Your response

Question	Your response
Question 1: Hybrid sharing could mean that the upper 6 GHz band will be used for mobile outdoors and Wi-Fi indoors. What are your views on the priorities for each of these two services, assuming that suitable coexistence mechanisms are developed?	*Is this response confidential? –N* There are many questions that need to be answered before the upper 6 GHz band could be used for mobile outdoors and Wi-Fi indoors, even if suitable coexistence mechanisms are developed. We think that due to the expected increase of indoor use in number of users and data rate per user, the priority should reflect this trend. In addition, low power indoor use enables a higher efficiency of spectrum usage compared to a high-power outdoor scenario, because it supports a much higher frequency reuse rate and offers a better Quality of Service (QoS) for a wide range of applications, such as file download, streaming, etc. Third, a license-exempt approach enables more options regarding supported use cases and applications since the user can adjust the network according to his needs.
Question 2(a): Hybrid sharing could mean that the upper 6 GHz ban will be used for mobile in some locations, and Wi-Fi in others. We would like feedback on the priorities for each of these two services, assuming that suitable coexistence mechanisms are developed. From the point of view of mobile, is the upper 6 GHz band most useful to provide outdoor coverage, or indoor coverage? Is it most useful in urban areas, or in those base stations that are currently carrying more traffic, or some other split?	*Is this response confidential? –N* The USA has opened the 6 GHz band for both outdoor and indoor use, with mechanisms like the Automated Frequency Coordination (AFC) system controlling standard power unlicensed devices to protect the incumbent fixed links. Upper 6 GHz could be used for both outdoor and indoor coverage. However, because of potential interference to the incumbents in the band, high power mobile macro base station deployment could be problematic. Instead, local/shared licensing that would allow private networks like in 3.8-4.2 GHz in the UK may make more sense. Unlicensed lower power Wi-Fi devices are being deployed indoor in USA and should be deployed outdoors too once the AFC and device ecosystem are ready. FCC will permit testing of AFC systems that will manage access

	to 6 GHz band spectrum by standard power unlicensed devices.[1]
Question 2(b): Similarly, what are the priorities from the point of view of Wi-Fi deployments?	*Is this response confidential? – N* In densely populated areas there is always a high demand on data traffic indoor and outdoor. As mentioned in 3.7, most of this traffic is indoor, therefore the priority should be to satisfy this increasing request on data rate by open new spectrum to indoor usage. In addition, offering more indoor capacity will decrease outdoor usage. Use by unlicensed devices like Wi-Fi or locally by IMT would help satisfy this indoor demand.
Question 3: What are your views on a modified AFC or SAS-type approach to enable hybrid sharing? What additional work do you think would be required?	*Is this response confidential? – N* We think that a data base approach would be the best mechanism to enable spectrum sharing in an efficient and flexible manner (see ETSI TR 103 885 and also white paper on "Spectrum sharing frameworks for temporary, dynamic, and flexible spectrum access for local private networks"). Depending on the level of coordination within the shared spectrum, different requirements need to be met by the sharing mechanism. AFC is designed to protect the primary user but does not give a guaranteed QoS to the non-primary users. If AFC shall support prioritization of non-primary users (Wi-Fi or mobile), it needs a kind of three tier implementation: primary user, prioritized non-primary user, non-primary user. The needed granularity in time is also an open issue. In contrast, SAS already supports a three-tier approach, but is a complicated system designed for the specific situation in the US 3.55 – 3.7 GHz band. To modify SAS according to the requirements of hybrid sharing seems to be a more elaborate approach compared to the needed adjustments of AFC.
Question 4: How could existing access protocols and sensing mechanisms be leveraged (i.e., those in Wi-Fi or 5G NR-U) to enable hybrid sharing?	*Is this response confidential? – N* Compared with a data base approach, spectrum sensing has the benefit that no additional service is necessary, and the sharing mechanism is implemented in the PHY and MAC layer of the technologies allowed to be deployed in the shared band. This makes sharing very efficient but limits it to specific technologies. If all non-primary users support

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[1] https://docs.fcc.gov/public/attachments/DA-23-759A1.pdf

	sensing mechanisms such as LBT, the spectrum access would be fairly managed meaning that in average every user gets the spectrum he needs. The drawbacks of sensing are, that the well-known "hidden node" issue will lead to false detection, QoS depends on the RF environment, and prioritization of non-primary users requires complex signal recognition rather than simple power detection.
Question 5: What mechanisms could potentially enable device-to-device connectivity?	*No answer*
Question 6: If hybrid sharing is eventually adopted, and requires licensed mobile to operate at medium power, in what way would mobile networks use the upper 6 GHz band?	*Is this response confidential? – N* The mobile networks could be used similarly to the local networks in 3.8-4.2 GHz in the UK.
Question 7: How would you suggest that the mechanisms presented here can be used, enhanced, or combined to enable hybrid sharing or are there any other mechanisms that would be suitable that we have not addressed?	*Is this response confidential? – N* In general, every data base approach can be used to enable spectrum sharing because it can be designed in a frequency and technology agnostic way. The needed granularity in time, geolocation, and frequency defines more or less the complexity of the system. The described sharing idea can be implemented with AFC equipped with a new non-primary prioritization feature.
Question 8(a): Assuming the future of the band includes indoor use for Wi-Fi and outdoors use for mobile: How could this be achieved without creating or suffering interference?	*Is this response confidential? – N* Restrict mobile use to certain areas where it is evident that additional resources are needed and Wi-Fi to other areas.
Question 8(b): Could there be a combination of technical adjustments such as power limits and other mechanisms (including databases or sensing mechanisms)?	*Is this response confidential? – N* A database approach augmented with equipment sensing to manage spectrum access for low power equipment and coexistence among users, especially the incumbents, Is worth exploring. Macro mobile deployments would be more problematic.
Question 9(a): We are interested in input about the importance of the upper 6 GHz band for its incumbent users, and on the potential impact of hybrid sharing of the band. What evidence do you have on whether incumbents are likely to coexist with hybrid sharing of the band with mobile and Wi-Fi? Are	*Is this response confidential? –N* Again, local use of mobile networks and Wi-Fi could be facilitated via an AFC.

there unique advantages of the upper 6 GHz band for these uses?	
Question 9(b): What are your views on the initial analysis we have conducted around hybrid sharing and coexistence with incumbents?	*No answer*
Question 9(c): For any incumbent uses that you view as unlikely to be able to coexist, what alternatives are there? What are the barriers that might prevent those alternatives?	*No answer*
Question 10: Do you have any other thoughts that you would like to share about hybrid sharing in the upper 6 GHz band, or about hybrid sharing more generally and its potential for applications in other bands?	*Is this response confidential? – N* In our view "hybrid sharing" is a good initiative to open new bands under a sharing regime. However, spectrum sharing between low power and high-power technologies and the coordination of these non-primary users in all three dimensions (time, geolocation, and frequency) are not an easy task and need a well-defined framework. Hybrid sharing would be more feasible between low power local mobile networks and Wi-Fi. Further work is needed to unlock its potential for applications in upper 6GHz and other bands.
Question 11: Do you have any other comments to make on these proposals or on the future use of the upper 6 GHz band?	*Is this response confidential? – Y / N (delete as appropriate)* We think that priority use by Wi-Fi would be the best solution for the upper 6 GHz band.

Please complete this form in full and return to Hybridupper6ghz@ofcom.org.uk.