

Your response

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Question 1: Do you have any comments on our impact assessments as set out in Annex 1? Please specify whether your comments relate to: • our wider impact assessment; • our equality impact assessment; or • our Welsh language impact assessment.	Confidential? – N The wider impact assessment appears to ignore some of the major issues which will be present if attempting to make assignments in the proposed frequency bands – especially with regard to non-standardised solutions, a temporary ‘UK only’ approach and complexity of co-ordination. Whilst the use of licensed spectrum rather than using license exempt bands brings benefits, the proposed usage of the 450 MHz frequency range would likely introduce significant co-ordination issues. This could result in additional costs to the UK due to lack of any meaningful ecosystem and requirements to swap out technology just a few years after initial deployment. The extent of this cost would depend upon how widely such a system were deployed.
Question 2: Do you agree with our assessment of the 450 MHz and 5030-5091 MHz bands for drone control links? Do you agree there is demand for these bands in the UK (please identify any relevant use cases and locations in your response)? Are there any other frequency bands we should consider for control links?	Confidential? – N The assessment around the proposal to utilise the 450 MHz band for drone control appears to minimise the complex co-ordination (both cross border and in-country) which would be required to make this a reality. The suggested power levels and altitudes of the drones would likely exacerbate existing issues with the 450 MHz band in the UK and beyond (see answer to Question 3). With regard to the 5030-5091 MHz band, although agreed at WRC-12, there are relatively few countries currently exploiting this band for drone control and the subject remains the subject of further standardisation work. There are other frequency bands under consideration as part of a more holistic ‘Air-Ground-Air’ strategy - (for instance 2.3 GHz) which may be more appropriate and ultimately be supported by a wider vendor ecosystem. Please note that in the TCCA / PPDR context the term AGA refers to mid altitude (up to 10,000 feet) rather than commercial aircraft. TCCA would like to add that ECC Recommendation (24)02 identifies 1880 – 1900 MHz / 1910 – 1920 MHz (including guidance and technical conditions) for government drone control and connectivity. Ofcom could consider this recommendation whilst remaining cognisant of the ESN gateway allocation in 1910-1915 MHz.
Question 3: Do you have any comments on our proposed approach to coordinating drones with other users of the 450 MHz band? In your response, please indicate whether it relates to co-channel or adjacent channel use, and provide evidence for any coexistence issues raised.	Confidential? – N In principal the proposed approach may work. However, we believe that several major challenges exist – 1) The current users of the 450 MHz band already suffer regular interference from the near continent due to the historic ‘band reversed’ hi-lo assignment of the UK compared to other CEPT countries. Although there is no authoritative study and report on such interference, empirical evidence from the energy utilities has been problematic for over a decade and

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	greatest in those areas close to the North Sea. (Ofcom's own measurements in 2016 confirmed that this is a genuine issue) 2) The frequency and duration of such events (caused by ducting effects) is increasing due in part to changes in climate and also due to deployment of Hi Power CDMA & LTE networks in neighboring countries (the interference is most noticeable in the receivers of the narrow band telemetry systems) 3) Existing users of the band (including many enterprise customers - especially energy and water companies) already saturate the majority of the 450 MHz band in many areas of the UK. The systems used by these organisations (including Telemetry / SCADA) are considered Critical National Infrastructure and would require a very high degree of protection which would be challenging given the proposed power levels and altitude of the drones. 4) The use of 12.5 kHz channels is restrictive in terms of data throughput, especially when considering that most other areas of the world are considering wider channels suitable for broadband drone applications. Although co-ordination of 12.5 kHz channels within the existing UK business radio arrangement may appear a logical approach in the short term, it could cause further complexity if Ofcom does eventually re-align the band (which has been repeatedly debated since at least 1998) <i>NB – more information from the Ofcom continental interference measurement campaign of 2016 can be found in Appendix 4 of Ofcom's 'Strategic review of UHF Band 1 & Band 2' Consultation</i>
Question 4: Do you have any comments on our proposed 450 MHz drone authorisation approach? Please provide any specific views (including technical justification where relevant) on: • the proposed technical conditions, including operating height AGL, power, channel bandwidth, designated service area, and number of base stations; • the proposed non-technical conditions, including licence fees and term, frequency flexibility and complying with CAA rules and radio equipment standards; and • reviewing our initial authorisation approach.	Confidential? – N The altitude (up to 100 metres) and power levels suggested will require large co-ordination distances which may not be compatible with existing users of the 450 MHz spectrum both in the UK and overseas. Close to the coast, propagation over North Sea, Irish Sea and English Channel will be significant and both transmitted and received interference could be problematic. A lower altitude limit may be more appropriate. To suggest the construction of expensive additional ground based infrastructure for a short duration (3-year) program appears to carry risks of the UK adopting a solution which is only partially successful in its objectives whilst simultaneously having little vendor support.

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Question 5: Do you have any comments on our proposed 5030-5091 MHz drone authorisation approach? Please provide any specific views (including technical justification where relevant) on: • the portion of the band proposed for early release (5040-5060 MHz); • the proposed technical parameters and approach to coordinating drones and/or protecting other users of the band; and • the proposal to phase out licences once there is global harmonisation, the required transition period and sunset clause.	Confidential? – N The development of drone technology and associated connectivity solutions are happening rapidly compared to other technological advancements in recent decades. However, drone technology has yet to reach a stage of maturity required for making long term decisions. Multiple standards bodies around the world (and ITU) continue to debate the best way to solve drone connectivity. If the UK adopts the use of the 5030-5091 MHz band which is not technology inclusive for drone connectivity then there is a real risk of creating a stranded asset scenario. If an interim solution is deemed necessary then it should only be on the proviso that a transparent, well-defined transition plan exists. The UK market is unlikely to represent sufficient volume to impact the global standardization trends in this field. If a short term solution is required then it may be advisable for Ofcom to consider allowing use of the mid-band MNO spectrum for the application.
-Question 6: Do you have comments on our proposal to create a new drone detection radar licence for the 24 GHz band, including the proposed technical and non-technical conditions, the proposed draft licence in Annex 12, and our coexistence analysis in Annex 6? Please provide evidence for any issues raised.	Confidential? – N TCCA believes that whilst a tactical implementation of 24 GHz radar could be helpful as an interim solution at key locations (e.g. major transport hubs, utility installations) a more effective nationwide solution would be built upon evolving technology within 5G Advanced / 6 G (ISAC) for detection and identification of drones and would be an important element to plan for within a multilayered detection strategy. The wider Air-Ground-Air long term topic should be considered on a holistic basis before committing the UK to further non standardised solutions
Question 7: Do you have comments on our proposal to create a new drone detection radar licence for the 16 GHz band on a case-by-case basis, including the proposed technical and non-technical conditions and proposed draft licence in Annex 12? Please provide evidence for any issues raised.	Confidential? – N As indicated in our answer to question 6, the implementation of additional radar systems should ideally be contained to specific locations / scenarios until standardized & harmonised approaches have been agreed on a global or at least regional basis.
Question 8: Have you identified any other frequency bands we should consider for drone control links in the longer term?	Confidential? – N TCCA believes that drone control links could be more adequately provided in a number of the MFCN frequency bands (mid band). This would allow for the most economic solutions in the future and would also allow the UK to exploit the refined capabilities of 6G which are being developed at the moment (ISAC, Positioning etc.)
Question 9: Do you have any comments related to the existing satellite frequencies available for drone control links?	Confidential? – N Considering the very rapid development of NTN technology and large number of agenda items in 3GPP it would seem sensible that the drone control solution (and hence

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	frequencies) should align with the evolving terrestrial / non terrestrial landscape. I.e. the drone control connectivity could be via multiple platforms and should therefore support connectivity via several standardised frequency bands.
Question 10: What are your needs and priorities for accessing spectrum for drone safety? Do you have interest in future use of 15 GHz and/or 76 GHz, or other specific frequencies and bands for similar drone safety use?	Confidential? – N No comments
Question 11: Do you have any interest in ground based UAT to complement the aerial component in 978 MHz licences?	Confidential? – N No comments
Question 12: Are you interested in or do you have any plans to trial the use of ISAC for drone detection purposes?	Confidential? – N Several TCCA members are working in the 3GPP community on the development of ISAC for drone detection. It is likely that opportunities for POC / demonstrations would be interesting to TCCA and our members in the near-medium term.
Question 13: Do you have any other comments on this consultation document?	Confidential? – N TCCA is pleased that Ofcom is considering this topic in earnest. Our membership includes organisations who already utilise drone technology as part of their mission to protect the general public. However, we would advise caution when considering implementing solutions for rapid short-term gain which could prove expensive and sub-optimal when compared with harmonised solutions which will be available in the medium term. Ofcom could also consider the 700 MHz Broadband PPDR bands to support public safety drone operations. They sit alongside the 700 MHz mobile bands and could offer a useful route for agencies using broadband PPDR. Any aerial use would of course need to be assessed against UK assignments and coexistence requirements – i.e. it should form of an integrated 3GPP approach rather than a separate drone-only system. Additionally, Ofcom should consider that drones may be used for providing additional coverage during times of terrestrial network unavailability either due to natural disasters or coverage limitations in remote areas. TCCA encourages Ofcom to adopt an evolutionary framework which enables innovation and trials in the short term without creating spectrum or infrastructure dependencies that impede migration towards standards-based solutions. This would minimise future upgrade costs and should feed into any economic analysis connected with the current proposals. TCCA remain available for further dialogue with Ofcom on this topic.