Your response

Question	Your response
Question 1: Do you have any comments on our proposals to gather additional antenna parameters, and would you prefer Ofcom to specify a small number of antenna pattern 'envelopes' or for users to provide details of the specific antenna parameters in use for Ofcom to assess? Please provide reasons for your views.	Yes Freshwave agree that Ofcom should capture additional antenna parameters, to maximise spectrum efficiency. We would prefer the approach outlined in para. 3.17(b) of the consultation, i.e. the applicant submits details of the specific antenna type(s) they plan to deploy, as this would provide more accurate predictions of interference. We are not convinced that the wide variety of existing antenna patterns could be approximated to 4 or 5 standard patterns as proposed in 3.17(a). The antenna types and characteristics are part of any design we do and would be relatively straightforward to include in a shared access licence application. A similar level of detail is already collected by Ofcom on form OfW 225 as part of their Innovation and Trial Licensing process.
Question 2: Do you have comments on the suggested approach to enable user-led coordination in certain circumstances?	We agree that stakeholders should be able to override Ofcom's rejection of an application if there is agreement from all potential sharers. However we would like Ofcom to go further and allow power and height limits to be exceeded if sharers agree. See also our response to Question 12 below.
Question 3: Do you have any comments on our proposal to increase the power level of our Low Power product by 3dBm in the 3.8-4.2 GHz band?	We agree that the low power (LP) 3.8-4.2 GHz power level should be increased, however we would like to see harmonisation with the CBRS level which is effectively 6 dB higher than the proposed Ofcom EIRP limit of 21 dBm / 5 MHz. Our predictions and surveys show that link losses increase rapidly with distance at 3.8-4.2 GHz, severely limiting coverage and increasing the cost of deploying a contiguous service. These large losses also reduce the risk of interference with other systems. We note the low number of LP 3.8-4.2 GHz shared access licences (SALs) existing currently. Our view is that the relatively low power level for the LP 3.8-4.2 GHz product is a barrier to economically viable deployments and should be increased further to match the CBRS level. Not all deployments will require this power level so Ofcom should capture the requested EIRP as

	part of the LP application process and use that detail in their coordination assessment, as they already do for MP applications.
Question 4 Do you have any comments on our proposal to remove the requirement for licensees holding a Low Power 3.8-4.2 GHz licence to keep a record of the address at which mobile terminals connected to an indoor base station will be used?	We agree with the proposed lifting of this requirement for indoor base stations, however we think it should also be lifted for outdoor base stations. We see neutral host (NH) as one of the prime use cases for the LP 3.8-4.2 GHz product. Lack of mobile capacity is a significant issue outdoors in some dense urban areas such as the City of London. It is often not feasible for each mobile network operator (MNO) to deploy their own small cells on street furniture. A much more efficient solution is to use an NH to deploy shared infrastructure, minimising planning issues as well as energy usage. Freshwave, working with NEC and with the support of the MNOs, have recently been awarded DSIT funding to develop a pilot NH network to increase mobile capacity in the City of London. Use of LP 3.8-4.2 GHz SALs for NH outdoors would enable spectrum and infrastructure sharing, however this requires lifting of the restriction on mobile terminals for outdoor base stations. We note Ofcom's policy decision to prioritise innovation in the 3.8-4.2 GHz band and consider outdoor NH in this band to be both innovative and beneficial to consumers.
Question 5: Do you agree with our proposals to assume synchronisation between users, and coordinate base station to terminal instead of base station to base station in the 3.8-4.2GHz band? If no, please explain how other measures could increase sharing of the band.	Yes. We note Ofcom proposes not to mandate a frame structure. We believe Ofcom should collect frame structure details as part of the licence application process, and publish this with the other licence data, to enable others to make better-informed decisions about their own designs and applications and further improve spectrum efficiency.
Question 6. Please indicate whether you support our preferred option of coordination at -88 dBm/20 MHz (based on I/N of + 3dB, at 1.5m) or a more conservative alternative of -91 dBm/20 MHz (based on I/N of 0dB at 3m), with reasons for your view.	Yes we support Ofcom's preferred coordination option A.
Question 7: Do you agree with our proposals for an increase in BEL in 3.8-4.2GHz? If no, are there alternatives which you consider could better achieve similar results?	Yes.
Question 8: Do you agree with our proposal that adjacent band protection for Shared	Yes.

Access users is in future limited to considering only the first 5 MHz above and below UK Broadband assignments?	
Question 9: Do you agree with our assessment that, in circumstances where localised shortages of spectrum have occurred, pricing can be used to influence requested spectrum amounts?	We agree that spectrum pricing could be used to influence spectrum requests. This should however be cost neutral overall and include reductions for areas where there is low spectrum demand, such as on large areas of private land (e.g. airports and parks), where spectrum pricing can be a barrier to innovation. See also our responses to other pricing-related questions below.
Question 10: Do you agree that we should take measures to reflect the impact of bandwidth, power levels and urban/rural location in our pricing approach for the 3.8-4.2 GHz band? Do you think there are other factors we should be taking into account?	Yes pricing should depend on bandwidth, power levels and urban/rural location, as these factors affect the availability of spectrum for others. Ofcom could also consider the sterilisation effect in their pricing. In our view the current "per site" pricing model is flawed where multiple medium power licences are required to cover a large area of private land, especially where there is low shared spectrum demand in surrounding areas. In some cases, e.g. large holiday parks, many licences may be needed to provide the required contiguous coverage, particularly at 3.8-4.2 GHz. The high cost of these licences is a barrier to deployment of private 5G (p5G). In contrast Freshwave currently provide private 4G (p4G) services in several parks, using a single local access licence to cover each park. We are therefore pleased to see that Ofcom proposes to take account of the clustering of sites. In our opinion Ofcom should consider the combined sterilisation effect of a cluster in their MP pricing. See also our response to Question 11 for a specific example. Similarly we believe Ofcom should take account of antenna characteristics in their pricing, as these parameters affect the sterilisation area. We note Ofcom is minded not to create additional pricing for indoor MP use. We don't currently have a need for MP licences indoors but can foresee scenarios where they might be required. Our view is that Ofcom's fees should take account of the sterilisation effect and assume an updated BEL figure for indoor deployments. Ofcom also considers how to take account of geographical demand but is

	minded to stick with the current urban/rural distinction. Again we think that Ofcom pricing (and exceptions decisions) should take account of the sterilisation effect of an application, perhaps via the "premise sterilisation number" used in section 6 of the consultation document.
Question 11: How do you consider the illustrative prices would impact your spectrum requirements and future deployment plans in the 3.8-4.2 GHz band? Please provide evidence in support of your view.	Freshwave have deployed p4G networks on large areas of private land in rural areas, and is being asked by customers for enhanced services requiring 100 MHz of p5G spectrum. In our view the proposed doubling of the fees for 100 MHz bandwidth rural medium power (MP) would be an unnecessary additional barrier to p5G deployment, unless there is a need to mitigate spectrum demand in specific areas, see also our response to Question 10. As an example a p4G network at a specific holiday park uses six base stations. The park uses 4G MNO spectrum via a local access licence (LAL) with a licence fee of around £300 per year. The provision of enhanced services via a p5G network using 100 MHz bandwidth would require 12 MP 3.8-4.2 GHz SALs to replicate the p4G coverage at this park. At current pricing the licence cost would be £9,600 per year, which we (and our customers) consider is already excessive given the lack of spectrum scarcity in surrounding areas. This fee would increase to £19,200 per year using Ofcom's illustrative pricing (excluding the possible mitigating impact of clustering). Similarly we consider the doubling of fees for a 100 MHz urban LP licence may be a potential barrier to the deployment of new services. We note the very low number of 3.8-4.2 GHz SALs in urban areas currently and believe that Ofcom should maintain the current urban LP pricing, increasing it only if/when/where intervention is needed. We agree that Ofcom should take account of EIRP in their full urban MP pricing proposals. This product has an EIRP limit which is 18 dB above the current LP limit, however some users may only need an uplift of a few dB and should be incentivised to use no more power than required.
Question 12: Do you have any comments on our proposals to clarify the circumstances in	We support Ofcom's objective to simplify the exceptions process and make it more

which exceptions are available, the tests we will apply, and how this supports user flexibility outside our overarching rules?	transparent. As well as requests for MP licences in urban areas and for exceeding the maximum antenna height, we believe Ofcom should consider requests to exceed the MP limit in rural areas. Increasing base station power would help to reduce the cost of deploying p5G networks over large areas. We see no reason why the premise sterilisation threshold could not be applied in such cases. Ofcom should also consider the availability of other spectrum in the 3.8-4.2 GHz band when making its coordination decision. The exceptions process should also be used for other types of requests such as use of band 40 SALs outdoors.
Question 13: Do you agree with our overall approach based around refining our existing coordination framework for Shared Access, whilst monitoring future opportunities for more user led and outcomes led coordination where evidence suggests it would be of benefit?	We believe that Ofcom should use an interference impact approach when assessing requests for large user-defined areas (similar to that used by BNETZA), giving applicants greater flexibility in their designs, including use of EIRPs and antenna heights which exceed the current limits for the MP product. As a first step we would like to see Ofcom provide an assessment of the methodologies used by BNETZA and others and their applicability to the UK.
Question 14: Do you agree with our assessment of the potential impact on specific groups of persons?	No comment.
Question 15: Do you agree with our assessment of the potential impact of our proposal on the Welsh language? Do you think our proposal could be formulated or revised to ensure, or increase, positive effects, or reduce/eliminate any negative effects, on opportunities to use the Welsh language and treating the Welsh language no less favourably than English?	No comment.
Question 16: Do you have any other comments on the proposals set out in this document?	We welcome Ofcom's proposals to enhance spectrum access and improve the authorisation experience for users, including online applications and spectrum availability maps. We also welcome updates to Ofcom's propagation clutter model. We believe Ofcom should be moving towards high resolution digital elevation models (DEMs) in urban areas, to improve spectrum reuse. We note the predictions for central London within the consultation, e.g. Figures 4.1 and 4.2, are quite different in appearance from our own

	predictions using DEMs, which align closely with our surveys. We note Ofcom is proposing to leave MP power limits unchanged. We think Ofcom should be less prescriptive about power limits in rural areas with low spectrum scarcity, focussing more on the interference impact. This would help reduce infrastructure costs. See also our response to Question 13. Our own predictions show that to upgrade our holiday park solutions from 4G to 5G reusing the current 4G sites (which operate in the 2.6 GHz band) we would need an EIRP around 6 dB higher than the current MP EIRP limit. The sterilisation effect around the parks would still be minimal at these higher powers, especially when antenna parameters are taken into account. We would also like to see Ofcom enable MP deployments in urban areas, subject to an assessment of the sterilisation impact using antenna parameters and an improved propagation model. This could help mitigate the need for increasing the LP limit proposed in our response to Question 3.

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