Ofcom
making communications work
for everyone

Evolution of the Shared Access Licence Framework

Call for Input

CONSULTATION:

Publication date: 28 March 2023
Closing date for responses: 16 May 2023

Contents

Section

Annex

Overview

What we are doing-in brief

We are seeking inputs to inform our forthcoming review of the Shared Access licence framework, where we will consider changes to support users' experiences in these bands.

Our objective in establishing the Shared Access Licence (SAL) framework in 2019 was to make spectrum available for a diversity of new users who were calling for access to spectrum which could support mobile technology. We wanted to promote innovation by providing localised access to spectrum under a simple, low-cost framework.

We recognised in 2019 that, as use of the bands developed over time, we might need to review our initial proposals in light of this user interest and experience. We consider we are now approaching that point, with more than 1600 licences issued across 4 bands (3.8-4.2 GHz; 1781.7-1785 MHz paired with 1876.7-1880 MHz; 2390-2400 MHz, and the lower 26 GHz indoors). 850 of those licences have been issued since 2020.

We want to explore what has been learned from these deployments and consider if and where improvements could be made to support our original policy intention.

In this document we provide an update on our perspective on important developments and experiences in the Shared Access bands over the last 3 years, and seek inputs from stakeholders on this. It represents the beginning of a renewed dialogue with SAL spectrum users that will help inform our thinking as we move towards a review of the framework.

1. The Shared Access framework – foundations and evolution

Our original objectives for introducing the Shared Access framework

1.1 As part of our duty to ensure the optimal use of the UK's spectrum, we want to support innovation and allow new users to access the airwaves that can connect and transform their businesses. Many industries are moving to digitise their systems, often using wireless technology as a key enabler of this, leading to an increased demand for spectrum. Advancements in technology are also making it possible for businesses to deploy their own networks to automate their processes and increase efficiency.

1.2 As innovation stimulates greater demand for limited spectrum resource, spectrum sharing becomes ever more important. We responded to this growing demand when we introduced the Shared Access licences in 2019, which gave new users localised access to spectrum bands that could support mobile technology to meet their emerging business needs (see figure 1.1 below for an overview of envisaged uses). We subsequently confirmed spectrum sharing as an area of increased focus for Ofcom over the next 10 years in our 2021 spectrum management strategy.

1.3 When setting out our approach to Shared Access, we incorporated our duty to secure efficient use of the spectrum by taking account of existing users and considering both our policy objective and legal duty to foster innovation. We wanted to enable a broad range of users and industries to make use of this resource and use it to drive their businesses forward and improve connectivity for consumers. We also wanted to make the bands available in a rapid and cost-effective manner to avoid withholding the benefits of their release.

1.4 We made four spectrum bands available to foster this nascent innovation in wireless connectivity. We introduced two main variants of the Shared Access licence, one low power and available across the UK, and one at medium power available in predominantly rural areas. Our framework permits users to deploy both indoors and outdoors (varying by band) and is intended to support a range of use cases.

Figure 1.1: Overview of Shared Access Use Cases Envisaged in 2019 by Spectrum Band

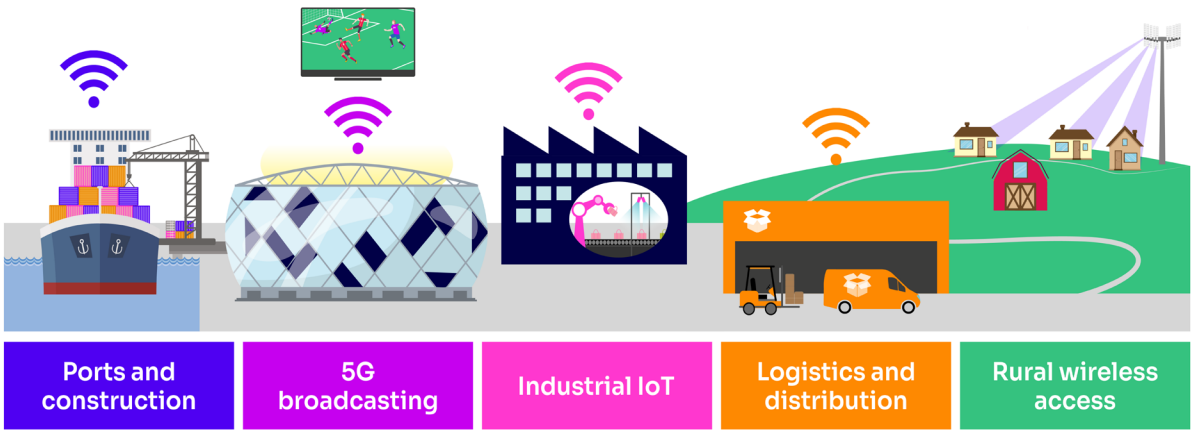
Uses	1800 MHz shared spectrum	2300 MHz shared spectrum	3.8-4.2 GHz	Lower 26 GHz band
Private network (e.g. industry uses)	✓ (narrowband)	✓	✓	✓ (indoor)
Mobile coverage (rural)	✓	Certain locations	×	×
Mobile coverage (indoor)	✓	✓	×	✓
Fixed wireless broadband	×	×	✓	Prior Authorisations

Developments we've seen in the Shared Access bands to date

1.5 Our framework has facilitated growing demand for spectrum access from many sectors. It has also been instrumental in supporting and enabling a wide range of activity associated with the UK Governments 5G Test Beds and Trials programme.

1.6 Since our initial launch, we have issued over 850 new licences, bringing the total of Shared Access licences issued to over 1600[1]. From ports to factories, from new fixed wireless access to improving indoor coverage, the Shared Access framework, and particularly the 3.8-4.2 GHz band, is enabling businesses and industry across the UK to benefit from direct access to spectrum which supports mobile technology.

Figure 1.2: Illustrative examples of Shared Access licence use cases



[1] The remainder of licences are shared access licences in the 1800 MHz band issued to legacy systems predating the framework.

1.7 Through these products, established spectrum users have explored novel and innovative ways in which 4G and 5G spectrum can deliver for them and the UK economy, for example:

- broadcasters, from the BBC to BT Sport, have undertaken innovative development of 5G broadcast technologies, including at the Commonwealth Games;
- mobile network operators are working directly with businesses to deliver networks tailored to their unique needs, whether in an enclosed factory or across a large logistics site;
- mobile equipment vendors have directly engaged with vertical sectors seeking ways to digitalise more of their day-to-day operations.

1.8 Newer players have also entered the market or expanded their operations. Examples include:

- new Fixed Wireless services from a range of growing providers, taking broadband to underserved rural communities from Cornwall to Cleveland;
- construction companies self-providing monitoring equipment and remote assistance across major industrial developments;
- neutral host players offering services ranging from in-building connectivity to coverage for major logistics sites;
- several Universities have deployed their own networks, supporting innovation and campus connectivity;
- local authorities have partnered with neutral hosts and systems integrators to support trials of new services and develop existing infrastructure.

Case Study: Sunderland and BAI Communications

Sunderland City Council announced in 2021 that it had entered into a 20-year strategic partnership with BAI Communications, the multi-use communications network provider. To date, Sunderland has around 50 Shared Access licences underpinning this partnership. It has a particular focus on unlocking benefits for high value manufacturing and logistics; scaling up the deployment of sensing technologies supporting social care and independent living; and unlocking further educational opportunities. In February 2023 it was announced that the Government had made an award of £3M to the Sunderland Advanced Mobility Shuttle project, a self-driving, zero emission shuttle that will connect Park Lane Transport Interchange to Sunderland Royal Hospital and the University. This is also expected to use the Shared Access spectrum to operate as it rolls out.

1.9 In the years since we launched Shared Access licences, we have also seen regulators across Europe begin to develop similar approaches and move to make more spectrum available for localised or industrial uses. We are encouraged to see other countries moving to make more spectrum available for Shared Access type applications and welcome the potential

for harmonisation which CEPT has a mandate to consider.[2] More details of different country's approaches are outlined in the table below.

Figure 1.3: Examples of Shared Access spectrum developments in Europe

Country	Licensing Approach	Spectrum Available
France	Local licences available on a trial basis from 2019[3]. Trial extended to December 2023.	3.8-4.2 GHz
Germany	Spectrum for local network usage for private companies from 2019. Users include Bosch, BMW and Siemens[4].	3.7-3.8 GHz
Norway	Nkom announced local access licences to be made available in 2022. Intended uses include provision of standalone private networks and FWA[5].	3.8-4.2 GHz
Sweden	Section of auctioned spectrum reserved for local and regional licences[6].	3720 – 3800 MHz
Finland	Spectrum available for local access[7]. Traficom envisage these licences being used for factories, ports, airports and shopping centres.	2300-2320 MHz and 24.25-25.1 GHz

User feedback and our licensing data points to the timeliness of a review

1.10 In light of these emerging use cases, growing demand and broader international developments, we consider the time is right to reflect on user experiences in the Shared Access bands, and explore opportunities for further evolving our approach based on stakeholder feedback and the usage data we collect from licensees.

1.11 We acknowledge that some stakeholders have been frustrated with the time taken to process their licence applications, and that administrative aspects of our systems and approach could be refined. We are already working on the automation of our licensing processes, to provide a better user experience and significantly reduce the time taken to access spectrum. This work is being delivered in phases, with some of our non-coordinated licence types moving to the new platform in 2023, and Shared Access licences targeted for 2024. In the meantime, we will continue to explore other ways in which we can deliver in a timely way for stakeholders.

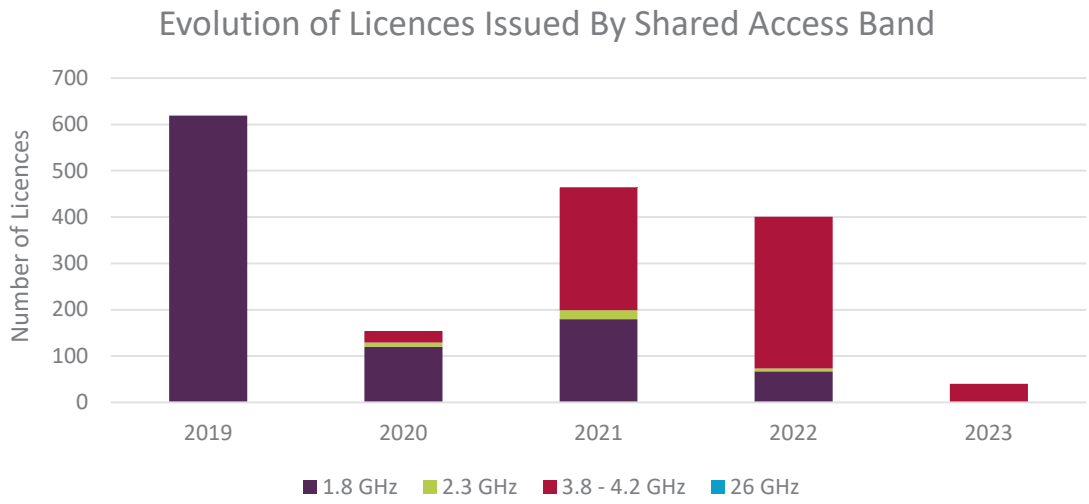
[2] https://ec.europa.eu/newsroom/dae/redirection/document/82230
[3] Press release - BUSINESSES' DIGITAL TRANSFORMATION (15 April 2019) (arcep.fr)
[4] Bundesnetzagentur - Regionale Netze; 5G private licences spectrum in Europe – 5G Observatory
[5] Nkom has opened 3,8-4,2 GHz for local area 5G networks - Nkom
[6] Spectrum Strategy and Spectrum Orientation Plan | PTS
[7] Local 4G/5G networks | Traficom

1.12 We are conscious of the need to keep our authorisation tools constantly under review to ensure our processes remain suitable to meet evolving demand. Alongside this call for input we have therefore published a document exploring options for increasingly flexible and adaptive spectrum access. However, given the nature of demand and need for reliable quality of service from current users in the Shared Access bands, our view is that automating our licensing process is the right first step to deliver the improvements SAL users are seeking.

Our data highlights the importance of opportunities provided by access to 3.8-4.2 GHz

1.13 We recognise that the emerging demand we have seen for Shared Access licences can vary across the bands available, which may in turn impact the level of access that is appropriate in the longer term. Our licensing data demonstrates that interest has been significant across several bands.[8] However, it is also clear that the 3.8-4.2 GHz band represents the area of greatest demand and growth.

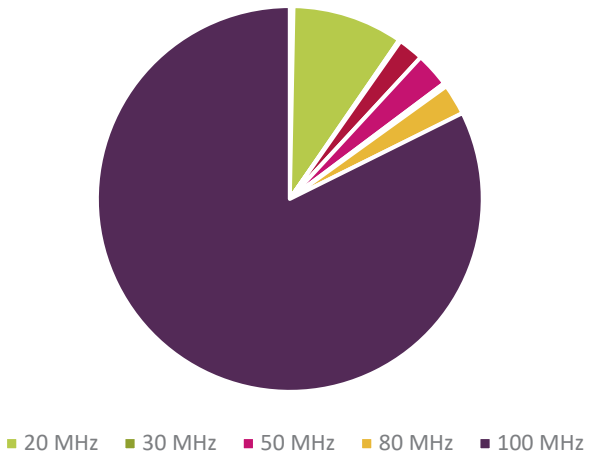
Figure 1.4: Overview of new Shared Access licences issued by band, 2019-2023



1.14 The popularity of the 3.8-4.2 GHz band reflects its suitability for a range of newer 5G use cases, with a developing 5G ecosystem and significant bandwidths available. Our data indicates that - setting aside legacy licensees - Fixed Wireless Access (FWA) and private network providers currently predominate in this band, followed by a 'long tail' of other varied uses (see Section 3.1 for further analysis of this distribution). Our data also indicates that a large proportion of users are requesting significant bandwidths, with more than three quarters of users requesting 100 MHz, to support these higher capacity services.

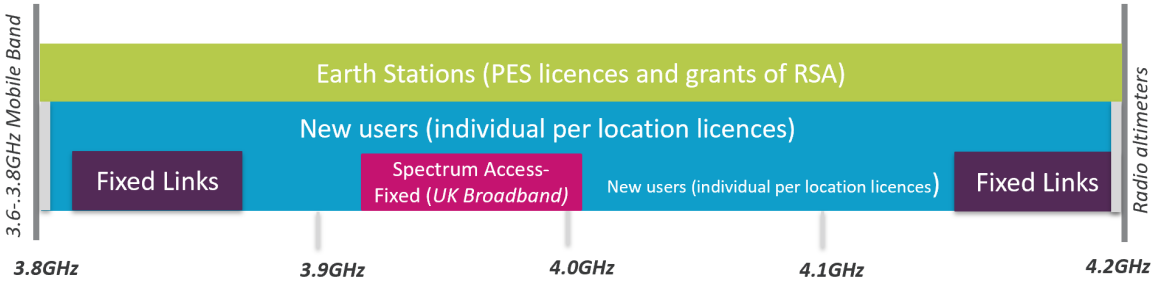
[8] We note there has been comparatively little interest in shared access to 26 GHz to date, whilst some of the interest in 1800 MHz may be derived from its use as an anchor band for non-stand-alone 5G networks in other bands.

Figure 1.5: Analysis of the bandwidths (in MHz) of issued licences in 3.8-4.2 GHz[9]



1.15 The demand for high bandwidth use cases demonstrates the impact that making this band available for Shared Access use has had. However, should this increased demand and focus on large bandwidths continue then, over time, this could raise issues over when and where spectrum is available, especially in locations where the band is being shared with a number of pre-existing users (as outlined below).

Figure 1.6: 3.8-4.2 GHz band overview[10]



Stakeholders have highlighted some limiting factors for the opportunities in 3.8-4.2 GHz

1.16 Some users have told us they have encountered problems obtaining equipment that operates across the entirety of the 3.8-4.2 GHz band (especially above 4 GHz), which might impact the total bandwidths available to users in the UK. The focus of activity in this band increases the importance of the equipment ecosystem continuing to develop particularly in the upper portion of this band. CEPT currently has a mandate from the EC to consider

[9] Licences for bandwidths of 10, 30 and 60 MHz also exist, but are not visualised here as they represent less than 1% of the total.

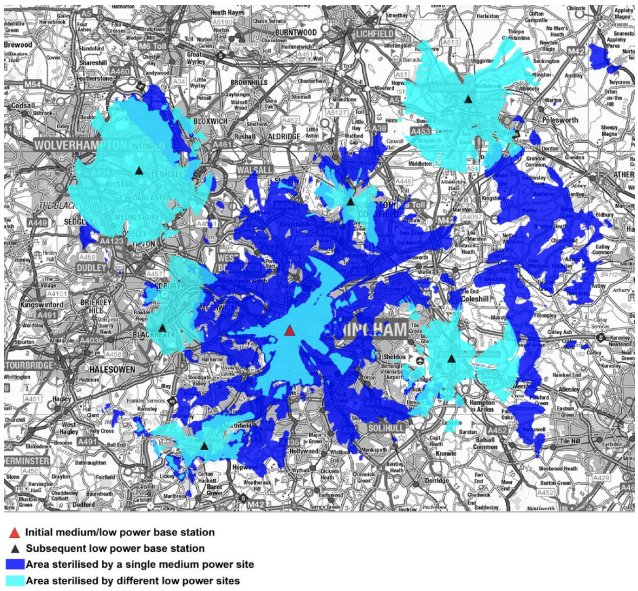
[10] Please note that restrictions around deployments near earth stations and fixed links apply only in certain locations. Similarly, deployment opportunities may be limited in specific locations around UK Broadband deployments.

whether and how the band could be harmonised for similar uses, which could significantly reduce cost and increase scale of equipment across the band. This work is ongoing and, in conjunction with those countries already in the process of making similar spectrum available for similar purposes, should build support for investment in the ecosystem.

1.17 Several stakeholders have indicated to us that for some of their use cases, they would benefit from additional flexibility over the operating powers permitted within the Shared Access Framework. For example, some have indicated significant benefits could come from utilising medium power in urban areas, or more generally operating at higher powers than we currently allow.

1.18 We did not offer an option for medium power in urban areas as standard in 2019 because we were conscious that using greater power levels in urban areas might preclude many neighbouring low power deployments. A more generally permissive approach to authorising medium power uses could therefore reduce the future availability of spectrum for other users, as a greater area is 'sterilised' by the initial user, as highlighted below.[11]

Figure 1.7: Illustration of relative sterilisation area of medium and low power



This image shows a hypothetical initial Shared Access base station (red) in Birmingham city centre, at medium power (dark blue) and low power (light blue). The medium power sterilisation area would preclude the additional 6 low power base stations (in black).

Note that the gaps in the area sterilised by the medium power base station reflect the impacts of terrain and clutter.

1.19 We have remained open to authorising individual applications where this 'sterilisation' impact would be low and can consider such requests on an 'exceptions' basis. However,

[11] Higher powers are also more difficult to accommodate alongside some of the existing users in the 3.8-4.2 MHz band.

there may be a trade-off between maintaining this flexibility and establishing a quicker and more fully automated authorisation solution.

Further stakeholder feedback can help ensure this framework is fit for the future

1.20 We want to consider both our own and stakeholders' experiences of the real-world operation of the SAL framework, alongside evolving user demands, to identify what is working well and any areas that may need to be refined further. In doing this, we are keen to hear from existing users of the band as well as other stakeholders who may have partnered with Shared Access spectrum users, or those who may be considering using Shared Access spectrum as part of their future plans. Our aim is to ensure our framework remains responsive to the needs of the current licensees as well as prospective users.

1.21 The remainder of this document seeks to summarise key areas where stakeholder feedback can shape our considerations, based on our current understanding of how the licences are being used. We invite stakeholders to respond sharing their feedback on experiences using the framework, with particular regard to the technical and policy questions we set out below. Our full set of questions for input is set out in Annex 4.

1.22 Subject to this feedback, alongside our internal analysis, we will consider the extent to which we should consult further on refining and developing the framework. Subsequent consultation is likely to take place in the second half of 2023.

2. Opportunities for evolution from ‘lived experience’

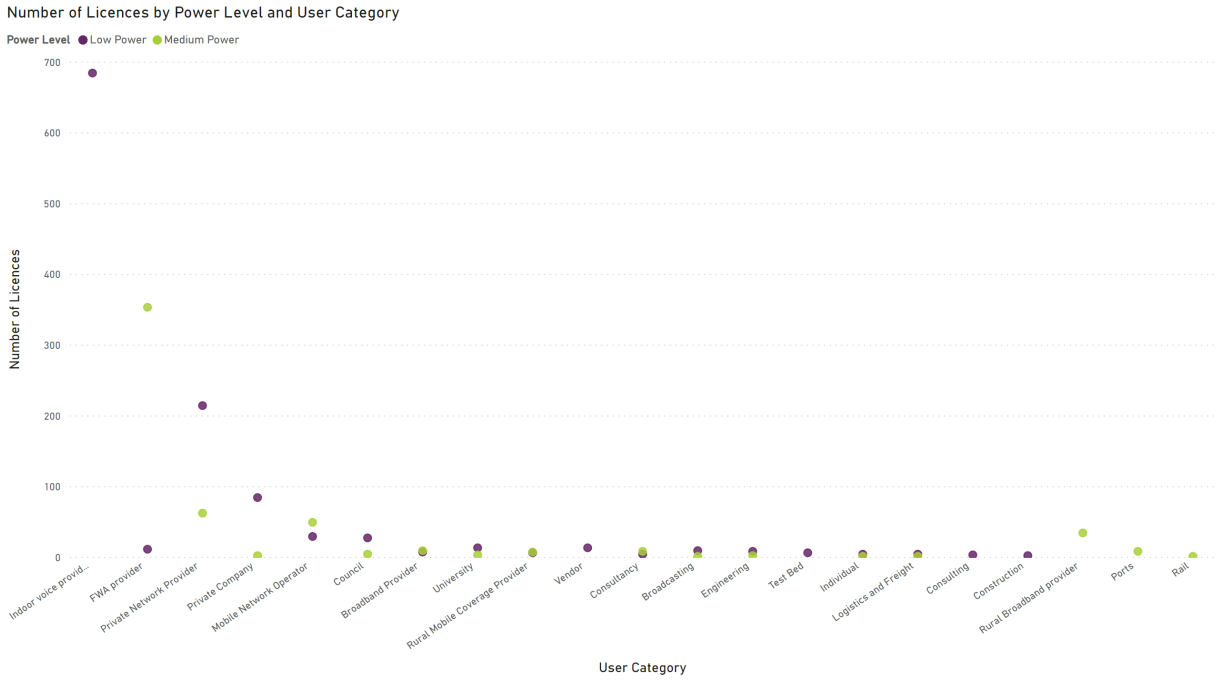
Shared Access Licence Use Cases & Needs

2.1 When we began work to establish a framework for Shared Access, we developed our licensing products based on the major areas of interest that had been highlighted at the time and our view of potential use cases for the future. However, we did not have a clear sense of how this demand would develop going forwards nor which aspects of demand would come to predominate.

2.2 Consequently, we sought to put in place a highly flexible and simple framework that could meet the majority of needs. This flexibility and simplicity came with some potential trade-offs in the options for allocating neighbouring users.

2.3 As time has gone on, we are starting to see a clearer picture of the variety of uses across the bands and those which are coming to dominate. We have undertaken an initial exercise to map these use cases, identify trends, and consider the likely spectrum requirements of these activities moving forward. This high-level analysis is illustrated in Figure 2.1 below.

Figure 2.1: Distribution of Shared Access licences by user group, all Shared Access bands



2.4 However, we also recognise that some of these use cases may still be in the relatively early stages of adoption and rollout, and that some (in particular mobile private networks) are forecast to grow significantly in the future.

2.5 As a part of this Call for Input we are aiming to develop our understanding of the detail and exact spectrum requirements behind the uses that the Shared Access licences are supporting, and how far they are expected to grow.

Questions

1. **How do you think demand for Shared Access is likely to change in future and why; which use cases do you think are likely to emerge or grow, and which decline?** *Please provide a view on the bandwidth you would consider the minimum and optimal requirement for growth use cases, and timelines you would expect for their development*.
2. **Are there elements of the current framework that complicate the use of Shared Access licences for specific use cases?** *If so, please provide specific examples and indicate the changes that would be required to facilitate this and how this might co-exist with other use cases.*

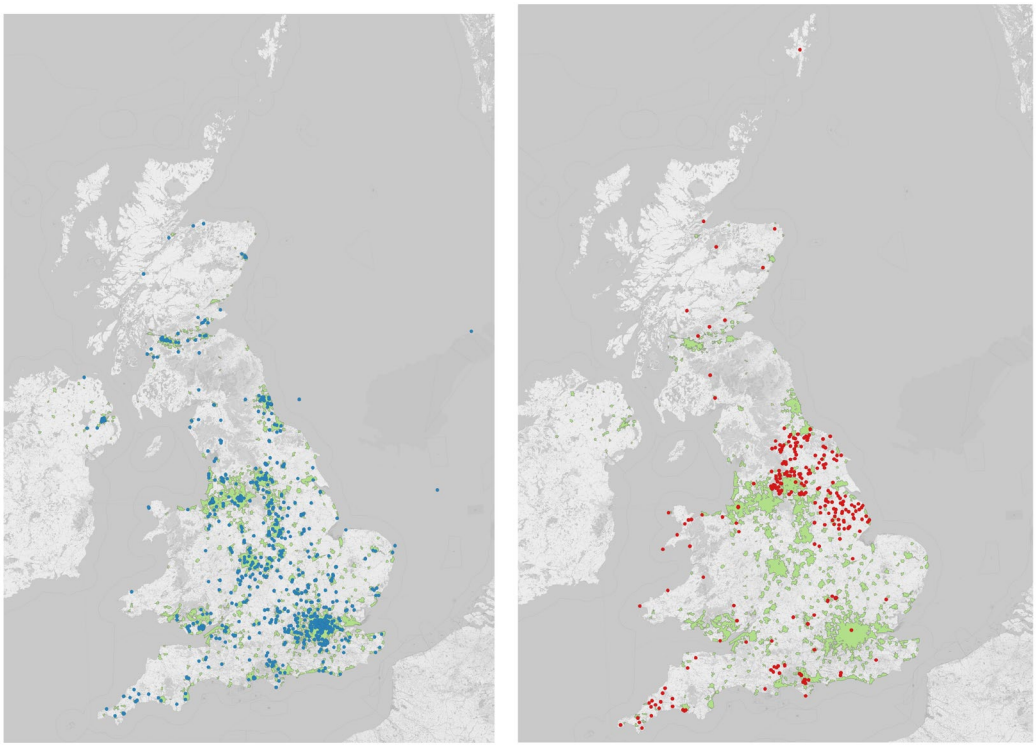
Urban/Rural Split of Permissible Operating Power

2.6 We currently offer two categories of licence to facilitate different types of deployments: a low power per area licence and a medium power per base station licence.

2.7 Our low power licence allows users to deploy as many base stations as they need within a circular area with a radius of 50 metres (as well as the associated fixed, nomadic or mobile terminals connected to the base stations and operating within range of the licensed area). Our medium power licence authorises a single base station and the associated fixed, nomadic or mobile terminals connected to the base station.

2.8 At the moment, medium power licence applications are typically limited to rural areas (as defined by the Office for National Statistics, the Scottish Government's Urban Rural classification and locations in Northern Ireland that fall into bands G or H of the Northern Ireland Statistics and Research Agency's settlement classification bands). The consequent user distributions we have seen for low power and medium power are shown in Figure 2.2.

Figure 2.2: Shared Access Licence Locations, Low Power (blue dots) and medium power (red dots). Urban areas highlighted in green[12]



2.9 When developing our original policy, we took the view that restricting medium power licences in this way better enables the deployment of likely services both in urban and rural areas and avoids constraining low power users in urban areas. This is because permitting medium power use in cities will typically limit the spectrum available for others to deploy nearby and might prevent multiple lower power users deploying in the adjacent area (except where these locations are physically isolated in some way).[13]

2.10 Our approach has enabled more low power deployments to be located close together (as illustrated in Figure 1.7, and highlighted by the clustering of low power deployments in urban areas in Figure 2.2 above). We have found that a significant number of low power licences are located within a few hundred metres of each other - a level of proximity unlikely to have been possible if higher powers were authorised.

2.11 We are aware that there are some cases where it may still be desirable to deploy medium power licences in urban areas (such as ports, railyards and large factories). Stakeholders have indicated to us that doing so could reduce the number of base stations required for certain projects, and so help the business case for their deployments. We need to balance this interest with the potential risk that supporting it could preclude many other future low power deployments in the surrounding areas. Consequently, we invite stakeholders' opinions on our current location restrictions.

[12] "Source: Ofcom; base map © OpenStreetMap contributor

[13] We recognise that in some cases this could still be justified, if the medium power use was of materially higher value – however this assessment could be complex and is not currently one we look to make.

2.12 We note that Bundesnetzagentur (the German spectrum regulator) has sought to provide additional flexibility by enabling adjacent licensees to negotiate neighbour agreements that aim to ensure interference free use for all parties, with a fallback mechanism of a defined field strength limit at the boundaries of the premises on which users operate.[14] However, this process may introduce some additional complexities, including establishing the appropriate measurement parameters at boundary limits, differences between site management and site ownership, and questions of spectrum value across larger areas.

Question:

3. **Do you have any comments on the power restrictions currently in place, particularly in urban/high density areas, under the Shared Access licence?** *Please explain what benefits could be delivered using a higher operating power (e.g. medium power in urban areas), or any concerns you have sharing with such operations.*

Exceptions process (including medium power in urban areas)

2.13 In our 2019 statement, we said we would consider exceptions requests to the standard Shared Access conditions, based on a range of parameters. This allows users to ask for a case-by-case assessment of the feasibility of departing from the overarching authorisation framework, including potentially increasing the low power level usually applied in urban areas, and greater antenna height (above 10m) in the 1800 and 2300 MHz shared bands.

2.14 In doing this we have sought to maximise the number of people who can make use of the Shared Access licences in the way that they want, whilst managing the impacts on the availability of spectrum for other users. These applications therefore undergo a bespoke process of assessment, taking into account factors such as geographical location and the nature of the users' requested technical parameters, to establish if the practical implications of the allowing the exception would have a material impact on the opportunities for other users beyond that of a standard authorisation.

2.15 To date, we have received around 30 exceptions requests under this framework. This approach has successfully enabled a range of additional users, including support for shore to sea connectivity at the Cowes Regatta and facilitating private networks to be deployed at Southampton Port.

2.16 However, the exceptions process requires additional information from stakeholders, and it can take significant time to reach a decision. We recognise that taking into account a wide range of factors, which could be subject to adjustment before the application can be approved, can increase uncertainty for applicants.

2.17 Our move to automate the Shared Access process will enable stakeholders to go through a more streamlined application process which will provide greater certainty and speedier

[14] https://www.bundesnetzagentur.de/SharedDocs/Downloads/EN/Areas/Telecommunications/Companies/TelecomRegulation/FrequencyManagement/FrequencyAssignment/LocalBroadband3,7GHz.pdf?__blob=publicationFile&v=2

responses on licence requests. However, the challenge of incorporating manual assessments into an automated process means the opportunity for exception-based decisions could be more limited in the future, and increased automation may lead to a more rigid set of outcomes. We will therefore need to strike the right balance between a more permissive upfront approach, which might allow initial applicants more freedom but impact future opportunities, or a narrower approach that may be more restrictive on users but preserves more opportunities for future users in neighbouring areas.

Question:

4. **Do you have any comments on the exceptions process, and how some of its benefits could be maintained within more standardised and automated assessments?**

Coordination Approach and Methodology

2.18 In our initial framework, we set out a number of technical parameters we expect users to abide by when operating in the Shared Access bands. The parameters support sharing between users, including existing users in these and adjacent bands. They are taken into account in our coordination approach to determine the viability of an application in relation to existing users in the band.

2.19 Key parameters include:

- **EIRP:** The maximum EIRP that we permit for low power base stations is 24 dBm per carrier per sector. The maximum EIRP that we permit for medium power base stations is 42 dBm / carrier for carriers ≤20 MHz per sector (36 dBm/5 MHz for carriers > 20 MHz) with this product typically limited to rural areas.[15]
- **Height:** We stipulate that antennas may only be 10m in height for medium power outdoor base stations in the 1800 and 2300 MHz shared bands[16]. We took the view that allowing higher antenna heights would increase the range in which interference may result and, therefore, conflict with our objective of enabling the maximum number of users to deploy under the Shared Access licence.
- **Terminal power limits:** these are set at 23 dBm and 25 dBm respectively in the 1800 MHz and 2300 MHz spectrum, and 28 dBm TRP in 3.8-4.2 GHz
- **Frame structure:** synchronization is not required, except in the 2300 MHz band where a 3:1 structure is required for all deployments.

2.20 These parameters play a key role in determining whether a new assignment is possible, whilst the 'footprint' of the assignments we have coordinated to date directly informs the view of spectrum availability in adjacent areas across the country. We therefore need to

[15] https://www.ofcom.org.uk/__data/assets/pdf_file/0035/157886/shared-access-licence-guidance.pdf
[16] We note that we do not currently have any deployments using medium power in the 2300 MHz band.

carefully consider the opportunities for any refinements that can support additional users, and the impact of any more fundamental changes on the area sterilised by a single user.

2.21 Our coordination methodology assumes the antennas used in SAL deployments are omnidirectional (both azimuth and elevation). We consider that this enables a quicker and simpler coordination approach, and may also help mitigate potential interference risks (e.g. from terminals which are not coordinated).[17]

2.22 Since we first set out our Shared Access approach, we have been monitoring developments in antenna technologies, such as Adaptive Antenna Systems (AAS), with a view to consulting on any changes to the technical licence conditions and coordination methodology for AAS. Based on initial stakeholder feedback, we consider it may now be more appropriate to look at the coordination methodology in the round, to best identify areas where changes could make the most impact on accurately assessing interference. This broader review could encompass aspects such as antenna tilt and antenna patterns. At this point, we consider refinement of, rather than fundamental changes to, the protection criteria used in the coordination methodology may be most appropriate.

2.23 We note that potential additions to our coordination framework may increase burdens on stakeholders to supply additional and accurate information. It may also add to the time taken to assess coexistence and issue responses to applications, at least until such additional calculations could be automated. We continue to seek a system that balances speed and simplicity with due consideration of relevant technical parameters for coordination.

2.24 We do not require user transmission frames to be synchronized (except in the 2300 MHz band) and allow users to operate the frame structure that most suits their needs. This has enabled a range of different use cases to co-exist (in particular across the 3.8-4.2 GHz band), including more downlink heavy networks based around AR and VR activities, and more uplink heavy activities, such as broadcast private networks. Requiring synchronisation in some or all parts of the 3.8-4.2 GHz band, or enabling additional information on frame structures to be used, might allow more users to be tightly packed together or to potentially enable use of higher powers. However, this could come at the cost of flexibility both for the range of users in the band, and flexibility within individual user operational patterns.

[17] It is possible that a terminal pointing towards a base station sector could cause a higher level of interference behind the base station than would be caused from the backlobe of that base station antenna. As terminals are not included within our coordination approach, this could lead to an increased risk of interference to other users.

Question:

5. **Do you have any views on whether and how the coordination approach should be modified?** *If yes, please provide comments in light of the issues set out above.*
6. **Do you have views on whether newer or emerging technologies can support coexistence between additional users in the band, and if so, how?**

Licensing Process

2.25 Some stakeholders have complained that it takes too long to issue a Shared Access licence and this can be problematic where deployment is needed swiftly or certainty of access is needed for commercial discussions to progress[18]. There can be a number of reasons why an application is understandably delayed, including where we need to ask for more information or where we are running an exceptions process. However, for standard applications which don't fall into these categories we are taking proactive steps to make the licensing process more efficient.

2.26 We are currently working towards further automating the various stages involved in issuing Shared Access licences (from capturing initial application details, through coexistence modelling, payment of the fee and licence issue). We expect to have removed manual intervention from the administrative elements of the process from 2024 which could significantly accelerate turnaround times, and to have made progress on automating the coordination steps. In the meantime, we are also refining our existing approach to ensure it functions in the best way possible.

2.27 The additional feedback we are aware of from stakeholders with regards to our licensing process is focused in two core areas:

- **Additional, interactive data upfront**: Some users have mentioned that it would be useful to be able to be able to access information that helps them understand what bandwidths and frequencies are likely to be available prior to applying for licences. They have also indicated this might lead to a more efficient licensing process overall as users would be more likely to submit successful applications which would streamline the process for Ofcom and prospective users. Ofcom already releases open data on existing licence assignments in the band[19] and we will consider how to make this information more visible for Shared Access applicants. We also note some private entities appear open to providing such estimates to applicants, which we have no objection to.
- **Additional options for input data**: Some stakeholders have indicated that it would be beneficial for them to be able to provide further details of their preferred assignment, including preferences for frequency assignment. Their concern is that without this, they may be being allocated a wide assortment of different blocks of spectrum where

[18] UK SPF: Recommendations for the future of spectrum sharing in the UK (techuk.org)
[19] Spectrum information portal - Ofcom

that frequency separation is not required, but could then have the effect of sterilising these areas for other users, especially those with larger bandwidth requirements.

2.28 We are considering these issues and the tradeoffs in cost and complexity (both for the licensing process, and for users) that may be involved in addressing them. However, we welcome further stakeholder inputs on these, or other aspects of the licensing process, for us to consider as we begin our review.

Question

7. **Please outline any comments on the current licensing process (e.g ease of application, time taken, the information we require).** *If relevant, please note aspects you are currently content with and which areas could be improved.*

3. A developing framework

3.1 Our Shared Access Framework includes a range of bands and options for different bandwidth and operating requirements. We always anticipated that this framework could grow to encompass additional bands in order to support a variety of use cases and we said we would add additional spectrum to this framework when appropriate.

3.2 Earlier in March 2023, we said we would be enabling opportunities to access mmWave spectrum (26 GHz and 40 GHz) across the country for a variety of new uses. This will be in addition to the existing availability of the lower 26 GHz band in our framework, and provide more opportunities for users to deliver wide bandwidth, high-capacity services. We set out how we will allocate this new mmWave spectrum to best support these uses, as follows:

- In the major towns and cities, where we expect the highest volume of mmWave deployment ("high density areas"), we will both assign local licences on a first come, first served basis, using our Shared Access licensing framework, and award city/townwide licences by auction.
- Elsewhere in the UK ("low density areas"), we expect deployments to be sparser, and so we will assign local licences on a first come, first served basis for mmWave spectrum, using our Shared Access licensing framework

3.3 This means the current shared access to the lower 26 GHz will extend from 24.25 26.5 GHz to 24.25-27.5 GHz. We also plan to permit outdoor use and increase the permitted power levels as we add this spectrum to the framework.

3.4 Additionally, we have been working with the Ministry of Defence to explore options for making some of the of the 2.3 GHz band (specifically in the 2300-2350 MHz range) available for low power indoor use under the Shared Access framework while also ensuring that defence capabilities (and other existing uses) are not negatively impacted. We are aiming to add a part of this band to the Shared Access framework, alongside the existing provision of 2390-2400 MHz.

3.5 We recognise that, to date, there has been greatest interest in the 3.8-4.2 GHz band, and more limited interest in some other Shared Access bands. To inform our review, we wish to consider how far this balance may change, and where existing or future use cases might best be enabled, within the context of this expanding framework and our decision to enable further Shared Access capacity in mmWave spectrum.

Question

8. **Do you have any comments on the suitability of available spectrum for your use cases?** *Please consider the relevance of the additional bands we are proposing for the framework, and the impact of any limitations on existing bands.*

Spectrum supply, equipment availability and fees

3.6 In our experience to date, our first come, first served approach to authorising use under this framework has generally been able to support the vast majority of applications. However, there have been a small number of instances where this has not been the case.

3.7 Our existing framework applies cost-based fees which multiply in relation to the bandwidth used, with some small differences in approaches between different bands. This is a common approach for first come, first served licensing where we expect there to be sufficient spectrum to meet demand from the kinds of use cases envisaged.

3.8 We anticipate that in most cases, the majority of applicants will continue to be able to access spectrum under the framework that broadly meets their requirements, particularly if demands remain in line with current trends. However, we note that were this trend to change, a purely cost-based approach may limit the options available for addressing scenarios where a single user's ideal deployment approach is deemed to sterilise too much of the opportunity in surrounding areas for other users, but actually has a very high value for this use and delivers significant benefits. Equally, in the event that there was limited additional bandwidth available, an existing users' deployment (whether the area served or the bandwidth they are holding) could limit the opportunities for new users with a higher value use for the spectrum.

3.9 We are also conscious that some of these bands are substantially busier than when we opened them, particularly reflecting the growth in Shared Access entrants in 3.8-4.2 GHz as well as the expansion of some incumbent footprints. In our 2019 statement, we indicated that users should obtain equipment that can tune across the entirety of the 3.8-4.2 GHz band so we could request them to move frequency if necessary, to enable more efficient use of spectrum and allow us to be more flexible in our channel allocation when authorising deployments. We note feedback from stakeholders that it can be challenging to acquire equipment that tunes across the entire 3.8-4.2 GHz band, and that this may impact their ability to access the full spectrum range available (although, as highlighted above, there are grounds to believe this situation may improve over time).

Question

9. **Do you have any comments on equipment availability limiting deployment options in 3.8-4.2 GHz?** *Please comment on the impact of any experiences you have had, and where relevant, your expectations for when more equipment will be broadly available across the band.*

Dynamic Spectrum Access (DSA)

3.10 In our previous publications on Shared Access, we acknowledged suggestions that a DSA approach could potentially provide users with more agile access to spectrum, due to the fact that devices would connect to a central database and be assigned spectrum based on what is accessible at that time and location. We said we would explore the potential for

introducing DSA in the initial Shared Access bands, noting that a DSA solution would likely be a long-term project and be complex to introduce.

3.11 We have examined the option of introducing DSA to support the Shared Access framework, through a combination of analysis and stakeholder engagements, including a workshop with interested industry parties in May 2022. Based on these discussions with stakeholders (where there was no consensus view) and our analysis of costs and benefits, this is not our preferred approach for these bands at this time.

3.12 Currently, we consider that a significant majority of the benefits which might be offered by DSA in these bands, can be supported in other ways, without some of the downsides we consider would be at play. In particular, we consider that our plans to automate licensing processes from 2024 will significantly reduce the time users experience waiting for their authorisations. We also think that over time, the collection of more and better data on licensee usage and the surrounding radio environment will allow efficiencies to be achieved under existing processes.

3.13 Underpinning our current view is the fact that Shared Access licensees have told us they value the relative certainty of spectrum access that the existing licensing process provides. Introducing a dynamic element to authorisation could significantly increase uncertainty of access (e.g. if another user was seeking to access the same spectrum at the same time) and could impact the quality of service users can deliver. Whilst there may be circumstances where this is reasonable, it is especially an issue where such spectrum is the only bandwidth available to that user, and the services being delivered require a high Quality of Service, as is often the case in the SAL bands.[20]

3.14 To balance the added complexity and potential impacts for users, there would need to be considerable benefits from enabling a dynamic regime in these bands. This is likely to be most significant where many users in the band have orthogonal needs, either in location, or time. However, this does not appear to be the case in Shared Access, with the greatest areas of demand broadly reflecting those areas where we see greatest demand in other services, namely in populated areas and daylight hours. We note that, in certain cases, Shared Access uses are operational only for very short time periods, and that a more dynamic process might enable such uses to come and go more readily. However, existing mechanisms are in place to allow licences to be handed back if they are not needed after use or new licences to be issued where the spectrum is no longer in use.

3.15 We consider the value placed by many Shared Access users on the certainty of their spectrum access is likely to be found across many user groups and bands, but we remain open to alternative approaches for managing spectrum usage in the future. Alongside this document, we have also published our review on Adaptive Spectrum Allocation (ASA), outlining the broader work we have done to assess the options and prospects for dynamic,

[20] This can be understood from the types of use cases we have seen in these bands, ranging from communication links for live television events to private networks supporting real time data transfer and control of industrial applications. It is arguably in the nature of a private network that at certain points in time it will require a higher level of confidence in a bespoke connectivity solution than a typical public network application.

flexible and adaptive spectrum management regimes in the UK. Within the Shared Access Framework, we continue to consider it appropriate to retain our existing requirement for licensee equipment to be capable of tuning flexibly across the band, at least for the duration of this review. We consider this may support more flexible spectrum management decisions moving forward.

Innovative Solutions via Spectrum Sandboxes

3.16 Ofcom set out its plan to support the development of spectrum sandboxes in our Spectrum Roadmap. We identified the 3.8-4.2 GHz band as our focus for the first workshop due to the high level of interest in using this band via Shared Access.

3.17 We are engaging with stakeholders to support innovation in this band and seek to gain insights on how this spectrum can be used most efficiently in response to any research or real-world data derived from this engagement.

3.18 We recognise that some innovations, or refinements in sharing, may be easier to achieve amongst some users than others. For example, more intensive sharing may be possible where users are delivering similar services, with similar frame structures and similar equipment with compatible levels of flexibility and KPIs. It will be important for any innovations to establish whether they are best applied in single service or multi-service environments.

3.19 We hosted our first stakeholder workshop in February 2023. We will consider the relevant feedback received from this session in the Shared Access review that we will initiate following consideration of the responses to this Call for Input.

Question

10. **Do you have any other general comments on the Shared Access framework?** *Please consider any areas where future innovations could further support Ofcom's policy objectives for this spectrum, and/or improve the experience for users.*

A1. Responding to this call for input

How to respond

A1.1 Ofcom would like to receive views and comments on the issues raised in this document, by 5pm on 16th May.

A1.2 You can download a response form from https://www.ofcom.org.uk/consultations-and-statements/category-2/shared-access-licence-framework-evolution. You can return this by email or post to the address provided in the response form.

A1.3 If your response is a large file, or has supporting charts, tables or other data, please email it to sharedaccessresponses@ofcom.org.uk as an attachment in Microsoft Word format, together with the cover sheet. This email address is for this consultation only, and will not be valid after the 16th of May.

A1.4 Responses may alternatively be posted to the address below, marked with the title of the call for input:

A1.5 Jack Hindley
Ofcom
Riverside House
2A Southwark Bridge Road
London SE1 9HA

A1.6 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; oruploa a video of you signing your response directly to YouTube (or another hosting site) and send us the link.

A1.7 We will publish a transcript of any audio or video responses we receive (unless your response is confidential)

A1.8 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.

A1.9 You do not have to answer all the questions in the consultation if you do not have a view; a short response on just one point is fine. We also welcome joint responses.

A1.10 It would be helpful if your response could include direct answers to the questions asked in the call for input document. The questions are listed at Annex 4. It would also help if you could explain why you hold your views, and what you think the effect of Ofcom's proposals would be.

A1.11 If you want to discuss the issues and questions raised in this consultation, please contact Jack Hindley on 020 7981 3810 or by email to Jack.Hindley@ofcom.org.uk

Confidentiality

A1.12 Call for inputs are more effective if we publish the responses before the period for input closes. In particular, this can help people and organisations with limited resources or familiarity with the issues to respond in a more informed way. So, in the interests of transparency and good regulatory practice, and because we believe it is important that everyone who is interested in an issue can see other respondents' views, we usually publish responses on the Ofcom website at regular intervals during and after the period we are seeking input.

A1.13 If you think your response should be kept confidential, please specify which part(s) this applies to, and explain why. Please send any confidential sections as a separate annex. If you want your name, address, other contact details or job title to remain confidential, please provide them only in the cover sheet, so that we don't have to edit your response.

A1.14 If someone asks us to keep part or all of a response confidential, we will treat this request seriously and try to respect it. But sometimes we will need to publish all responses, including those that are marked as confidential, in order to meet legal obligations.

A1.15 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. This is the Department for Science, Innovation and Technology for spectrum matters and online safety, Department for Business and Trade for postal matters and the Department for Culture, Media and Sport for broadcasting matters.

A1.16 Please also note that copyright and all other intellectual property in responses will be assumed to be licensed to Ofcom to use. Ofcom's intellectual property rights are explained further in our Terms of Use.

Next steps

A1.17 Following this call for input, consultation is likely to take place in the second half of 2023.

A1.18 If you wish, you can register to receive mail updates alerting you to new Ofcom publications.

A2. Ofcom's Consultation Principles

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

Before the consultation

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

During the consultation

A2.2 We will be clear about whom we are consulting, why, on what questions and for how long.

A2.3 We will make the consultation document as short and simple as possible, with 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.

A2.4 We will consult for up to ten weeks, depending on the potential impact of our proposals.

A2.5 A person within Ofcom will be in charge of making sure we follow our own guidelines and aim to reach the largest possible number of people and organisations who may be interested in the outcome of our decisions. Ofcom's Consultation Champion is the main person to contact if you have views on the way we run our consultations.

A2.6 If we are not able to follow any of these seven principles, we will explain why.

After the consultation

A2.7 We think it is important that everyone who is interested in an issue can see other people's views, so we usually publish 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.

A3. Call for Input Cover Sheet

BASIC DETAILS

Consultation title:

To (Ofcom contact):

Name of respondent:

Representing (self or organisation/s):

Address (if not received by email):

CONFIDENTIALITY

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

Nothing ☐

Name/contact details/job title ☐

Whole response ☐

Organisation ☐

Part of the response ☐

If there is no separate annex, which parts? _____

_____

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

DECLARATION

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

Ofcom 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)

A4. Call for Input Questions

Questions:

1. **How do you think demand for Shared Access is likely to change in future and why; Which use cases do you think are likely to emerge or grow, and which decline?** Please provide a view on the bandwidth you would consider the minimum and optimal requirement for growth use cases, and timelines you would expect for their development
2. **Are there elements of the current framework that complicate the use of Shared Access licences for specific use cases?** If so, please provide specific examples and indicate the changes that would be required to facilitate this and how this might co-exist with other use cases.
3. **Do you have any comments on the power restrictions currently in place, particularly in urban/high density areas, under the Shared Access licence?** Please explain what benefits could be delivered using a higher operating power (e.g. medium power in urban areas), or any concerns you sharing with such operations).
4. **Do you have any comments on the exceptions process, and how some of its benefits could be maintained within more standardised and automated assessments?**
5. **Do you have any views whether and how the coordination approach should be modified?** If yes, please provide comments in light of the issues set out above.
6. **Do you have views on whether newer or emerging technologies can support coexistence between additional users in the band, and if so, how?**
7. **Please outline any comments on the current licensing process (e.g. ease of application, time taken, the information we require).** If relevant, please note aspects you are currently content with and areas which could be improved.
8. **Do you have any comments on the suitability of available spectrum for your use cases?** Please consider the relevance of the additional bands we are proposing for the framework, and the impact of any limitations on existing bands.
9. **Do you have any comments on equipment availability limiting deployment options in 3.8-4.2 GHz?** Please comment on the impact of any experiences you have had, and where relevant, your expectations for when more equipment will be broadly available across the band.
10. **Do you have any other general comments on the Shared Access framework?** Please consider any areas where future innovations could further support Ofcom's policy objectives for this spectrum, and/or improve the experience for users.

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