Consultation title	Fixed wireless spectrum strategy: Consultation on proposed next steps to enable future uses of fixed wireless links
Organisation name	Cambridge Communication Systems Ltd

Response

Question 1: Do you agree that we have identified the key drivers likely to have a significant impact on the spectrum demand for fixed wireless links? If not, please provide further detail and evidence to support your answer. **Do you have other comments to make/points to raise with us on these issues?**	Confidential? – N Yes, CCS agrees that you have identified the main areas that will be responsible for spectrum demand in the future.
Question 2: Do you agree with our conclusions on spectrum implications and our proposed strategy/next steps for each band? **Are there any other considerations of significance that you feel we should have included or do you have other comments to make/points to raise with us on these issues?** **Please provide as much detail as possible to support your answer.**	Confidential? – N CCS Agree with the conclusions made, however in addition we believe that the spectrum allocation should be flexible for both FDD and TDD. It should also be available for large block allocation, where Self Organising can be used to self-manage interference, for PtMP and MPtMP mesh solutions in 56/112MHz channels. TDD should be able to use both the go and receive frequencies allowing uplink and downlink to be combined to a single TDD channel allowing more flexible use of the spectrum for TDD applications. It is seen that the 66-71GHz spectrum use cases are around smart city applications, FWA as well as 5G access and backhaul. Regarding the 57-64GHz band mesh, we strongly agree with the proposed change to enable point to multipoint /mesh technologies on a license exempt basis. However, we believe that the EIRP should be increased to fall in line with similar specifications as stated by the FCC which would allow short to medium applications such as FWA.
Question 3: Do you agree with the items we have identified for further consideration? Are there any other significant areas that you believe should be included? If so, please include all necessary evidence to support your view.	Confidential? – N Agree, Self-organising self-healing should be supported in the future, to be able to deliver better QoS with high efficiency and larger capacities. This will also give better coordination with other fixed wireless systems
Question 4: Do you agree with our proposal to change the authorisation regime in the 64 – 66	Confidential? – N CCS Strongly agree with this proposal.

GHz band to licence exempt to create a common authorisation approach across the 57 – 66 GHz band for fixed outdoor installation use and that this would be a benefit to UK citizens and consumers?	This could free up opportunities for V band FWA which could benefit small ISPs and independent operators. This is something that is being looked at already in the USA by Tier 2 companies and local municipalities. CCS believes that anything that can help access to market for new and small businesses can only be a good thing to improve digital connectivity and the UK economy moving forward.
Question 5: **a) Do you agree with the proposed new technical conditions in Table 6 to facilitate equipment intended for fixed outdoor installation in the 57 – 66 GHz band? Please provide evidenced views /alternatives if you disagree with our proposal. Do you consider any additional conditions should be mandated as part of a licence exemption to manage the interference environment?** **b) Do you agree with our assessment that the proposed changes in technical conditions will have minimal impact on existing use and are appropriate to manage the future outdoor interference environment?** **c) Are there likely to be any fixed outdoor installation use cases that will require operation at eirp levels above 55 dBm? If so, please provide evidence of how the coexistence with the different outdoor users could be ensured?**	Confidential? – N a) CCS feel that EIRP should be at least 55 dBm (irrespective of the 10dBm transmit power). We would encourage Ofcom went further and aligned to FCC thereby allowing EIRP to 82dBm. This would then allow vendors to have a common set of requirements to work to, standardising across the globe. For reference the FCC states the following which is encouraging new market opportunities (Title 47, Chapter I, Subchapter A, part 15, subpart C, Section 15.255) A summary of the key points is: • Maximum conducted power = 500mw (+27dBm) • Average EIRP shall not exceed +40dBm or • For fixed outdoor P2P transmitters average EIRP = 82 - 2*(51- Ant dBi) but transmit EIRP is not required to reduce below +40dBm The FCC regime is preferred to the OFCOM requirement of reducing conducted power to +10 dBm when using externally deployed high gain antennas. b) Yes, agree that this will have minimal impact on existing and future interference environment. It would be recommended that any systems that would be allowed to operate with higher EIRP should have built in intelligent interference management systems. c) It is believed that allowing support of high antenna gain and higher Tx power for longer links in urban and rural areas, would also enable the use for FWA where fibre is not cost effective or practical. As these applications would be in rural rather than urban areas the risk of interference is reduced due to the distances that would be involved. To ensure the coexistence with other

	outdoor users it is believed that any equipment operating above 55dBm should have built in interference awareness. The systems deployed in this band should be able to intelligently manage interference using both time and frequency agility, as well as rerouting on alternative paths as required in mesh networks.
Question 6: **a) What are the use cases and technical parameters envisaged for the 66 - 71 GHz band? Are they likely to be similar to those in the 57 – 66 GHz band? If so, what are your views on extending the same or similar technical conditions as described above for the 57 - 66 GHz band (both existing wideband data transmission (SRD) and new fixed outdoor technical conditions) to the 66 – 71 GHz band to facilitate both fixed and mobile use cases.** **b) Please provide your view on whether the technical parameters of wideband data transmission (SRD) as shown in Figure 4 are suitable to facilitate mobile/portable equipment including use outdoor? If you do not consider they are suitable, what alternative technical parameters do you think should be considered?** **Please provide as much detail to your answer as possible and your considerations on the co-existence aspects.**	Confidential? – N a) We believe that the use cases will be similar to the 57-66GHz band, encompassing both 5G access and backhaul as well as fixed wireless access. b) Regarding the technical parameters though CCS believe that these should be as stated in the response to question 5, where the EIRP should be greater than 55 dBm (irrespective of the 10dBm transmit power or 30dBi antenna gain) This would allow longer connections for 5G access and backhaul as well as serving FWA for areas where fibre is not an alternative. We would like to highlight that this band should also cover point to multipoint and multipoint to multipoint /mesh systems for the development of 5G as it is seen that most future networks in this area would be of a mesh topology allowing the capacities and availabilities that 5G is looking to deliver especially in the dense urban environments. This has also been observed with some of the 5G innovation test beds that are being deployed in the UK highlighting the need for mesh topology with self-healing and higher EIRP to achieve these 5G demands.
Question 7: Do you agree that there is a continued need for future low capacity fixed link applications? **If so, please provide information to support your view and what alternatives you would consider appropriate should the upper 1.4 GHz band no longer be available.** **Please provide clear evidence to support the reasons for your views.**	Confidential? – N Agree that there will still be a small need for low capacity links in the future, which could be addressed by these bands. However, CCS are seeing that in most industries the demand for data is shifting towards higher capacities.
Question 8: **Do you consider there is merit in considering making the bands 52 GHz and 55 GHz available under alternative authorisation approach(es)**	Confidential? – N In General, the more spectrum that is made available the better for the consumers. This band should would need to be allocated in a way that allows it to be fully utilised be that

such as block assignment? If so, what would you consider to be the best approach(es)? Please provide detailed views to support your response.	by having the band license exempt or by licensing also allowing use of mesh systems as well as PtP and PtMP systems. Issues have been seen when specific bands are allocated to specific operators who then restrict the use of the spectrum or manage it inefficiently. There are companies who have sat on their frequencies which restricts what other operators and disruptive newcomers can do. The main issue arising at the moment in most places is that of interference, due to the high concentration of radio links. CCS believes that the way forward is to have the Interference intelligently managed by system rather than the user. This can be done by the use of interference aware systems managing its own channel usage. Alternatively, new spectrum in both microwave and mmwave bands could be managed on a coordinated, and shared basis, using SAS (Spectrum Allocation Servers). See question 9 below.
Question 9: **Do you think we should review our authorisation approach to any other band used for fixed wireless links?**	Confidential? – N It would be recommended to look at a shared spectrum approach like CBRS as done by the FCC in the USA. Details are found in FCC Rule Part 96
Question 10: **a) How do you envisage W band and D band will be used for mobile backhaul provision and the likely timescales? Please provide as much detail as possible on deployment scenarios and whether this would include indoor use. Are there any other types of applications (other than mobile backhaul) that could be suited for these bands?** **b) What are your views on the most appropriate authorisation approach for the W and D bands? Please provide as much detail and technical evidence as possible in your answer.**	Confidential? – N a) It is believed that W and D band will be used for mobile backhaul in the future. It is hard to say when operators will take up on this and deploy such scenarios. b) Regarding the approach to the W and D bands we would recommend that this is not restricted to PtP and would give unlicensed or block allocation to mesh and Multipoint to multipoint networks for both indoor and outdoor use. This would allow meshed 5G networks to be deployed quickly and easily in dense urban environments.
Question 11: Which capacity enhancing technique(s) are you using or planning to use? Please provide detail / evidence and clearly explain why and how each technique is planned to be used and if you consider there are any other aspects that should be considered.	Confidential? – N CCS have developed cognitive radio intelligence SON using dynamic spatial multiplexing techniques to ensure that system capacity is delivered at maximum spectral efficiency, within a single frequency channel. This is achieved by continually measuring self and 3rd party interference and then harnessing switch beam antennas or multiple high capacity

	phased array transceivers. This approach enables access and backhaul systems to be rapidly deployed using low cost workforce and removing the need to continually re-plan and optimise the radio network should anything change.