Your response

Question	Your response
Question 1: (Section 3) Do you agree with our proposal for a single authorisation approach for new users to access the three shared access bands and that this will be coordinated by Ofcom and authorised through individual licensing on a per location, first come first served basis? Please give reasons supported by evidence for your views.	Yes we agree that there should be a single authorising and independent body that authorises access to the shared bands. It is our opinion that this should be through a mechanism that ties a base station to a location, ensures that the base station has been approved for use in the UK and is being operated under a license granted to a service provider or an end user. The issue of first come first served basis may need some further rules and adjudication especially in the area of Multi Tenanted buildings, high density areas and Not Spots. If the base station is not in operation the licensee will lose the rights in that location. A period of 90 days would seem reasonable if this is a base station placed within a building and an additional request is received for spectrum at that location for example a tenant. The 50m radius points may require precise positioning by a GPS locator (with altitude or floor level for multi tenanted buildings) as post codes will not be sufficiently granular.
Question 2: (Section 3) Are there other potential uses in the three shared access bands that we have not identified?	We concur with Para 2.11 in the consultation document, we are not aware of current applications beyond those set out in Para 1.3. However, clarity on the availability of spectrum for innovative products and services encourages investment in productivity tools and infrastructure
Question 3: (Section 3) Do you have any other comments on our authorisation proposal for the three shared access bands?	No
Question 4: (Section 3) What is your view on the status of equipment availability that could support DSA and how should DSA be implemented?	We are of the view that a DSA is an essential part of efficient spectrum sharing in areas with a high density use base and are badly served by the licensed MNO's macro network. Multi tenancy buildings being a case in point. The combination of low power, directional antenna and in building clutter will facilitate the re-use

	of channels in the 3.8-4.2GHz band but may require some control over channel allocation and separation to achieve maximum performance and best user experience.
Question 5: (Section 4) Do you agree with our proposal for the low power and medium power licence? Please give reasons supported by evidence for your views.	Yes. We agree with proposal, some thought needs to be given to the planned use of high gain antenna as used in MIMO SIMO and COMP base station configurations specifically in high density multi tenancy building and campus facilities. This could easily be managed by the DSA with additional RAN functions.
Question 6: (Section 4) Are there potential uses that may not be enabled by our proposals? Please give reasons supported by evidence for your views.	There will be use cases for 5G IoT nomadic applications in rural and remote areas that will not be covered adequately by the low power only deployment in the 3.8 to 4.2GHz band. We would like to see wider consideration given to this
Question 7: (Section 4) Do you agree with our proposal to limit the locations in which medium power licences are available? Please give reasons supported by evidence for your views.	Yes. Noisy neighbours are a problem faced today in the unlicensed Wi-Fi spectrum. Licensed spectrum should be considered clean and in urban locations the only way to achieve this is through the strict control of ERP that is the TX power and antenna gain/location combined.
Question 8: (Section 4) Do you have other comments on our proposed new licence for the three shared access bands?	We would like to understand the policy as to the eligibility of the licensee, should a license be restricted exclusively to the occupier/tenant and/or the property owner at the location of the base station. OR should a service provider hold the license on the part of the tenant. There will be several case structures to consider, particularly with community and rural inclusion projects.
Question 9: (Section 4) Do you agree that our standard approach to non-technical licence conditions is appropriate? Please give reasons supported by evidence for your views.	Yes, but as always with the proviso that the permitted equipment is subject to a UK approvals process, both in terms of radio interference, security, TX.RX capabilities and compatibility with the DSA. A network Serial Number similar to an IMSI, IMEA or, in FCC CBRS terms, a FCCID + CBSD Serial Number may be required to allow OFCOM to remotely manage out of spec transmitters where the site owner is not in attendance.

Question 10: (Section 4) Are you aware of any issues regarding numbering resources and Mobile Network Codes raised by our proposals which we have not considered here?	No
Question 11: (Section 5) Do you agree with the proposed technical licence conditions for the three shared access bands? Please give reasons supported by evidence for your views.	Yes we agree with the proposed technical requirements of the license. Our interest is providing in building coverage for users of 5GNR and LTE handsets. We also have clients who continue to be frustrated by the MNO's price, speed and interest in deploying in building coverage. As spectrum holders they are able to limit the focus and pace of deployment. We strongly believe that providing an alternative approach can only benefit the UK. We wish to procure off the shelf network appliances with standard air interfaces and control protocols. We have reviewed equipment currently specified for use in the CBRS band, albeit the spectrum allocations are different but are compatible with the OFCOM proposal
Question 12: (Section 5) Are there other uses that these bands could enable which could not be facilitated by the proposed technical licence conditions? Please give reasons supported by evidence for your views.	Support of National/International Events such as the Commonwealth Games. Given a few days or weeks of event, the current licence allocation and pricing does not cover scenarios where the licence is used on a short term basis
Question 13: (Section 5) Do you agree with our proposed coordination parameters and methodology? Please give reasons supported by evidence for your views.	We support the process illustrated in Section 5 Figure 15. We would like to understand the case where a user request for example 40MHz of BW and part of that requested allocation could only be assigned by interfering with other services. Would the process offer a reduced BW allocation or alternatively suggest a lower power option. Our interest is essentially for in building use, where buildings have multiple occupants; compromises will become the order of the day. EIRP is the yardstick of permitted power, what happens in the case of highly directional phase arrays with forward gains of say 10 to 20dBm. Is there going to be scope for RAN management beyond the DSA as an evolution.
Question 14: (Section 5) What is your view on the potential use of equipment with adaptive antenna technology (AAS) in the 3.8-4.2 GHz band? What additional considerations would we need to take into account in the technical conditions and coordination methodology to	Our previous answer partly covers this point. Phased array antennas are a fundamental part of the 5G radio technology and MIMO SIMO COMP spatial path multiplexing will become the means to deliver HDTV and AR applications over 5G eMBB bearers

support this technology and to ensure that incumbent users remain protected?	The antenna's employed in both the base station and to a lesser extent terminals will need to be taken into consideration as to the sitting of the base station within the licensed location. A simple solution would be to require the use of self-optimising radio technology and make this a part of the approval when using adaptive antenna technology. In the case of protecting incumbent users in the 3.8-4.2GHz band it would be sufficient to restrict emission beyond the licensed site by applying additional power levels when assigning channels. Consultations with the equipment manufacturers will be important.
Question 15: (Section 5) Do you agree with our proposal not to assign spectrum to new users in the 3800-3805 MHz band and the 4195-4200 MHz band?	We support the use of the 5MHz guard band above and below the 3.8 to 4.2GHz spectrum. Particularly as services affecting public safety operate in adjacent bands.
Question 16: (Section 6) Do you agree with our fee proposal for the new shared access licence? Please give reasons supported by evidence for your views.	It is important that the fee is sufficient to provide effective management of the spectrum. It is clear from the consultation document that OFCOM carefully considered the quantum and that the service is sustainable. We wish to emphasize the point of effective management, 5G eMBB and URLLC will be supporting critical services. Consumers will expect higher availability from private networks than the variable service quality provided by a MO macro network, particularly in multi occupancy buildings. The choice of a Private LTE or 5G delivery service over Wi-Fi will be made in part on the guarantee of uninterrupted service. The fee structure proposed is affordable and will not undermine the viability of private networks. An important factor driving the take up of in building radios for 4G and 5G is the low cost of equipment compared to DAS. Scaling license fees to the CPE cost culture with the promise of an assured user quality of experience will be an important factor in market take-up. Will the rules and fee for licensing the 5GHz Medium Power Wi-Fi be brought into line with this proposal? A mechanism to prevent hogging of spectrum licenses in multi-tenant buildings is desirable. OR a further reduction of ERP to minimise interference between base stations used in closer proximity. OR as higher mmWave bands become available a longer term solution is sort by opening up more spectrum at future

	date.
Question 17: (Section 7) Do you agree with our proposal to change the approach to authorising existing CSA licensees in the 1800 MHz shared spectrum? Please give reasons supported by evidence for your views.	Yes There is a clear need for a uniform process
Question 18: (Section 8) Do you agree with our proposal for the Local Access licence? Please give reasons supported by evidence for your views.	Fundamentally Yes. The high cost of providing wireless infrastructure in hard to reach places generally means that coverage is poor or that provision of services is provider later than what may be acceptable. If a community can achieve the required service level in an affordable and sustainable form then it should not be held back from doing so. The same argument holds for FTTH. The incumbent MNO may be supportive of this as it removes an obligation to invest in a low ROI situation, hence place their capital in locations with better prospects with benefits to the wider economy.
Question 19: (Section 8) Do you have any other comments on our proposal?	It would be useful if the MNO's had a collective position on this matter. Clearly Section 8 takes away the exclusive use of the spectrum the MNO's have paid a high price for. Access to spectrum is just one matter that will need addressing, roaming arrangement and ensuring that number ranges to these micro carriers are not blocked or restricted. We would like to see this challenge managed in a separate process to the "3 Share Spectrum Bands" which should face less opposition, however thee will still be issues relating to roaming and number ranges.
Question 20: (Section 8) What information should Ofcom consider providing for potential applicants in the future and why would this be of use?	Not Spots or poorly served areas can be for technical reasons and/or economic scarcity. OFCOM has a broad view of activities in an area, ergo deployment of local fibre, experience of particular MNO's responses to sharing requests and so on. Most community lead applications for spectrum will lack the skills and formalities of an industry hardened applicant. Therefore a set of guidelines and an online registry of previous applications would be helpful. Along the lines of a local authority "register of planning applications". Will OFCOM have a formal process to review applications and an appeal process?
Question 21: (Section 8) Do you agree with our proposal to have a defined licence period and	Yes to the license period, BUT we are not sure that 3 years is sufficient to amortise the

do you have any comments on the proposed licence term of three years?	investment required to encourage and build infrastructure including the deployment of new fibre backhaul. We would prefer a 5 year term.
Question 22: (Section 8) Do you have any other comments on the proposed Local Access licence terms and conditions?	The complexities of 5G and the ability to deliver multiple services and network slices change the dynamics from former 2/3/4G simple voice and internet propositions that can be handled over a basic IP link to a Telco. New enhanced services will depend on Mobile Edge Cloud and C-RAN carrier infrastructure. OFCOM may wish to consider a licensing structure where a small number of Suitably Qualified Service Providers (SQSP's) are approved to build and operate these rural networks and become the licensed operators. The objective being to maintain a set of service standards consistent with national objectives. The concept of Ma and Pa Telco's will not work in this future context
Question 23: (Section 8) Do you agree with our fee proposal for the new local access licence? Please give reasons supported by evidence for your views.	Yes This is a very modest fee to enable in most cases a set of very important community services. We would hope that OFCOM would 1) Have clear rules to avoid a land grab 2) Undertake thorough due diligence on the bona- fide and motivation of the applicant.