Your response

Question	Your response
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.	We are an industry alliance and do not develop products directly.
Question 2: Are you interested in providing or developing AFC databases for use in the Lower 6 GHz band in the UK?	We are an industry alliance and have no interest in developing an AFC database directly. We have worked with other industry groups to develop specifications for AFC in the US.
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?	Working with industry associations such as WInnForum to develop the AFC functional specifications and test specifications for AFC was successful in the US. We suggest that this could be a useful path forward for OfCom.
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?	We support the phased approach when it also considers existing users and users of the spectrum. Ultra-Wideband (UWB) is presently in use and effectively sharing the subject band with other technologies due to the extremely low interference footprint. In adding new uses consideration of the impacts upon what is presently in use so as to provide for compatible non-disruptive use will provide the greatest value to the UK from the spectrum. When introducing RLAN in phase 1, the impact on

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	existing UWB should be considered. When introducing mobile services in Phase 2, consideration of impact on RLAN and all other existing uses should be considered. In both cases, an effective way to improve sharing and spectrum reuse is to limit transmit power to provide more equitable levels with minimized interference footprint. When introducing new uses, priority should be given to avoiding disruption of the users in the band.
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.	We suggest prioritizing access based on power level – lower is better. Incentives to operate with lower power levels than typically assumed will promote innovation as well as promote better sharing. We suggest not giving priority to mobile users over other existing users.
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?	We are not clear on this proposal. The predominant use of Wi-Fi requires clients to connect to Wi-Fi. The rules in most regions require clients to operate under the operation of an AP. If the intention is to authorize client to client operation, we support the suggestion. Use of client to client communications can reduce overall traffic in the channel as well as enable reducing transmit power for client devices, as most client to client communication is over a very short distance. An alternative would be to authorize first very low power devices, with both VLP APs and clients, and authorize client to client communication for VLP clients. We suggest also considering incentives for development of adaptive

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	transmit power control that can reduce interference footprint and overall capacity of the spectrum.
Question 11: Do you have any comments on our plan for a "phase 2" when mobile will be introduced?	When introducing mobile services, we suggest that limiting transmit power to levels near equal to, or below existing uses, including Wi-Fi, will better support effective sharing by reducing disruption. This will also spur innovation by requiring some changes in the assumptions and technology use
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.	We suggest not giving priority to mobile users over other existing users. This is counter to innovative sharing. We suggest incentives that reward innovation in sharing.
Question 13: Do you have any evidence or views about the geographical extent of mobile networks' likely deployment in Upper 6 GHz?	We question the need for higher power base stations to provide indoor coverage for urban areas. Indoor coverage in most urban settings is much better provided by RLAN or low power microcells. The power needed for indoor coverage from macro base stations greatly introduces interference footprint and disrupts sharing of the spectrum. We instead encourage limiting maximum transmit power to levels that promote greater spatial reuse and sharing.
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?	When power levels higher than existing uses of the band, including UWB, require detect and defer to other services already using the band. It is technically feasible today to detect low-power services in proximity, including UWB. Sharing through coexistence and special reuse is enhanced by using dynamic power adjustment based on what is detected, as well as limiting power to only that needed for a given point to point link. We believe that "detect and adjust" along with more typical transmit power control will enhance overall use of and value from the band. This should be required for both RLAN and IMT access. We suggest that when defining technical requirements for Contention Based Protocol the capability to detect all other users sharing the band. As Wi-Fi has evolved to the point of using 320 MHz channels, it is technically feasible to sense over the entire 320 MHz

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	(and in some cases wider) frequency range. Techniques beyond simple energy detect should be considered. With present technologies and the presence of multiple technologies in a typical device, recognition more than simple energy above threshold is feasible, e.g. detecting a UWB preamble is also possible in many usage scenarios.
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?	We support consideration if Very Low Power devices but suggest that "very low" might be lower than what is conventionally used by RLAN VLP devices in other regions. What has been defined as "very low" in some regions is many orders of magnitude greater than the power limits for UWB presently allowed in the band, for example. The need for such relatively high power is based on assumptions rooted in technology realizations of decades old designs. For example the specifications for receiver performances in IEEE Std 802.11 are based on assumptions that effectively have not been updated in over 2 decades and set the bar very low for receiver sensitivity. Link budget analysis typically presented use these poor RX sensitivity levels as assumptions for the TX power required. We suggest considering incentives to encourage VLP operation at much lower levels than typically discussed.
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?	As noted, reducing power levels reduces interference footprint and thus improves sharing of spectrum through coexistence, and special spectrum reuse, enhancing effective sharing in many environments. We also ask Ofcom to consider conditions that would enable other technologies beyond Wi-Fi to operate with similar technical conditions that promote sharing through coexistence.

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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?	We support providing incentives to share through awareness of other users and evaluation of channel condition to avoid disruption to other users, as we believe there is much room for innovation in sharing through co-existence which should be encouraged.
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.	The power levels for outdoor use of UWB have been proven to not cause interference to radio astronomy services. Consider similar power limits for Wi-Fi in the subject band. This will protect radio astronomy services and may also serve to promote innovation in achieving ultra-low power RLAN.
Question 21: Do you agree with our assessment of Wi-Fi coexistence with existing users of the band? If not, please provide details.	As realized in other regions, Wi-Fi can be disruptive to existing users of the band, for example, UWB. Due to the disparate power levels of LPI and even VLP in some regions, as well as the method of evaluating "contention based protocol" that requires only detection of services at similar or higher transmit power levels. While this allows for very simple implementations it does not encourage more efficient and effective techniques to be applied. Requiring better assessment and detection of other than Wi-Fi signals will improve coexistence and overall spectrum value. UWB implementers have demonstrated ability to operate without causing interference to other services, a key to successful sharing. UWB implementations show that useful communication rates can be achieved at transmit power orders of magnitude lower than presently assumed for RLAN and Mobile services. Studies in ETSI and IEEE standards development work have shown the potential for Wi-Fi to interfere with other services, including other Wi-Fi networks and UWB. There are studies and efforts ongoing to develop mitigation techniques to provide for enhanced coexistence and sharing. Such efforts are needed to realize all the goals for sharing stated by OfCom.

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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?	