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| **Consultation title** | Fixed wireless spectrum strategy: Consultation on proposed next steps to enable future uses of fixed wireless links |
| **Organisation name** | Huawei Technologies |

# Response

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| **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.**<br><br>**Do you have other comments to make/points to raise with us on these issues?** | Confidential? – N<br><br>Huawei agrees on the key drivers that were identified and on the necessity to provide better broadband through fixed wireless links where fibre isn't viable. |
| **Question 2: Do you agree with our conclusions on spectrum implications and our proposed strategy/next steps for each band?**<br><br>**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?**<br><br>**Please provide as much detail as possible to support your answer.** | Confidential? – N<br><br>Huawei agrees with the overall analysis.<br><br>In addition, Huawei has the following comments:<br><br>• On the potential of the bands between 20 and 45 GHz, with regard to the 28, 32 and 40 GHz bands, Huawei identifies 32 GHz, thanks to the very similar propagation characteristics and the still low current usage of the band, as the "safe harbour", being the most suitable band both to re-plan/migrate existing 26 GHz fixed links, and as a target for new deployments, thereby discouraging operators from further investments in fixed links in the 26 GHz band.<br><br>• On the potential of the bands below 20 GHz, Huawei would encourage Ofcom to consider migration of 1.4 GHz low capacity fixed links to other bands, in order to make the band available for mobile communications in the UK, benefiting from Europe-wide harmonisation. |
| **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** | Confidential? – N<br><br>On paragraphs 5.1-5.5:<br><br>• We consider that there is no need to promote 52 and 55 GHz as significant bands for fixed links in future, given the relatively limited amounts of spectrum and scarce components availability |

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| **include all necessary evidence to support your view.** | in these frequency bands.<br><br>• D-band: We encourage CEPT ECC SE19 and ETSI TM4 to draft regulations and harmonized standards, actively promoting industry investments according to ISG mWT application scenarios. The availability of huge amounts of spectrum in the D-band and its favourable propagation characteristics, makes this a high priority band for the industry.<br><br>• W-band: We encourage CEPT ECC SE19 to draft regulations to secure spectrum for fixed services, without pressing for industry investment in this band.<br><br>• V-band: We encourage allowed use of FWA, WiGig-like outdoor installations, with EU regulations adapted accordingly. |
| **Question 4: Do you agree with our proposal to change the authorisation regime in the 64 – 66 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?** | Confidential? – N<br><br>Huawei agrees and supports the proposal. |
| **Question 5:**<br><br>**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?**<br><br>**b) Do you agree with our assessment that the proposed changes in technical conditions will have minimal impact on** | Confidential? –N<br><br>a) Huawei agrees with the general principle expressed by Ofcom. Moreover, to allow better usage of the band, Huawei proposes the following modifications:<br><br>i. Modify the EIRP vs. antenna gain slope, by allowing 2 dB EIRP increase per each 1 dB antenna gain increase (similar to FCC approach). See Figure 6 new (a).<br>ii. No change in the maximum allowed EIRP values, limited to 55 dBm.<br>iii. From the feasibility point of view, higher gain antennas would imply larger arrays which are technically challenging, more costly and with unsuitable form factor. |

**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?**

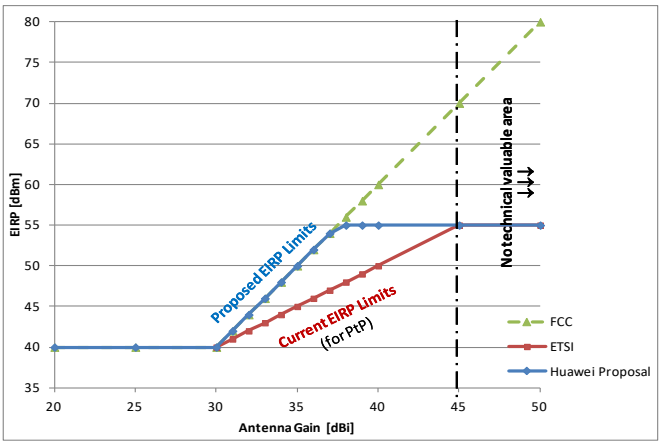


*Figure 6 new (a)*

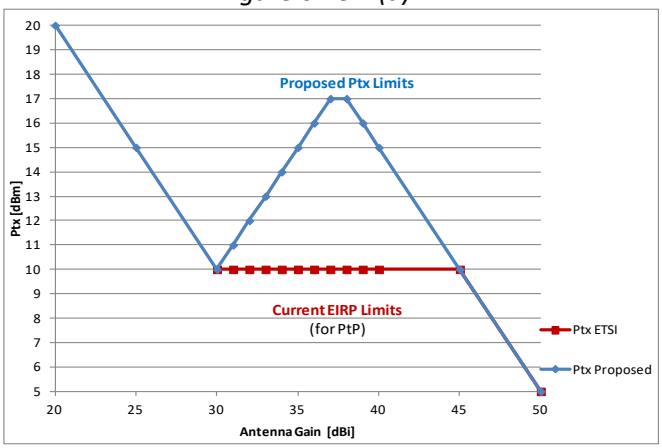


*Figure 6 new (b)*

iv. Maximum output power according to Figure 6 new (b), with maximum output power of 17 dBm @ 38 dBi antenna gain. See also Table 6 new. The value of the EIRP is the minimum of 55 and [55 – 2∗ ($G_{antMAX}$ –$G_{ant}$)] dBm.

| Transmit eirp | Requirement | Note |
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| ≤ 40 dBm | Minimum antenna gain of 20 dBi | New technical condition |
| 40 dBm < eirp ≤ 55 dBm | Minimum antenna gain of 30 dBi<br>**Maximum output power according to the graph (Maximum output power of 17 dBm @ 38 dBi antenna gain)** | **New technical conditions according to Huawei proposal** |

*Table 6 new*

v. To have better system gain with the same a*ntenna gain*, the output power should be increased accordingly. Figures 6 new a/b show the proposed solution in terms of EIRP, output power and antenna gain.

b) Due to the relatively low number of installed fixed links in this band, Huawei does not expect particularly heavy interference issues and, in case, these might be managed by choosing an alternative channel, in line with the usual approaches in unlicensed regimes.

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| | c) Please refer to Question 5a, above. |
| **Question 6:**<br><br>**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.**<br><br>**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?**<br><br>**Please provide as much detail to your answer as possible and your considerations on the co-existence aspects.** | Confidential? – N<br><br>a) Huawei agrees with Ofcom's assessment that the 66 - 71 GHz should be promoted as a priority band for study in the context of 5G services. However, Huawei considers it premature at this stage to recommend general authorization (license exemption) of 66-71 GHz. It could be considered that it would be preferable for the 66–71 GHz band to be made available on a licensed basis, as a complement to the substantial amount of underused spectrum (57-66 GHz) available today through general authorisation (license exemption) immediately below the band.<br><br>b) Please refer to Question 5, above. |
| **Question 7: Do you agree that there is a continued need for future low capacity fixed link applications?**<br><br>**If so, please provide information to support your view and what alternatives you would consider appropriate should the** | Confidential? – N<br><br>Huawei thinks there would be limited interest in such links. Huawei would encourage Ofcom to consider migration of such links to other bands in order to allow the availability of the 1.4 GHz band for mobile communications in the UK, benefiting from Europe-wide harmonisation measures. |

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| **upper 1.4 GHz band no longer be available.**<br><br>**Please provide clear evidence to support the reasons for your views.** | |
| **Question 8:**<br><br>**Do you consider there is merit in considering making the bands 52 GHz and 55 GHz available under alternative authorisation approach(es) such as block assignment? If so, what would you consider to be the best approach(es)? Please provide detailed views to support your response.** | Confidential? – N<br><br>Huawei's opinion is that there is no need to promote 52 GHz and 55 GHz as significant bands for fixed links in future, given the relatively limited amounts of spectrum and scarce components availability in these frequency bands. |
| **Question 9:**<br><br>**Do you think we should review our authorisation approach to any other band used for fixed wireless links?** | Confidential? – N<br><br>Huawei envisages the need to provide 10 Gbps @ E-band to cope with increased capacity requirements. To make this viable, authorisation of wider channels of 2 GHz at E-band would be recommended. |
| **Question 10:**<br><br>**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?**<br><br>**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<br><br>a) Huawei envisages two main applications for these bands:<br><br>i. Backhaul and Front-haul of 4.5G and 5G, exploiting very wide channels and low size antennas for ultra high capacity<br><br>ii. Fixed Wireless Access, safe cities, urban areas, exploiting very high frequency for very compact, low power consumption and TCO<br><br>Regarding the timescale, Huawei considers that commercial availability will likely not be before 2020, taking into account both the technology availability and the standardization process<br><br>b) With channelization based on 250 MHz basic channels and multiples as per ECC CEPT proposal, two main approaches of channel raster may be envisaged:<br><br>i. block based use of channels with "flexible duplexing" or duplexer-free architecture, given new systems capable of operating on very narrow duplex separations with no significant threshold degradation |

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| | ii. use of equipment with traditional fixed duplexer schemes<br><br>To be able to support the applications mentioned above, availability of channels of 5 GHz @ D-band is suggested. |
| **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<br><br>Huawei envisages the use of the following:<br><br>i. Sophisticated interference mitigation techniques like CCIC (co-channel interference canceller) to allow and improve efficient use of spectrum<br><br>ii. MIMO techniques to improve spectral efficiency and capacity, at least for those frequency bands which allow a reduced spatial antenna separation (higher frequency bands)<br><br>iii. Similarly, carrier and/or band aggregation to enable higher capacities links |