOs to match the indoor downlink coverage they get from current macro site deployments in 3.5 GHz. They also acknowledge that lower frequency bands will likely be required to improve the capacity in the uplink from those indoor locations. Allowing high power mobile across the entire Upper 6 GHz band (with national licensing) may maximise the benefits to mobile, but it would severely constrain any benefits to Wi-Fi. In our view this is unlikely to lead to the greatest benefits to consumers overall, especially in the longer term as buildings become more energy efficient and mobile networks densify. We think the greatest possible benefits would be achieved by adopting one of the sharing options discussed above.

5.16 Unlike the indoor/outdoor split, high power mobile could be supported by the prioritised spectrum split option, which is likely to be more compatible with current mobile network architectures. This would preserve the benefits from mobile and Wi-Fi in their respective priority portions of the band and allow opportunistic use in the non-priority portions. Thus, it is likely to generate significant overall benefits.

5.17 Over time, we anticipate that mobile operators will want to re-evaluate the way they plan and deploy their networks to meet user needs. This could make the indoor/outdoor split an attractive future option for them. As buildings become more energy efficient, it will become harder for mobile signals to penetrate into them, especially at higher frequencies like 6 GHz. Even today, in-building coverage from outdoor macro sites using the 3.5 GHz band can be patchy, with the band only able to provide "shallow" indoor coverage in many cases. At 6 GHz it may be even harder to provide reasonable indoor coverage.

5.18 In the future, operators may need to consider much greater use of in-building solutions to provide indoor coverage. This could be by either investing in low power indoor Wi-Fi (noting that various trusted/untrusted network interworking technologies including OpenRoaming[25] and Passpoint[26] have the potential to enable seamless connectivity between Wi-Fi networks and mobile devices), or by deploying indoor mobile small cells. A low power mobile technology such as 5G New Radio-Unlicensed (NR-U) could be adapted to meet the same technical conditions as we propose for Wi-Fi in Upper 6 GHz, which could enable indoor mobile use alongside Wi-Fi.

5.19 We will not make a final decision on which sharing option to adopt in the UK until the outcome of European harmonisation becomes clearer. At the moment, we expect we would align with the approach to sharing agreed at the European level, although, recognising commercial mobile requirements for higher power, we are currently leaning towards a prioritised spectrum split as our preferred outcome.

5.20 It is also worth noting that, if European harmonisation ultimately settles on a prioritised spectrum split, the maximum permitted mobile power we ultimately set will need to account for coexistence with incumbent users. We have assumed a maximum mobile power of 73 dBm/100 MHz in most of our coexistence analysis in this consultation. This was the level agreed for the studies in preparation for WRC-23 and in the current CEPT work.

[25] Wireless Broadband Alliance, OpenRoaming
[26] Wi-Fi Alliance, Passpoint

We will decide on the maximum permitted mobile power once the outcome of European harmonisation is clearer.

Introducing new users into the band

5.21 As mentioned earlier, European harmonisation is important for providing the certainty needed for manufacturers, operators and users to invest in equipment and services for the band. If we go ahead with our proposals and implement sharing between Wi-Fi and mobile in the band, the timing has to be compatible with the European harmonisation processes. However, this does not mean we have to wait for the conclusion of that process to get started. A phased approach as proposed below would allow UK and European developments to progress in parallel, with both processes potentially benefitting from each other.

5.22 In addition to the phased approach we have also considered an alternative approach for the introduction of sharing between mobile and Wi-Fi in this band:

- **A phased approach**
  - Phase 1: authorising low power indoor Wi-Fi in the whole of the Upper 6 GHz as quickly as possible.
  - Phase 2: authorising mobile once the outcome of European harmonisation is clearer.
- **Alternative approach: Wait for European harmonisation** before authorising Wi-Fi and before authorising spectrum for mobile.

5.23 The pros and cons of these approaches are discussed below.

Phased approach

5.24 We note the strong signals from the mobile industry on the need for high power mobile spectrum in the Upper 6 GHz. As we explain above, a prioritised spectrum split approach to sharing the band can allow for this (whereas an indoor/outdoor split cannot).

5.25 Therefore, under the phased approach we would plan for the implementation of a prioritised spectrum split (the initial stages of which would also remain compatible with an indoor/outdoor split).

5.26 In phase 1, we would authorise low power indoor Wi-Fi use on a licence exempt basis across the whole Upper 6 GHz band as quickly as possible. We would also indicate the amount of spectrum we would allocate for the Wi-Fi priority portion of the band with the remainder likely to be allocated to the mobile priority portion.

5.27 Authorisation of mobile spectrum would come later, in phase 2, once the outcome of European harmonisation is clearer.

5.28 The main risk with this approach is that some “legacy” Wi-Fi devices, deployed before European harmonisation concludes, may not have implemented some features agreed as part of the harmonisation that could help reduce the risk of interference with mobile later, such as “enhanced sensing”. We explain later in this section why we believe this risk is manageable.

5.29 In our view the phased approach would be compatible with the likely range of possible outcomes of the European harmonisation process, even in less likely scenarios such as harmonisation for single use:

- Any requirements on Wi-Fi decided as part of a European decision for **sharing between Wi-Fi and mobile** could be added to the UK licence exemption later;
- If Europe harmonised Upper 6 GHz for **Wi-Fi use only**, we anticipate minimal or no need for changes to the proposed UK licence exemption.
- If Europe harmonised Upper 6 GHz for **mobile use only**, we believe that Wi-Fi, as part of shared use in the UK, could still continue by using the existing equipment ecosystem created for Wi-Fi use in the USA and elsewhere while still prioritising commercial mobile uses when and where required.

5.30 The phased approach would:

- start realising the benefits of Upper 6 GHz for UK consumers as soon as possible; and
- inform the European harmonisation progress, via the work we would be conducting to progress the UK licence exemption.

5.31 We explain in more detail how this phased approach would work later in this section.

Wait for European harmonisation

5.32 Under this (more cautious) approach, we would wait until the work on European harmonisation completes before moving ahead with the authorisation of either Wi-Fi or mobile. This could be the simplest way to ensure that the UK is aligned and compatible with the European equipment ecosystem. However, we would not get any benefits from early use of the band by Wi-Fi and miss out on opportunities to help inform and drive the international process with the UK's practical experience.

5.33 This approach would mean we would not be in a position to progress with the introduction of any new services in the band until after 2027 at the earliest. It would also remove a key driver for industry to agree early on sharing mechanisms; there would be very little incentive for the mobile industry to agree anything with respect to sharing mechanisms with Wi-Fi until it was ready and able to use the spectrum itself. This approach could risk the whole implementation timetable being dictated by one industry sector at the expense of another and inevitably delaying benefits to citizens and consumers.

5.34 On balance, we do not consider this to be an attractive option, as the UK would not get any benefits from early use of the band by Wi-Fi, and it could remove industry incentives to reach agreement on sharing mechanisms. For these reasons, we are concentrating our proposals on the phased approach described above.

Question 6: Do you have any comments on our proposal to use a "phased" approach, or on the alternative to wait for European harmonisation?

Implementation of a phased approach

Phase 1: Authorising licence exempt Wi-Fi

5.35 We propose to authorise low power indoor Wi-Fi use on a licence exempt basis across the whole Upper 6 GHz band as the first phase in enabling sharing in the band. Limiting Wi-Fi to low power indoors will enable most of Wi-Fi's potential value while minimising the coexistence challenges with incumbent users and with mobile once it enters the band.

5.36 To do this we are consulting on the specific technical conditions that we think are required at this stage, including Wi-Fi power levels (see Section 6). As we are moving ahead in advance of the availability of an ETSI harmonised standard covering Upper 6 GHz, we are including in this consultation a draft voluntary national specification (VNS) that could be used as the basis for demonstrating that equipment meets the technical conditions outlined in Section 6.[27] If we were to proceed with phase 1, we would expect to consult on specific exemption regulations later in 2025, based on the detailed technical specifications in this consultation.

5.37 Where mobile and Wi-Fi are present in the same geographical areas, Wi-Fi's detect-and-avoid mechanisms will mean that Wi-Fi should cease to transmit when it detects mobile. However, some Wi-Fi access points in locations where the mobile signal is weaker may continue to transmit, potentially suffering interference from and causing performance degradation to mobile.

5.38 We recognise that the outcome of the European harmonisation process may lead to a need to improve Wi-Fi access points' ability to sense mobile signals. This could be beneficial for Wi-Fi access to the mobile priority part of the band in a prioritised spectrum split option, as well as in an indoor/outdoor split. Two examples of how this improved sensing could be done are: by requiring mobile to broadcast a specific (Wi-Fi-like) beacon signal; or by Wi-Fi sensing an existing mobile control signal. In either case, it may mean that changes would be needed to Wi-Fi access point software or hardware.

5.39 There are some differences in the performance of the two mechanisms. However, of the two, requiring mobile to broadcast a Wi-Fi-like beacon is our strong preference, and we will advocate for this in the European harmonisation discussions. It makes more sense for this to be implemented in thousands of mobile base stations than requiring significant changes in many more access points for Wi-Fi to decode mobile control signals. We note that Qualcomm is specifically looking at what they refer to as cross-technology signalling based on mobile transmitting a Wi-Fi-like signal.[28]

5.40 However, even where changes to the Wi-Fi access point are necessary in the future, we do not think this should prevent us from moving ahead with authorising Wi-Fi in the meantime. Under our currently preferred mechanism (requiring mobile to broadcast a Wi-Fi-like beacon), this is likely to only need a software upgrade to Wi-Fi equipment.

5.41 Early authorisation will allow manufacturers to start including the Upper 6 GHz band in client Wi-Fi devices straight away, thus seeding the market with products that can make use of the band as soon as access points become available.

5.42 This first generation of "legacy" devices (i.e., those deployed after we authorise Upper 6 GHz but before the rules for a new shared use mechanism is defined) may have an increased risk of interference compared to later devices with an enhanced sensing mechanism.

5.43 However, we believe there should be limited risk from deploying access points without additional sensing. This is because the likelihood of interference in practice should only become material in much later stages of adoption, when demand and deployment of both

[27] The VNS is not intended to provide guidance on meeting the essential requirements of The Radio Equipment Regulations 2017.

[28] ECC PT1(25)059, Qualcomm, "Study D9 updates"

services is extensive. In practice, the overlap in time between the use of first generation "legacy" Wi-Fi devices and mobile rollout should be short, because:

- we expect adoption of Upper 6 GHz for both technologies to be relatively gradual;
- we understand that Wi-Fi kit is likely to be refreshed after 5–7 years or so, based on feedback we have received from industry; and
- we are proposing not to authorise mobile in the band before the outcome of the European harmonisation process becomes clearer. Following that, it will take time for the mobile equipment ecosystem to become available, for operators to deploy the band in their networks, and for mobile devices which use the band to be taken up by users in significant quantities.

5.44 The Wi-Fi 7 standard certified devices have been available since early 2024, and we anticipate that this will be the dominant technology in the first wave of Upper 6 GHz access points. We have been engaging with Wi-Fi chipset and equipment manufacturers and we understand that some of the enhanced features of the Wi-Fi 7 standard could help mitigate many of the coexistence issues with mobile (e.g., enhanced adaptability, preamble puncturing and automatic channel selection).

5.45 In addition, we will explore ways to further reduce any risks from first generation Upper 6 GHz "legacy" Wi-Fi devices. For example, one option we are considering would be to require "legacy" access points to stop transmission on all or a portion of Upper 6 GHz frequencies from, say 2030, unless they have confirmed they can continue to do so. This could be achieved by requiring them to consult a simple web interface from time to time (e.g., every 6 months from 2030 onwards), to determine whether they can continue to use the Upper 6 GHz band. If a prioritised band split is adopted later, it could be possible to move "legacy" access points out of a mobile priority portion of the band.

Question 7: Do you have any comments on the above suggestion to manage any "legacy" Wi-Fi devices, or alternative suggestions?

5.46 Given these considerations, we are not proposing to require enhanced sensing in Wi-Fi access points at this time. However, once the outcome of the European harmonisation process becomes clear, we would expect any such requirements to be implemented in due course. We would expect to consult on making the necessary changes to our licence exemption regulations at that time.

5.47 One of the goals of our proposals is to provide as much certainty as possible to manufacturers, operators, and users over future access to the band. There is obviously a degree of uncertainty around the approach we might take for the introduction of mobile in phase 2.

5.48 If we were to adopt the prioritised spectrum split option, once mobile rolls out in the future, the Wi-Fi community should be able to count on the continued use of the spectrum in the Wi-Fi priority portion of the band with opportunistic access still available in the mobile priority portion in places where mobile doesn't roll out. We would expect this to include most locations outside urban areas, as well as some locations within urban areas, as we would expect mobile deployments to focus on areas of highest network congestion.

5.49 Under a prioritised spectrum split, we remain open to any quantity of spectrum between 160 and 400 MHz to prioritise for Wi-Fi but note evidence we have seen could point to 320 MHz.

Question 8: Do you have a view on the amount of spectrum that should be prioritised for Wi-Fi under the prioritised spectrum split option? Please provide evidence for your view.

5.50 If we were to adopt the indoor/outdoor split option, Wi-Fi would continue to have access to the entire band indoors, albeit with some contention with mobile possible in some shallow indoor locations.

5.51 While our clear preference is for phase 1 to proceed as described above, we have also identified a potential variant where we would only include client Wi-Fi devices during phase 1, not access points. This would not allow immediate use of the band, but it would allow manufacturers to "seed" the market with client devices such as phones and laptops. Access points would be authorised later once the European harmonised technical requirements are clear. This may reduce the risk of early introduction of Wi-Fi leading to coexistence issues with mobile later on, however as discussed above we believe these are already manageable. It would significantly reduce the benefits to consumers by delaying the date when the band could be used by Wi-Fi, and for this reason we are not proposing to consider it further.

Question 9: Do you have any comments on our plan for a "phase 1" when Wi-Fi will be introduced?

Question 10: One variation on "phase 1" would be to only authorise Wi-Fi in client devices to "seed" the market. Would you have any views on this, or suggestions for other variations?

Phase 2: Authorising mobile

5.52 As proposed above, mobile use of the band would come later, in a second phase once European harmonisation is more mature. We expect that we will need to wait until the specific sharing mechanism is clearer before setting out detailed proposals on mobile authorisation. However, we are setting out below, at a high level, some of the approaches we are considering and how we think we would likely proceed. We set these out at high level here to prompt stakeholder feedback. We will consult later with more specific authorisation proposals for the mobile allocation, including confirming the amount of spectrum that would be prioritised for mobile under a prioritised spectrum split option.

5.53 The physical characteristics of the Upper 6 GHz band make it particularly well suited for providing additional capacity in parts of the mobile network where traffic is very high, rather than expanding coverage. Therefore Upper 6 GHz spectrum is most likely to be deployed in "high density" areas, primarily the largest cities and towns. We are considering an approach similar to that adopted for the forthcoming mmWave award, whereby we would award wide-area licences based on these areas.[29]

5.54 If we proceed with this proposal to support a mobile authorisation, we will need to consider the impact on incumbent users in these areas; Section 7 shows our initial high-level views on how we might manage this impact and invites feedback. In any case, we expect to consult later with more specific details about any impact on incumbent users.

[29] For more information on how these were decided, see Section 4 of our March 2023 Statement and further consultation: Enabling mmWave spectrum for new uses.

5.55 Within these high density areas, a licence could give a licensee access to the same spectrum block across all high density areas. Alternatively, spectrum blocks in each high density area could be awarded separately, though this might be a more complex process.

5.56 Outside of high density areas, we anticipate that we would adopt an alternative approach that reflects the likely lower demand from mobile operators. For example, we could consider local licensing on a first come, first served basis. This could be similar to the Shared Access licences available in other spectrum bands, which we authorise on a location-by-location basis, although we would consider alternatives if needed to meet mobile demand.

5.57 Another option, if demand from mobile operators outside high density areas is confirmed to be low, could be to use an AFC system to allow Wi-Fi and NR-U use in these areas, while protecting incumbents.

5.58 There are other decisions that we can only take once European harmonisation is mature. For example, requiring mobile to adopt a similar channel plan to Wi-Fi could help coexistence.

Question 11: Do you have any comments on our plan for a "phase 2" when commercial mobile will be introduced?

Question 12: Do you have a view on the amount of spectrum that should be prioritised for mobile under the prioritised spectrum split option? Please provide evidence for your view.

Question 13: Do you have any evidence or views about the geographical extent of mobile networks' likely deployment in Upper 6 GHz?

Question 14: Do you have any comments on our proposed phased approach to authorisation of both Wi-Fi and mobile in the Upper 6 GHz band?

6. Authorising Wi-Fi use of the Upper 6 GHz band

What we are proposing to make available

6.1 We are proposing to make the Upper 6 GHz band available to indoor Wi-Fi use. These proposals would allow greater capacity in future Wi-Fi networks in homes and enterprises across the UK, providing additional bandwidth that can enable future innovation.

6.2 This section details the technical conditions we propose for Wi-Fi use. At a high level, these are broadly similar to those used in existing Wi-Fi bands for indoor use. The technical conditions are based on our analysis which shows that, if they are implemented as proposed here, there is a low risk of interference to existing users of the band.

6.3 As explained earlier in this document, we are proposing to make the 6425–7125 MHz band available for use by any technology capable of meeting our technical conditions, but in practice we expect Wi-Fi to be the most likely candidate technology.

Proposed technical conditions

6.4 We would mandate contention-based (polite) protocols (such as listen-before-talk) to minimise the potential for interference with other new and incumbent users of the band.[30]

6.5 Outdoor use would not be permitted, and indoor use[31] will be limited to 250mW EIRP (with maximum mean EIRP density of 12.6mW/MHz in any 1 MHz bandwidth). We have proposed these requirements because:

a) The EIRP limits align with the technical parameters for Wireless Access Systems (WAS) in the Lower 6 GHz band (5925–6425 MHz) contained in UK Interface Requirement IR-2030, which will facilitate compatibility of equipment across the whole 6 GHz band.
b) Limiting devices to low power indoor (LPI) operation will help to protect incumbents due to the additional loss incurred as signals pass through buildings.

6.6 A LPI client device would need to be under the control of a LPI access point and will not be permitted to connect directly to another LPI client (e.g., to establish an ad-hoc network). The purpose of this requirement is to prevent client devices from operating outdoors at locations where they may cause interference to incumbents.

[30] As explained in Section 5, we may mandate new protocols or enhanced sensing mechanisms at a later date if we consider it to be necessary and proportionate to assist sharing with other services, in particular to support a second phase of sharing when mobile is introduced.
[31] "Indoor use" means within a building or within an aircraft or any other enclosed space, having attenuation characteristics at least equivalent to those of a building or an aircraft, to establish a connection with stations or apparatus within the same building or aircraft or other enclosed space for communications purposes.

6.7 We are not currently proposing to permit very low power (VLP) portable outdoor devices or standard power devices (outdoor or indoor)[32] in the Upper 6 GHz band, but we will keep this under review.

Question 15: Do you have any comments on our proposal to not include very low power portable devices in the Upper 6 GHz band at this stage, but to keep this under review?

6.8 To protect passive observation of methanol spectral line emissions by radio astronomy observatories we are proposing that Wi-Fi equipment will not be permitted to transmit in the band 6650–6675.2 MHz. This means that two 20 MHz channels will not be available for Wi-Fi in the Upper 6 GHz band and portions of wider channels that overlap these frequencies may need to be punctured.

Table 6.1: Proposed technical conditions for Wi-Fi in the Upper 6 GHz band

Permitted deployment	Indoor only
Frequency band	6425–6645 MHz, 6685–7125 MHz
Bandwidth	Channel bandwidths up to 320 MHz are permitted
Maximum mean EIRP	250mW (24 dBm)
Maximum mean EIRP density	12.6mW/MHz (11 dBm/MHz) in any 1 MHz band

Source: Ofcom

Question 16: Do you have any comments on our proposal to authorise the use of low-power indoor Wi-Fi access points and client devices to use 6425–7125 MHz?

Question 17: Do you have any comments on the proposed technical conditions?

Implementation

6.9 UK Interface Requirement IR-2030 contains the requirements for the licensing and use of short-range devices. We intend to consult on updates to IR-2030 and the Exemption Regulations[33] later in 2025.

6.10 In the absence of an ETSI harmonised standard for the Upper 6 GHz band we have developed a Voluntary National Specification (VNS) to provide guidance on meeting the requirements of IR-2030, which can be found in Annex A3. The VNS is likely to be withdrawn if a harmonised ETSI standard is published for the Upper 6 GHz band.

Question 18: Do you have any comments on the proposed VNS draft?

[32] In the Lower 6 GHz band, we defined Very Low Power devices as those operating with EIRP up to 25mW, and allowed outdoor and indoor operation. In Upper 6 GHz, because the authorisation is for indoor only, these devices are already covered by the LPI authorisation and a separate category of VLP devices is not required. However, outdoor use is not permitted. Standard power devices are those that can operate with EIRP up to 4W.

[33] Either an update to the existing Exemption Regulations or the development of new regulations.

Upcoming requirement for enhanced sensing

6.11 Although we are not proposing requiring enhanced sensing from Wi-Fi at this stage, we are interested in input on how it could be implemented. Our initial view is that, in general, it would be preferable to adapt mobile base stations to transmit signals that can be readily understood by Wi-Fi devices (see Section 5).

6.12 One study from Qualcomm[34] suggests a practical implementation, using existing Wi-Fi standards. The mobile base station and/or handset would transmit IEEE 802.11bc uplink (UL) frames with Higher Layer Payload (HLP). The Wi-Fi access point operating in the Upper 6 GHz band would be mandated to receive and process the messages as specified by the existing IEEE standard. The effect would be for Wi-Fi to vacate the channel when mobile is active, in mobile priority parts of the band (if a prioritised spectrum split is adopted).

Question 19: Do you have any suggestions for an appropriate mechanism for enhanced sensing, or comments on the proposed solution above?

Wi-Fi sharing with existing users in Upper 6 GHz

6.13 When we made the Lower 6 GHz band available for use by Wi-Fi in 2020[35] we undertook coexistence analysis to ensure existing users of the band would not be impacted. Due to the similarity in use between the Lower and Upper 6 GHz band we believe our previous analysis is still valid for most of the incumbent scenarios in the Upper 6 GHz band.

6.14 More recently, sharing studies between Wi-Fi and incumbent systems in the Upper 6 GHz band have been carried out within Working Group SE45 of the CEPT Electronic Communications Committee (ECC) culminating in the publication of ECC Report 364.

6.15 Based on our earlier analysis and the SE45 studies, we do not consider that low power indoor Wi-Fi, subject to the technical conditions proposed, is likely to cause harmful interference to existing users. We provide a summary of our analysis below with further technical details provided in Annex A2.

Wi-Fi with fixed links

6.16 When considering Wi-Fi sharing with fixed links, Working Group SE45 looked at a wide range of deployment scenarios and operating assumptions including population density, market adoption rate of Wi-Fi, different distributions of Wi-Fi devices around fixed links (in terms of both height and distance) and representative fixed link operating requirements. The SE45 analysis concluded that interference from low power indoor Wi-Fi is unlikely except in a few isolated corner cases.[36]

6.17 We undertook our own analysis when we made the Lower 6 GHz band available and we updated this for the Upper 6 GHz band in our 2022 consultation. Our analysis supports the

[34] ECC PT1(25)059, Qualcomm, "Study D9 updates"
[35] Ofcom, Statement: Improving spectrum access for Wi-Fi – spectrum use in the 5 and 6 GHz bands, 4 October 2023
[36] In these corner cases several factors would need to occur simultaneously, including the Wi-Fi access point being in the main beam of a low gain fixed link antenna, a low fixed link fade margin and low signal attenuation through the building.

SE45 conclusions, and we consider the risk of interference from low power indoor Wi-Fi to fixed links is very low.

Wi-Fi with programme making and special events

6.18 In the UK we have an allocation for programme making and special events (PMSE) equipment that overlaps with the top end of the Upper 6 GHz band (7110–7425 MHz). We looked at the range of separation distances that might be required to protect wireless video equipment (cordless camera and portable video links) from indoor Wi-Fi operation. Since there are only two 20 MHz Wi-Fi channels that overlap with the PMSE allocation our analysis focussed on Wi-Fi using 40 MHz or 80 MHz channels directly adjacent to the PMSE allocation.

6.19 We found that it is unlikely that PMSE wireless video links and Wi-Fi can both operate indoors in close proximity on adjacent frequency channels, but we believe these situations can be managed operationally, for example by choosing different channels in either the Wi-Fi or wireless camera or the use of a PMSE channel filter.

6.20 When Wi-Fi is operating indoors and PMSE operating outdoors, separation distances are likely to be negligible when factors like building entry loss, antenna pointing, and Wi-Fi activity factor are considered. Larger Wi-Fi channels also help to reduce the potential for interference as the Wi-Fi power is spread over a wider bandwidth (i.e., the power spectral density is reduced).

Wi-Fi with radio astronomy

6.21 SE45 considered aggregate interference from different Wi-Fi deployment scenarios into the Jodrell Bank observatory (along with three others in different European countries). As noted in Section 2, Jodrell Bank is one of six observatories in the UK that together form the e-MERLIN array for studying methanol line emissions in the Upper 6 GHz band.

6.22 The SE45 studies only considered Jodrell Bank operating as a single dish but the results can be used to estimate the separation distance required to protect e-MERLIN observations, which are less sensitive to interference than using a single dish. The results suggest a separation distance of around 20 km is required based on the assumptions used in the SE45 study.

6.23 Our own analysis, based on the impact of a single interfering Wi-Fi access point but using pessimistic assumptions[37] are in line with the SE45 studies. Maintaining the required separation distance between licence exempt equipment such as Wi-Fi and radio astronomy sites would be difficult to implement so instead we are proposing to restrict Wi-Fi equipment from transmitting in the radio astronomy band 6650–6675.2 MHz. This means that two 20 MHz channels (6645–6685 MHz) will not be available for Wi-Fi.[38] We will keep this under review pending any new technical analysis we receive from stakeholders.

[37] We assumed maximum transmit power and did not take into account other factors used in the SE45 studies that might help to reduce interference, such as busy hour factor or RF activity factor.

[38] It may still be possible for Wi-Fi to use 80 MHz, 160 MHz or 320 MHz channels provided techniques such as preamble puncturing are used to avoid transmissions in the RAS band.

Question 20: Do you agree with our proposal to restrict Wi-Fi from transmitting in the 6650-6675.2 MHz band to protect the radio astronomy service? Please provide any technical evidence to support your view.

Wi-Fi with the Earth exploration satellite service

6.24 The Upper 6 GHz band is used by the Earth exploration satellite service (EESS) for sea surface temperature (SST) measurements to support weather predictions and climate modelling. To ensure the long-term continuity of these measurements, new frequency bands are under study for the next World Radio Conference in 2027. In the medium term, we consider the risk of interference to EESS from indoor Wi-Fi is low, but we will be seeking a positive outcome on the allocation of new frequency bands to safeguard SST measurements on a long-term basis.

Wi-Fi with short-range devices and ultra-wideband devices

6.25 As we outlined in Section 2, the main short-range device use in the Upper 6 GHz band is tank level probing radar (TLPR). We consider it unlikely that Wi-Fi will cause interference to these devices due to the nature of their installation inside metal or reinforced concrete tanks with a high degree of RF isolation.

6.26 The 6000–8500 MHz band is also used by ultra-wideband (UWB) equipment for sensors, location tracking, vehicle access and in a range of consumer devices. There are some existing studies in ECC Report 302 that show the probability of Wi-Fi causing a reduction in sensitivity for location tracking devices is less than 3%, and less than 2% for sensing devices. European Commission Implementing Decision (EU) 2024/1467 (May 2024) identified new usage cases for UWB including fixed outdoor use and enhanced (higher power) indoor use, but we do not think these new applications will change the SE45 conclusions that Wi-Fi can share with UWB.

Wi-Fi with the fixed satellite service

6.27 SE45 assessed the potential for interference from Wi-Fi into satellite-based receivers, including aggregate interference from more than 1.5 million transmitting Wi-Fi devices. The studies concluded there is a very low likelihood of interference with large margins before the interference threshold at the satellite receiver is reached.

Question 21: Do you agree with our assessment of Wi-Fi coexistence with existing users of the band? If not, please provide details.

7. Coexistence of mobile with other users of Upper 6 GHz

Summary

7.1 We present in this section our preliminary analysis about how future mobile deployment might coexist with current users of the band. This is to prompt feedback from stakeholders and help inform our thinking. We cannot provide any proposals or a detailed analysis of coexistence with mobile because the appropriate technical conditions for mobile will only become clear later after the European harmonisation process progresses further (see Section 5).

7.2 Much of the analysis in this section focuses on mobile deployments in "high density areas" (see paragraphs 5.52–5.58), as this is where we think Upper 6 GHz deployments are most likely. However, we will consult on the specific details of mobile authorisation in Upper 6 GHz in the future.

Mobile with fixed links

7.3 Our analysis suggests that there is a potential risk of interference from mobile base stations located potentially up to several tens of kilometres of a fixed link receiver, especially if the mobile base station is on the boresight of the fixed link antenna. The exact distances will depend on mobile power levels, and site-specific factors including height and local clutter. It is unlikely that fixed links overlapping with high density areas could be protected from interference from mobile base stations deployed in those areas without causing significant constraints on mobile. We would expect that some fixed links outside high density areas that are near enough to receive interference from mobile deployments inside those areas could face similar issues. However, we think that for most fixed links outside of high density areas, the risk of interference from mobile is low.

7.4 Our initial view is that the benefit to citizens and consumers of using Upper 6 GHz for mobile in high density areas is likely to be greater than that of fixed links. We understand that the number of links in high density areas is relatively small and therefore we think the overall cost of moving these links should be relatively low.

Question 22: Do you have any evidence about the costs to operators of moving fixed links in and around "high density" areas (such as urban centres) to other bands?

7.5 Given the above, we think it likely that before awarding the spectrum to mobile, we would propose giving notice to revoke fixed link licences for links in and around high density areas, with five years' notice to clear the band in line with the terms of the licences. If, however, a fixed link operator wished to remain in the band without protection, we may consider this option.

7.6 To be clear, at this stage we are not proposing to clear fixed links from high density areas, but we are considering this as a likely future option. We would consult further on any clearance in future publications.

7.7 Outside of high density areas we do not think there is sufficient justification to clear incumbent fixed links. We expect that suitable coordination procedures could be implemented to mitigate any risk of interference from mobile use, which would be more localised and sporadic.

Mobile with programme making and special events

7.8 Our analysis indicates that interference between mobile and programme making and special events (PMSE) equipment could occur over distances up to a few tens of kilometres from high power mobile base stations for co-channel deployments. We therefore think it likely that we would need to make some changes to PMSE access to Upper 6 GHz spectrum.

7.9 As shown in Section 2, PMSE use of the Upper 6 GHz band can fall in the following two categories:

- **Overlap**. Frequencies between 7110–7125 MHz are included in Upper 6 GHz and also in the 7 GHz PMSE band. This is a small overlap in comparison to the size either band.
- **Borrowing.** Where an event has exceptional demand for spectrum, up to 300 MHz has been borrowed from Upper 6 GHz for PMSE use in the past (for example the F1 race meeting at Silverstone).

7.10 Allowing PMSE to continue to borrow Upper 6 GHz in high density areas could require significant constraints on mobile use of the band, which would not support our objective to maximise the benefits to the UK from this spectrum. However, outside high density areas we think that there should be no issue with continuing to allow borrowed use.

7.11 In addition, Silverstone, with its regular and heavy PMSE use, could, if necessary, be treated as a special case and we are considering the option of an exclusion zone of a few kilometres around the racetrack which would be effective for the duration of the F1 race meeting (around 1 week).

7.12 Our analysis has indicated that PMSE use in the overlapping spectrum (7110–7125 MHz) can be accommodated elsewhere in the 7 GHz band. We are therefore considering removing 7110–7125 MHz from the preferred block of frequencies for PMSE. We are also considering the option of allowing its use on a borrowed basis outside high density areas.

7.13 If we were to go ahead with changes to PMSE access to Upper 6 GHz spectrum, we do not think this should cause a significant problem to PMSE users for the following reasons:

a) We note that PMSE equipment can generally tune across the entire 6350–7500 MHz range and that frequencies above 7390 MHz are currently very lightly used. Our analysis indicates that making greater use of the upper part of 7 GHz PMSE band should compensate for any reduction in access below 7125 MHz. Exceptions could be Silverstone (hence the option of treating it as a special case outlined above) and occasional large events such as the Commonwealth Games. In these cases, borrowing from Upper 6 GHz may be possible in some areas, or we may look for alternative spectrum such as expanding sharing arrangements with the MOD, see below.
b) We are exploring the possibility with MOD of allowing some spectrum in the 7250–7300 MHz and 7425–7500 MHz bands for PMSE in some locations, though this is at an early stage.

Mobile with radio astronomy

7.14 Our coexistence analysis between mobile and the radio astronomy service (RAS) shows that, co-channel, separation distances up to 50 to 60 km may be needed to protect the six e-MERLIN sites from interference from high power mobile base stations (73 dBm/100 MHz). If we were to adopt an indoor/outdoor split approach to sharing the band, the separation distances would be up to 30 to 40 km due to reduced power for mobile base stations.

7.15 For adjacent channel use, the separation distances are lower, e.g., 20 to 40 km depending on the mobile base station powers.

7.16 We note that there is no primary or secondary allocation for RAS in the band and it is not included under the radio astronomy grant of recognised spectrum access (RSA) or the pricing arrangements for public sector spectrum use. However, we do recognise the increasing importance of the band for RAS research and we are considering potential solutions to protect e-MERLIN use.

7.17 Our current view is that radio astronomy could be protected by imposing a coordination requirement on the deployment of mobile base stations that operate co-channel or in the immediately adjacent spectrum, similar to the approach already in place for RAS sharing with fixed links.

7.18 Such a coordination requirement could impact certain parts of several high density areas including Manchester, Liverpool and Cambridge. Given this, we will consider if use of the band by RAS should be recognised in their fees.

Mobile with the Earth exploration satellite service

7.19 We note that some preliminary studies were started in ITU-R prior to WRC-23 showing that interference to sea surface temperature (SST) measurements might occur at quite large distances over the ocean. However, these studies were not concluded and, in our view, were based on some quite pessimistic assumptions.

7.20 Nevertheless, we agree that the protection of these measurements is important. The WRC-23 outcome was to agree to study the possibility of allocating, at WRC-27, additional spectrum to the Earth exploration satellite service (EESS) for SST measurements in the 4.2–4.4 GHz and 8.4–8.5 GHz bands. Our view is that the allocation of either or both of these bands should alleviate any concerns around the continuation of SST measurements from the time that mobile rollout is expected.

Mobile with short-range devices and ultra-wideband devices

7.21 As outlined in Section 6 above, we consider that the characteristics of TLPR, including the generally industrial setting of its use, enclosed nature of the tanks and vats in which it is used, downward-facing antennas and use of automatic power control all contribute to limiting the possibility of interference from or into TLPR. We therefore do not expect any significant level of interference between TLPR and mobile.

7.22 Ultra-wideband (UWB) devices are authorised on a non-interference, non-protection basis, and they operate at extremely low power over a very wide frequency range, which is designed to help mitigate the effect of other signal interference. We do not expect any

significant coexistence issues between mobile and UWB regardless of the power level mobile is licensed to use.

Mobile with fixed satellite

7.23 Coexistence between mobile base stations and receivers on satellites was studied extensively in the run up to WRC-23. The outcome of the conference was to agree a set of restrictions on the amount of power a mobile base station can emit at various angles above the horizon (a so-called vertical elevation EIRP mask).

7.24 We believe that the mask agreed at WRC-23[39] will provide adequate protection to satellite receivers operating in the band and therefore we intend to include this mask in the technical licence conditions for mobile.

Mobile with MOD

7.25 The MOD uses spectrum across the Upper 6 GHz band, but only at select, remote locations. We would not anticipate that this MOD use or any protection (if necessary) for this use would have a material impact on future mobile use of the band, although it is possible that MOD uses could cause occasional interference to nearby mobile equipment.

Question 23: Do you have any comments on our initial assessment of our likely approach to coexistence between future mobile use and current users in the Upper 6 GHz band?

[39] See Resolution 220 (WRC-23).

8. Next steps

8.1 The consultation period for this document will close on 8 May 2025, after which we will consider responses. We will then publish separate statements setting out our policy decisions for the Lower 6 GHz and Upper 6 GHz bands along with further consultations where appropriate.

8.2 If we decide to proceed with authorising outdoor and standard power Wi-Fi via AFC in the Lower 6 GHz band, final details of this proposal will be set out in a statement, likely in autumn 2025, alongside a consultation on further details.

8.3 If we decide to proceed with our phased approach to Upper 6 GHz, this would begin with authorising Wi-Fi. We would likely publish a statement on this policy decision, and consult on draft regulations, in autumn 2025. We would consult further on any policy proposals regarding mobile at a later date, once the outcome of ongoing European harmonisation work has become clearer.

Question 24: Do you have any other comments on our policy proposals or any of the issues raised in this document?

A1. Impact assessments

A1.1 Section 7 of the Communications Act requires us to carry out and publish an assessment of the likely impact of implementing a proposal which may significantly affect businesses or the public, or when there is a major change in Ofcom's activities.

A1.2 More generally, impact assessments form part of good policymaking and we therefore expect to carry them out in relation to a large majority of our proposals. We use impact assessments to help us understand and assess the potential impact of our policy proposals before we make them. They also help us explain the policy decisions we have decided to take and why we consider those decisions best fulfil our applicable duties and objectives in the least intrusive way. Our impact assessment guidance sets out our general approach to how we assess and present the impact of our proposed decisions.

A1.3 The relevant duties in relation to the proposal on which we are consulting are set out in Section 3.

A1.4 Taking our proposals in the round, we consider that they will help the Wi-Fi and mobile industries to meet anticipated growth and innovation in the UK, by providing them with access to additional spectrum which will support increased data capacity and speeds. We expect that these proposals are likely to yield greater benefits than the possible costs of implementing them, as well as the net benefits of the alternatives.

A1.5 We consider that the proposed measures to enable shared use of the Upper 6 GHz band by mobile and Wi-Fi, set out in this document, will:

- Support efficient use of spectrum by enabling both Wi-Fi and mobile to make use of the Upper 6 GHz band to provide services to people and businesses;
- Encourage investment and innovation, by providing mobile and Wi-Fi with additional spectrum needed to help meet future demand. Regarding Wi-Fi, our proposal will encourage investment by providing greater certainty to equipment manufacturers on the availability of Upper 6 GHz, with the expectation of sharing with mobile in the future.
- Support competition, as people and businesses will have greater choice of how to access data with higher speed and capacity;
- Encourage economic growth, by supporting investment and competition; and
- Promote the interests of UK consumers, who will benefit from improved mobile and Wi-Fi services.

A1.6 This annex focusses on our proposal to authorise Wi-Fi use in the Upper 6 GHz band. Below we discuss how this proposal may affect relevant stakeholders, including citizens and consumers. We will carry out impact assessments of other proposals discussed in this document in future consultations.

Proposal to authorise low power indoor Wi-Fi in the Upper 6 GHz band by end 2025

A1.7 We consider our proposal to authorise Wi-Fi specifically indoor and at low power, and to authorise it as early as is feasible, will provide the greatest overall benefit to people and

businesses in the UK (see Section 5), as the majority of Wi-Fi use is indoors. Equally, we believe low power, indoor Wi-Fi is sufficient for the majority of use-cases while supporting coexistence with existing and future co-channel users. We begin by considering the benefits and then describe mitigations against risks.

A1.8 We consider that our proposal to authorise low power indoor Wi-Fi in the Upper 6 GHz band (see Section 6) would benefit citizens and consumers in the UK. This is because it would enable Wi-Fi services to increase their speed and capacity, especially in areas with high demand such as enterprise buildings and multi-dwelling properties. As discussed in paragraph 2.43, several countries, including the USA, have already authorised Wi-Fi to use Upper 6 GHz, which should facilitate the creation of an ecosystem of devices and applications. We also discuss in paragraphs 2.20–2.24 the demand for Upper 6 GHz Wi-Fi in the UK. As Wi-Fi traffic continues to grow, and we see new innovations which rely on high data-rates enabled by larger channels, such as VR/AR use-cases, access to additional spectrum will enable Wi-Fi to meet these new demands.

A1.9 Our proposal to authorise Wi-Fi before European harmonisation in 2027, and ideally by the end of 2025, will:

- give equipment manufacturers the certainty they need to invest in developing Wi-Fi equipment now, and
- provide people and businesses with timely access to improved Wi-Fi services.

A1.10 Having considered the benefits, we now turn to the risks and mitigations.

A1.11 First, we do not consider that this proposal will significantly constrain deployment of existing and future users in the band (and adjacent bands) as Wi-Fi will be low power and indoors, with some possible exceptions where mitigations may be necessary. In general, this should mean that Wi-Fi can coexist with use-cases that deploy outdoors, for example with fixed links users, and SRDs (mainly TLPR).

A1.12 Installation of Wi-Fi and UWB systems in the same building is likely to be planned to avoid interference and tracking applications are already in use in other bands shared with Wi-Fi. We do not think these new usage cases will change the conclusions that Wi-Fi can share with UWB.

A1.13 Second, in some instances where interference could be material, for example between Wi-Fi and programme making and special events (PMSE) as outlined in paragraphs 6.18–6.19, we expect this can be managed operationally, for example by choosing different channels in either the Wi-Fi or wireless camera or the use of a PMSE channel filter. Similarly, to mitigate interference between Wi-Fi and radio astronomy, we are proposing that Wi-Fi cannot transmit in 6650–6675.2 MHz (see paragraphs 6.21–6.23).

A1.14 Third, as discussed in paragraphs 6.20–6.22, it is possible radio astronomy could suffer interference from Wi-Fi, if we did not adopt mitigations. To protect radio astronomy, possible mitigations include prohibiting Wi-Fi from using the frequencies used by radio astronomy, and exclusion zones around the RAS sites. We are proposing the former, given the potential costs and difficulties of enforcing exclusion zones around these sites. Prohibiting Wi-Fi from using the radio astronomy frequencies should not impose a disproportionate cost on Wi-Fi and is worth the protection of RAS.

A1.15 Finally, we turn to the timing of our authorisation, and the benefits and risks associated with this in the context of introducing mobile later.

A1.16 As discussed in paragraphs 5.24–5.58, our preferred approach to authorising Wi-Fi and mobile is a phased approach, with access granted to Wi-Fi as early as is feasible, and access to mobile granted after European harmonisation work is mature (from 2027). Earlier access to Wi-Fi should enable people and businesses to realise the benefits of Upper 6 GHz as soon as possible, encouraging timely investment and allowing manufacturers to seed the market with devices capable of using Upper 6 GHz.

A1.17 We do not consider that Wi-Fi devices using Upper 6 GHz will cause material interference to mobile in most circumstances (see paragraphs 5.35–5.51). This is because we expect adoption of Upper 6 GHz to be gradual and the coexistence risks between mobile and Wi-Fi to only become relevant in later stages of adoption, when deployment of both applications is extensive. We expect that by this time, coexistence measures will likely have been implemented. Where changes to Wi-Fi access points are necessary in the future, our current expectation is that this is likely only to need a software update (see paragraph 5.40). Furthermore, we understand that Wi-Fi kit is likely to be refreshed every 5–7 years, reducing any overlap in time between legacy Wi-Fi devices and mobile. Therefore, there is little risk to giving access to Wi-Fi early.

A1.18 Overall, we assess that our proposal to authorise Wi-Fi to use Upper 6 GHz should benefit citizens and consumers in the UK without causing material interference to most other users of the band; where there is potential for material interference, we are putting in place proportionate mitigations.

Equality Impact Assessment

A1.19 We have given careful consideration to whether our proposals will have a particular impact on persons sharing protected characteristics (broadly including race, age, disability, sex, sexual orientation, gender reassignment, pregnancy and maternity, marriage and civil partnership and religion or belief in the UK and also dependents and political opinion in Northern Ireland), and in particular whether they may discriminate against such persons or impact on equality of opportunity or good relations. This assessment helps us comply with our duties under the Equality Act 2010 and the Northern Ireland Act 1998.[40] We have also had regard to the matters in section 3(4) of the Communications Act.

A1.20 When thinking about equality we think more broadly than persons that share protected characteristics identified in equalities legislation and think about potential impacts on various groups of persons (see paragraph 4.7 of our impact assessment guidance).

A1.21 In particular, section 3(4) of the Communications Act also requires us to have regard to the needs and interests of specific groups of persons when performing our duties, as appear to us to be relevant in the circumstances. These include:

- the vulnerability of children and of others whose circumstances appear to us to put them in need of special protection;
- the needs of persons with disabilities, older persons and persons on low incomes; and
- the different interests of persons in the different parts of the UK, of the different ethnic communities within the UK and of persons living in rural and in urban areas.

[40] Section 75 of the Northern Ireland Act 1998

A1.22 Our proposals will likely increase capacity and speed of Wi-Fi, and later mobile, services. We believe use of Upper 6 GHz by these applications will predominantly be in high density areas, such as town and cities, or where there is high demand for these applications. We have not identified any adverse impacts on specific groups of persons that are likely to be affected in a different way to the general population.

Welsh language impact assessment

A1.23 Ofcom is required to take Welsh language considerations into account when formulating, reviewing or revising policies which are relevant to Wales (including proposals which are not targeted at Wales specifically but are of interest across the UK).[41]

A1.24 We do not consider our proposals have any impact on opportunities for persons to use the Welsh language or treating the Welsh language no less favourably than the English language. We also do not think there are ways in which our proposals could be formulated so as to have, or increase, a positive impact, or not have adverse effects or decrease any adverse effects. This is because our proposals relate to spectrum access across the UK.

A1.25 We note that Ofcom's current practice is to offer to produce spectrum licences in Welsh, and when requested does provide licences in Welsh, in accordance with its obligations set by the Welsh Language Commissioner. This will apply to licences discussed in this document.

[41] See Standards 84 – 89 of Hysbysiad cydymffurfio (in Welsh) and compliance notice in English. Section 7 of the Welsh Language Commissioner's Good Practice Advice Document provides further advice and information.

A2. Wi-Fi sharing with incumbent users of the Upper 6 GHz band

Introduction

A2.1 In Section 6 we provide an overview of our analysis of Wi-Fi sharing with existing users of the Upper 6 GHz band. In this Annex we provide further technical detail to support our conclusions.

Wi-Fi with fixed links

A2.2 SE45 considered sharing between Wi-Fi and fixed links using a wide range of input assumptions and deployment scenarios.

A2.3 One of the SE45 studies considered a distribution of low power indoor and accidental outdoor Wi-Fi use together with very low power outdoor use. The study considered statistical combinations of position, population density, fixed link height and antenna gains from licences issued by a European administration. The study concluded that interference would be very rare, with the long-term protection threshold (I/N of -10 dB for less than 20% of the simulation runs) respected for all cases including accidental outdoor Wi-Fi use.

A2.4 Another study considered the impact of high population density on the likelihood of interference, with Wi-Fi devices placed in a circular area around a fixed link with a radius of 5km. The study considered different population densities of 3,000, 6,000, 12,000 and 18,000 inhabitants per km^2, with only the higher population densities resulting in the I/N and Fractional Degradation in Performance (FDP) thresholds being exceeded. A similar study based on a population density of 5,400 inhabitants per km^2 (similar to the population density of London)[42] found that Wi-Fi is unlikely to cause interference except in a few edge cases assuming a combination of factors including high market adoption in Upper 6 GHz, the Wi-Fi transmitter is in the main beam of the fixed link receiver, there is a low fade margin, low building entry loss, low fixed link antenna gain and Wi-Fi is at a (relative) high height compared to the fixed link receiver.

A2.5 One of the SE45 studies considered a subset of actual UK fixed links located in densely populated areas. In addition to the licensed parameters (link lengths, antenna heights, antenna gains etc.), maps of UK population around the fixed link receiver were used together with real building positions and heights to model indoor Wi-Fi distributions. The analysis showed that none of the links exceeded the long-term protection threshold of I/N = -10 dB for more than 20% of the simulation runs. The analysis also showed that the FDP was below the 10% threshold criterion.

[42] The population density of London as a whole was 5,640 inhabitants per km^2 at the time of the last census in 2021, although a few London boroughs have population densities as high as 15,000 inhabitants per km^2 (see Tower Hamlets Council, Tower Hamlets Borough Profile 2024, May 2024)

A2.6 We undertook our own analysis of Wi-Fi sharing with a subset of fixed links when we made the Lower 6 GHz band available and updated this analysis for the Upper 6 GHz band in our 2022 consultation. We considered that, due to the similarity in technical parameters between the Lower and Upper 6 GHz bands, typical LPI Wi-Fi use will not cause harmful interference to fixed links.

Wi-Fi with programme making and special events

A2.7 We used a Minimum Coupling Loss (MCL) analysis[43] to calculate the minimum separation distances that might be needed between Wi-Fi and programme making and special events (PMSE) wireless video link equipment, namely, cordless camera links (CCL) and portable video links (PVL).

A2.8 Wi-Fi parameters were based on those used in the SE45 studies using a transmission mask in accordance with ETSI harmonised standard ETSI EN 303 687 for 6 GHz WAS/RLAN. The PMSE parameters were taken from ECC Report 219 and are shown in Table A2.1 below. We considered the 50% probability of interference (MCL_{50}).

Table A2.1: PMSE parameters used in sharing study

		CCL	PVL
Channel bandwidth (BW_v)	MHz	10	10
Noise Figure (NF)	dB	4	3
I/N	dB	-6	-6
Thermal Noise (N_{TH})	dBm/BW	-104	-104
ACS	dB	30	30
Antenna gain (G_v)	dBi	3	9
Feeder loss (G_{vfe})	dB	0	0
Antenna height (H_v)	m	2	4

Source: Ofcom

A2.9 We assumed an interference threshold of I/N = -6 dB and we calculated the required separation distance using Recommendation ITU-R P.525-5 (free space path loss) and Recommendation ITU-R P.2109-2 (building entry losses at 50% for MCL_{50}). We assumed the Wi-Fi transmitter is in the boresight of the PMSE antenna and we considered a range of overlapping Wi-Fi channel bandwidths. Building entry loss was calculated for a mix of traditional and thermally efficient buildings with a weighting factor of 70/30. As Wi-Fi only overlaps with PMSE when using 20 MHz channels we consider that this is unlikely to occur, and we summarise the results for adjacent channel uses in Table A2.2 as these are the more likely scenarios.

[43] The Minimum Coupling Loss method calculates the isolation required to prevent interference between a victim receiver and an interfering transmitter.

Table A2.2: Separation distances for low power indoor Wi-Fi with PMSE wireless video links operating in adjacent channels.

Wi-Fi channel bandwidth	Wi-Fi and PMSE both indoors (same building) (m)		Wi-Fi indoors / PMSE outdoors (m)	
	CCL	PVL	CCL	PVL
40 MHz	315	625	14	28
80 MHz	190	380	9	17

Source: Ofcom

A2.10 Our analysis shows that separation distances decrease as the Wi-Fi bandwidth increases. In indoor scenarios, the required separation distances make it unlikely that PMSE wireless video links can operate indoors where Wi-Fi is active in the Upper 6 GHz band unless additional mitigation techniques are applied, such as the use of PMSE channel filters. For example, a 30 dB filter will reduce the separation distance for Wi-Fi operating on an 80 MHz channel from a CCL from 190m to 6m.

A2.11 For PMSE equipment operating outdoors in an adjacent channel, the required separation distances are likely to be negligible in practice once other mitigating factors like antenna discrimination, activity factor and Wi-Fi deployment model[44] are considered.

A2.12 For PMSE equipment operating outdoors in a co-located channel, the required separation distances can be up to a few hundred meters. This is only applicable for the two 20 MHz Wi-Fi channels that overlap with PMSE (up to 7125 MHz) and if PMSE were to borrow spectrum in the Upper 6 GHz band for large events and indoor Wi-Fi was also deployed.

Wi-Fi with radio astronomy

A2.13 The SE45 studies considered aggregate interference from different Wi-Fi deployment scenarios into 4 RAS sites out of 18 located across Europe. The Jodrell Bank observatory in the UK was included in the studies because of its closeness to a relatively densely populated area (Manchester) and flat terrain.

A2.14 The study concluded that relatively large exclusion zones (60 km) may be required around Jodrell Bank if it is used for single dish observations. This was based on a high distribution of Wi-Fi access points (more than 22,000) all assumed to be instantaneously transmitting on an overlapping RAS channel within a 3° x 3° area around the RAS site. We note that compared to a single dish, arrays such as e-MERLIN have less stringent protection criteria. In the Upper 6 GHz band observations using e-MERLIN are 29 dB less sensitive to interference than using a single dish (see Figure 5 of The CRAF handbook on Radio Astronomy), which would reduce the exclusion zone to about 20 km based on the assumptions used in the study.

A2.15 We have undertaken our own analysis of the potential for interference to RAS. Our analysis examined the impact of a single Wi-Fi interferer on the Jodrell Bank observatory, using the

[44] In the SE45 studies the Wi-Fi deployment model includes a number of factors such as the speed of market adoption, the Upper 6 GHz factor (share of 6 GHz capable devices that transmit on a channel in Upper 6 GHz), the busy hour factor (percentage of devices that operate during the busiest hour of the day), RF activity factor and number of instantaneously transmitting devices (the number of devices in an area likely to be transmitting at the same time).

e-MERLIN interference protection requirement. Our findings indicate that interference from indoor Wi-Fi could be caused to Jodrell Bank observatory up to 25 km away, in line with the conclusion from SE45. The potential interference range to other RAS sites in the UK is smaller due to local topography.

A2.16 To protect sensitive radio astronomy measurements, we are proposing that Wi-Fi equipment will not be permitted to transmit in the band 6650–6675.2 MHz (2x 20 MHz channels from 6645–6685 MHz).

Wi-Fi with the Earth exploration satellite service

A2.17 Coexistence studies between Wi-Fi and EESS prior to the last World Radiocommunication Conference (WRC-23) concluded that high density Wi-Fi deployments could interfere with Sea Surface Temperature (SST) measurements up to several hundred kilometres from the coast. To ensure long-term continuity for SST measurements, WRC-23 proposed studies for a new primary EESS (passive) allocation in the 4200–4400 MHz and 8400–8500 MHz bands for consideration at the next WRC in 2027.[45] We support the decision to identify a new primary allocation for EESS (passive) and will be seeking a positive outcome on the allocation of new bands to safeguard SST measurements on a long-term basis. In the medium term, we consider the risk to the current band is low as we are limiting Wi-Fi deployment to low power indoor use.

Wi-Fi with short-range devices and ultra-wideband devices

A2.18 As we outlined in Section 2, the main SRD in this band is tank level probing radar (TLPR). The industrial nature of TLPR applications is likely to result in a very low deployment density of devices in this band, and TLPR sensors, which are required to be downward-facing, are enclosed within generally metal or reinforced concrete tanks with a high degree of isolation. TLPR devices also have Automatic Power Control (APC) that helps mitigate interference. For these reasons we consider it unlikely that low power indoor Wi-Fi would cause harmful interference.

A2.19 The 6000–8500 MHz band is also used by ultra-wideband (UWB) equipment for applications such as location tracking, vehicle access, consumer devices and sensors. There are some existing studies in ECC Report 302 for the Lower 6 GHz band that show the probability of Wi-Fi causing a 3 dB reduction in sensitivity for location tracking devices is less than 3%, and less than 2% for sensing devices.

A2.20 European Commission Implementing Decision (EU) 2024/1467 (May 2024) identified new usage cases for UWB including fixed outdoor use, enhanced indoor use and in-vehicle applications. For UWB outdoor and vehicle use there will be some protection from indoor Wi-Fi due to building entry loss. For fixed outdoor use antenna heights above 2.5m must be directive and down-tilted, which will provide additional protection. Enhanced indoor use is intended mainly to improve coverage in larger spaces such as concert halls and exhibition centres or to provide precise tracking over short distances, e.g., Apple AirTags. Installation of Wi-Fi and UWB systems in the same building is likely to be planned to avoid interference

[45] Resolution 674 of the Final Acts WRC-23

and tracking applications are already in use in other bands shared with Wi-Fi. We do not think these new usage cases will change the conclusions that Wi-Fi can share with UWB.

Wi-Fi with fixed satellite

A2.21 To assess the potential for interference into satellite receivers (in the Earth-to-space direction), SE45 considered aggregate interference from a range of Wi-Fi distributions and representative population densities. In some scenarios more than 1.5 million instantaneously transmitting Wi-Fi devices were considered. Different satellite beam types were studied including global, regional, zone and spot beams. The analysis concluded that there is a margin of at least 15 dB before the interference threshold at the satellite receiver is reached. This is consistent with earlier analysis for the Lower 6 GHz band.

A3. Draft Voluntary National Specification

Overview

Purpose of this document

This Voluntary National Specification (VNS) is intended to provide guidance on equipment that may be suitable for operating in the 6425 to 7125 MHz frequency band under the licence exemption specified in the Wireless Telegraphy (Exemption) (Amendment) Regulations 20xx ("the 6 GHz WAS/RLAN Regulations")[46] and Interface Requirement 2030.

ETSI harmonised standard EN 303 687 V1.1.1 (2023-06) covers Wireless Access Systems (WAS) including Radio Local Access Network (RLAN) equipment capable of operating in the Lower 6 GHz band, from 5945 MHz to 6425 MHz. This VNS is intended to provide guidance for RLAN equipment capable of operating in the Upper 6 GHz band from 6425 MHz to 7125 MHz, based on the technical characteristics and methods of measurements contained in ETSI EN 303 687.

This VNS is likely to be withdrawn if the scope of ETSI EN 303 687 is updated or a new EN is created to cover the 6425 MHz to 7125 MHz frequency range. We will keep this situation under review.

This VNS should not be relied upon as legal advice or understood as modifying any legal obligations which may otherwise apply. In particular, this VNS is not intended to provide guidance on meeting the essential requirements of The Radio Equipment Regulations 2017. Manufacturers and Economic Operators should seek their own independent advice as to their legal responsibilities. Ofcom makes no representation or warranty, express or implied, with respect to the information contained in the VNS and any liability is therefore expressly disclaimed.

Scope

Frequency band

This VNS gives guidance on the minimum technical characteristics for Upper 6 GHz Wireless Access Systems including Radio Local Area Network (WAS/RLAN) equipment.

This radio equipment is capable of operating in all, or parts of the frequency bands given in Table A3.1.

Table A3.1: Service frequency band

	Service frequency band
Transmit	6425 MHz to 7125 MHz
Receive	6425 MHz to 7125 MHz

[46] This reference will be updated once the Wireless Telegraphy (Exemption) (Amendment) Regulations are updated.

References

ETSI EN 303 687 V1.1.1 (2023-06): "6 GHz WAS/RLAN; Harmonised Standard for access to radio spectrum".

IR2030 – UK Interface Requirements 2030: "Licence Exempt Short Range Devices (SRDs)".

Definition of terms

For the purposes of the present document the following terms apply. Refer to section 3.1 of ETSI EN 303 687 V1.1.1 (2023-6) for the definition of other terms used in this VNS:

Channel: continuous part of the radio-frequency spectrum used for transmission and reception by WAS/RLAN equipment and identified by a nominal centre frequency and a nominal bandwidth.

Integral antenna: antenna designed as a fixed part of the equipment (without the use of an external connector) which cannot be disconnected from the equipment by a user with the intent to connect another antenna.

Low Power Indoor Access Point (LPI AP): LPI access point or LPI bridge.

Upper 6 GHz band: frequency range of 6425 MHz to 7125 MHz.

WAS/RLAN: broadband radio systems that allow wireless access for public and private applications regardless of the underlying network topology.

WAS/RLAN devices: components or sub-assemblies which intentionally emit and/or receive radio waves for the purpose of radio communication and are intended for incorporation into WAS/RLAN equipment.

Symbols

For the purposes of the present document the following symbols apply. Refer to section 3.2 of ETSI EN 303 687 V1.1.1 (2023-6) for the definition of other symbols:

dB	decibel
dBm	dB relative to 1 mW
f_c	nominal centre frequency for 20 MHz channels
f_{c_offset}	frequency offset from the nominal centre frequency
GHz	gigahertz
Hz	Hertz
kHz	kilohertz
MHz	megahertz
n_{ch}	channel identifier
P_{min}	minimum power level of the wanted signal

Abbreviations

For the purposes of the present document the following abbreviations apply. Refer to section 3.3 of ETSI EN 303 687 V1.1.1 (2023-6) for the definition of other abbreviations:

AP	Access Point
EIRP	Equivalent Isotropically Radiated Power

LPI	Low Power Indoor
PFD	Power Flux Density
PSD	Power Spectral Density
RLAN	Radio Local Area Network
UUT	Unit Under Test
VLP	Very Low Power
VNS	Voluntary National Specification
WAS	Wireless Access Systems

Minimum technical characteristics

Equipment category

This present VNS applies to WAS/RLAN equipment that operate under the Low Power Indoor (LPI) category with maximum mean EIRP as defined in IR2030. Very Low Power (VLP) indoor and mobile outdoor use is not permitted in the 6425 MHz to 7125 MHz band.

There are two sub-categories of LPI devices as follows:

- LPI AP/bridge sub-category device
- LPI client sub-category device

Minimum technical characteristics

This section gives guidance on the minimum technical characteristics for WAS/RLAN equipment operating in the Upper 6 GHz band. Table A3.2 gives detailed guidance on limits for the key technical parameters of WAS/RLAN equipment that may be considered.

Wherever the 5945 MHz to 6425 MHz frequency range is referred to in ETSI EN 303 687 V1.1.1 (2023-6), appropriate translation may be needed for the 6425 MHz to 7125 MHz frequency range.

Table A3.2: Minimum technical characteristics of equipment

<table>
<tr><th>Parameter</th><th>Reference</th><th>Limits</th></tr>
<tr><td>Nominal centre frequencies and nominal bandwidth</td><td>4.3.1 of ETSI EN 303 687 V1.1.1 (2023-06)</td><td>Use 4.3.1 of ETSI EN 303 687 V1.1.1 (2023-6). Use the following equation in place of 4.3.1.3 of ETSI EN 303 687 V1.1.1 (2023-06):
$f_c = 5935 + (n_{ch} \times 20)$ MHz $\pm f_{c\_offset}$ where n_{ch} is an integer and
$25 \leq n_{ch} \leq 59$</td></tr>
<tr><td>RF output power</td><td>4.3.2 of ETSI EN 303 687 V1.1.1 (2023-06)</td><td>Use 4.3.2 of ETSI EN 303 687 V1.1.1 (2023-6). Use the following table in place of Table 2 from 4.3.2.2 of ETSI EN 303 687 V1.1.1 (2023-06):
Table 2: Mean EIRP limit for RF output power
<table>
<tr><th rowspan="2">Frequency range (MHz)</th><th colspan="2">RF output power limit (dBm)</th></tr>
<tr><th>LPI usage</th><th>VLP usage</th></tr>
<tr><td>6425 to 7125</td><td>24</td><td>Not permitted</td></tr>
</table></td></tr>
<tr><td>Power Spectral Density</td><td>4.3.3 of ETSI EN 303 687 V1.1.1 (2023-06)</td><td>Use 4.3.3 of ETSI EN 303 687 V1.1.1 (2023-6). Use the following table in place of Table 3 from 4.3.3.2 of ETSI EN 303 687 V1.1.1 (2023-06):
Table 3: Mean EIRP density limit
<table>
<tr><th rowspan="2">Frequency range (MHz)</th><th colspan="3">PSD limit (dBm/MHz)</th></tr>
<tr><th>LPI usage</th><th>VLP usage</th><th>VLP NB usage</th></tr>
<tr><td>6425 to 7125</td><td>11</td><td>Not permitted</td><td>Not permitted</td></tr>
</table></td></tr>
</table>

<table>
<tr><th>Parameter</th><th>Reference</th><th>Limits</th></tr>
<tr><td></td><td></td><td>4.3.3.3 of ETSI EN 303 687 V1.1.1 (2023-6) is not applicable.</td></tr>
<tr><td>Transmitter unwanted emissions</td><td>4.3.4 of ETSI EN 303 687 V1.1.1 (2023-06)</td><td>Use 4.3.4 of ETSI EN 303 687 V1.1.1 (2023-6).
For transmitter unwanted emissions in the out-of-band domain use the following table in place of Table 4 from 4.3.4.1.2 of ETSI EN 303 687 V1.1.1 (2023-06):
Table 4: Transmitter unwanted emission limits in the out-of-band domain
<table>
<tr><th rowspan="2">Equipment</th><th rowspan="2">Frequency (MHz)</th><th rowspan="2">Limit</th><th colspan="2">Out-of-band/spurious domain boundary separation from the nominal centre frequency under test (where applicable)</th></tr>
<tr><th>N < 100 MHz</th><th>N ≥ 100 MHz</th></tr>
<tr><td rowspan="2">LPI</td><td>< 6425</td><td>Spectral power mask as defined by application of figure 1 and figure 2 (as applicable) in clause 4.3.4.3.2.</td><td rowspan="2">±250% x N</td><td rowspan="2">±150% x N + 100 MHz</td></tr>
<tr><td>> 7125</td><td>Spectral power mask as defined by application of figure 1 and figure 2 (as applicable) in clause 4.3.4.3.2.</td></tr>
</table>
For transmitter unwanted emissions in the spurious domain use Table 5 from 4.3.4.2.2 of ETSI EN 303 687 V1.1.1 (2023-06).</td></tr>
<tr><td>Receiver spurious emissions</td><td>4.3.5 of ETSI EN 303 687 V1.1.1 (2023-06)</td><td>Use 4.3.5 of ETSI EN 303 687 V1.1.1 (2023-06).</td></tr>
<tr><td>Channel access mechanism</td><td>4.3.6 of ETSI EN 303 687 V1.1.1 (2023-06)</td><td>Use 4.3.6 of ETSI EN 303 687 V1.1.1 (2023-06).
In 4.3.6.3.2.3 of ETSI EN 303 687 V1.1.1 (2023-06), channels with a total bandwidth of 320 MHz are also permitted under Option 2.
Refer to Figure A3.1 in Annex A of this VNS instead of Figure 6 in 4.3.6.3.2.3 of ETSI EN 303 687 V1.1.1 (2023-06).</td></tr>
<tr><td>Receiver blocking</td><td>4.3.7 of ETSI EN 303 687 V1.1.1 (2023-6)</td><td>Use 4.3.7 of ETSI EN 303 687 V1.1.1 (2023-6). Use the following table in place of Table 9 from 4.3.7.3 of ETSI EN 303 687 V1.1.1 (2023-6):
Table 9: LPI Receiver blocking parameters
<table>
<tr><th>Wanted signal mean power from companion device (dBm)</th><th>Blocking signal frequency (MHz)</th><th>Blocking signal power (dBm) (see note 2)</th><th>Type of blocking signal</th></tr>
<tr><td>P_{min} + 6 dB</td><td>6 375 (see note 3)
7 175</td><td>-53</td><td>Continuous Wave</td></tr>
<tr><td>P_{min} + 6 dB</td><td>6 175 (see note 3)
6 275 (see note 3)
7 275
7 375</td><td>-47</td><td>Continuous Wave</td></tr>
<tr><td colspan="4">NOTE 1: P_{min} is the minimum level of the wanted signal (in dBm) required to meet the minimum performance criteria as defined in clause 4.3.7.2 in the absence of any blocking signal.
NOTE 2: The levels are specified at the UUT antenna connector(s). In case of radiated measurements on a UUT with an integral antenna equipment without external (temporary) antenna connector(s) provided, the equivalent Power Flux Density (PFD) at the UUT is the ratio of the level specified and the antenna area of the UUT antenna. In case of radiated measurements with a substitution antenna, the equivalent PFD at the said antenna is the ratio of the level specified and the antenna area of the substitution antenna.</td></tr>
</table></td></tr>
</table>

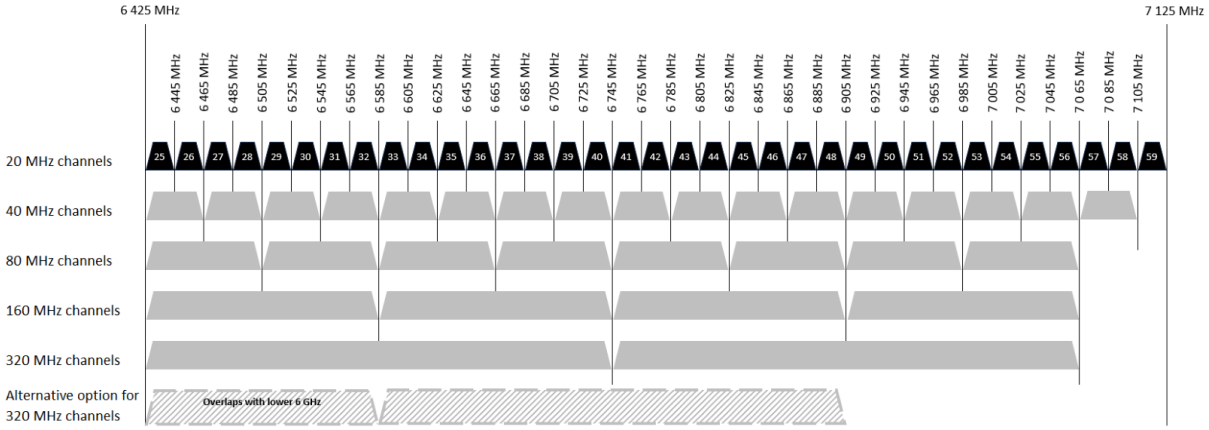
Parameter	Reference	Limits
		NOTE 3: Where the equipment also supports WAS/RLAN operation in the band 5945 MHz to 6425 MHz (the Lower 6 GHz band) compliant with ETSI EN 303 687, this frequency is not to be tested. Table 10 from 4.3.7.3 of ETSI EN 303 687 V1.1.1 (2023-6) is not applicable.
Receiver selectivity	4.3.8 of ETSI EN 303 687 V1.1.1 (2023-6)	Use 4.3.8 of ETSI EN 303 687 V1.1.1 (2023-6). Replace NOTE 4 of Table 11 from 4.3.8.3 of ETSI EN 303 687 V1.1.1 (2023-6) with the following: NOTE 4: The requirement applies with one interferer signal confined within the range 6 425 MHz to 7 125 MHz for interferer frequencies on either side of the wanted signal. The interferer signal frequency offset is the absolute value of the frequency separation between the interferer centre frequency and the nominal centre frequency of the wanted signal. If the manufacturer decides to make use of the permitted frequency offset of the nominal centre frequency of the wanted signal as specified in clause 4.3.1.3, a maximum offset of the interferer centre frequency offset of ±200 kHz from the said nominal centre frequencies and a resulting offset of the interferer signal frequency offset of up to ±400 kHz are also permitted.
Mechanical and electrical design	4.3.9 of ETSI EN 303 687 V1.1.1 (2023-6)	Use 4.3.9 of ETSI EN 303 687 V1.1.1 (2023-6).
User access restrictions	4.3.10 of ETSI EN 303 687 V1.1.1 (2023-6)	Use 4.3.10 of ETSI EN 303 687 V1.1.1 (2023-6).

Annex A to the VNS: Multi-channel operation

Groups of adjacent channels for option 2

This annex provides an alternative to Figure 6 in ETSI EN 303 687 V1.1.1 (2023-6).

Figure A3.1: Groups of adjacent channels for option 2



Note: The alternative option for 320 MHz channels extends to the Lower 6 GHz band. There is currently no provision for 320 MHz channels in ETSI EN 303 687 V1.1.1 (2023-6) so this option will not be available until such time as ETSI EN 303 687 is revised.[47]

[47] ETSI EN 303 687 is currently under review in TC-BRAN and the next version is likely to include a channelisation plan for 320 MHz.

Annex B to the VNS: Informative Annex

The Very Low Power (VLP) category[48] of device is not permitted in the UK. We will keep this under review and may update this VNS later to include this category.

We intend to update this VNS to include new sensing mechanisms if they are required to facilitate sharing with other users of the 6425–7125 MHz band.

This VNS is likely to be withdrawn if an ETSI harmonised standard for the 6425–7125 MHz band is published. We will keep this situation under review.

[48] We define a very low power device as a portable device with maximum mean EIRP of 25mW.

A4. Responding to this consultation

How to respond

A4.1 Ofcom would like to receive views and comments on the issues raised in this document, by 5pm on Thursday 8 May 2025.

A4.2 You can download a response form on our web-page. You can return this by email or post to the address provided in the response form.

A4.3 If your response is a large file, or has supporting charts, tables or other data, please email it to sharingupper6ghz@ofcom.org.uk, as an attachment in Microsoft Word format, together with the cover sheet.

A4.4 Responses may alternatively be posted to the address below, marked with the title of the consultation:

Upper 6 GHz Project Team
Ofcom
Riverside House
2A Southwark Bridge Road
London SE1 9HA

A4.5 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.

A4.6 We will publish a transcript of any audio or video responses we receive (unless your response is confidential)

A4.7 We do not need a paper copy of your response as well as an electronic version. We will acknowledge receipt of a response submitted to us by email.

A4.8 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.

A4.9 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 A6. 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.

A4.10 If you want to discuss the issues and questions raised in this consultation, please contact the Upper 6 GHz Project Team by email to sharingupper6ghz@ofcom.org.uk.

Confidentiality

A4.11 Consultations are more effective if we publish the responses before the consultation period closes. 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 responses on the Ofcom website at regular intervals during and after the consultation period.

A4.12 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.

A4.13 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.

A4.14 To fulfil our pre-disclosure duty, we may share a copy of your response with the relevant government department before we publish it on our website.

A4.15 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

A4.16 Following this consultation period, Ofcom plans to publish a statement in autumn 2025.

A4.17 If you wish, you can register to receive mail updates alerting you to new Ofcom publications.

Ofcom's consultation processes

A4.18 Ofcom aims to make responding to a consultation as easy as possible. For more information, please see our consultation principles in Annex A5.

A4.19 If you have any comments or suggestions on how we manage our consultations, please email us at 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.

A4.20 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

A5. Ofcom's consultation principles

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

Before the consultation

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

2. We will be clear about whom we are consulting, why, on what questions and for how long.
3. We will make the consultation document as short and simple as possible, with an overview of no more than two pages. We will try to make it as easy as possible for people to give us a written response.
4. When setting the length of the consultation period, we will consider the nature of our proposals and their potential impact. We will always make clear the closing date for responses.
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.
6. If we are not able to follow any of these principles, we will explain why.

After the consultation

7. We think it is important that everyone who is interested in an issue can see other people's views, so we usually publish the responses on our website at regular intervals during and after the consultation period. 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.

A6. 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 you selected 'Part of the response', please specify which parts:

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)?

Yes ☐ No ☐

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 aims to publish responses at regular intervals during and after the consultation period. 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)

A7. Consultation questions

Please tell us how you came across about this consultation.

- ☐ Email from Ofcom
- ☐ Saw it on social media
- ☐ Found it on Ofcom's website
- ☐ Found it on another website
- ☐ Heard about it on TV or radio
- ☐ Read about it in a newspaper or magazine
- ☐ Heard about it at an event
- ☐ Somebody told me or shared it with me
- ☐ Other (please specify)

Sub-heading (if required)

Question 1: What interest do you have in deploying outdoor or standard power Wi-Fi or other licence exempt RLANs in the Lower 6 GHz band? Please provide details of the types of expected deployments.

Question 2: Are you interested in providing or developing AFC databases for use in the Lower 6 GHz band in the UK?

Question 3: Do you have any views on the operational considerations of setting up and running AFC databases?

Question 4: Do you have any views on how we should manage the approval process for AFC databases and, in particular, whether we should rely on parts of the FCC process rather than requiring the whole process to be re-run in the UK?

Question 5: Please provide any other comments on our proposals for extending access to standard power Wi-Fi and outdoor use, including the overall approach, any details on technical parameters and the running of the AFC databases in this band.

Question 6: Do you have any comments on our proposal to use a “phased” approach, or on the alternative to wait for European harmonisation?

Question 7: Do you have any comments on the above suggestion to manage any “legacy” Wi-Fi devices, or alternative suggestions?

Question 8: Do you have a view on the amount of spectrum that should be prioritised for Wi-Fi under the prioritised spectrum split option? Please provide evidence for your view.

Question 9: Do you have any comments on our plan for a “phase 1” when Wi-Fi will be introduced?

Question 10: One variation on “phase 1” would be to only authorise Wi-Fi in client devices to “seed” the market. Would you have any views on this, or suggestions for other variations?

Question 11: Do you have any comments on our plan for a "phase 2" when mobile will be introduced?

Question 12: Do you have a view on the amount of spectrum that should be prioritised for mobile under the prioritised spectrum split option? Please provide evidence for your view.

Question 13: Do you have any evidence or views about the geographical extent of mobile networks' likely deployment in Upper 6 GHz?

Question 14: Do you have any comments on our proposed phased approach to authorisation of both Wi-Fi and mobile in the Upper 6 GHz band?

Question 15: Do you have any comments on our proposal to not include very low power portable devices in the Upper 6 GHz band at this stage, but to keep this under review?

Question 16: Do you have any comments on our proposal to authorise the use of low-power indoor Wi-Fi access points and client devices to use 6425–7125 MHz?

Question 17: Do you have any comments on the proposed technical conditions?

Question 18: Do you have any comments on the proposed VNS draft?

Question 19: Do you have any suggestions for an appropriate mechanism for enhanced sensing, or comments on the proposed solution above?

Question 20: Do you agree with our proposal to restrict Wi-Fi from transmitting in the 6650-6675.2 MHz band to protect the radio astronomy service? Please provide any technical evidence to support your view.

Question 21: Do you agree with our assessment of Wi-Fi coexistence with existing users of the band? If not, please provide details.

Question 22: Do you have any evidence about the costs to operators of moving fixed links in and around "high density" areas (such as urban centres) to other bands?

Question 23: Do you have any comments on our initial assessment of our likely approach to coexistence between future mobile use and current users in the Upper 6 GHz band?

Question 24: Do you have any other comments on our policy proposals or any of the issues raised in this document?