

IEEE 802 is a committee of the IEEE Standards Association and Technical Activities, two of the Major Organizational Units of the Institute of Electrical and Electronics Engineers (IEEE). IEEE has about 400,000 members in over 160 countries. IEEE's core purpose is to foster technological innovation and excellence for the benefit of humanity. In submitting this document, IEEE 802 acknowledges and respects that other components of IEEE Organizational Units may have perspectives that differ from, or compete with, those of IEEE 802. Therefore, this submission should not be construed as representing the views of IEEE as a whole¹.

IEEE 802 LMSC is a leading consensus-based industry standards body, producing standards for wireless networking devices, including wireless local area networks ("WLANs"), wireless specialty networks ("WSNs"), wireless metropolitan area networks ("Wireless MANs"), and wireless regional area networks ("WRANs"). We also produce standards for wired Ethernet networks. Technologies produced by implementers of our standards are critical for all networked applications today.

¹ This document solely represents the views of the IEEE 802 LAN/MAN Standards Committee and does not necessarily represent a position of either the IEEE, the IEEE Standards Association or IEEE Technical Activities.

Your response

Question	Your response
Question 1: Do you agree with the prioritisation of the agenda items, as shown in Annex 5, and if not why?	Confidential? – N IEEE 802 LMSC agrees with Ofcom's view that Agenda Item 1.2 should be considered "HIGH" priority. See more detailed arguments in response to question 3c.
Question 2: What are your views on the continued need to protect global aeronautical and maritime services, in the 4.8 – 4.99 GHz band, under this agenda item?	Confidential? – Y / N
Question 3a: Do you agree that the UK interest in the bands 3 600-3 800 MHz and 3 300-3 400 MHz in Region 2 (North & South Americas) should be limited to any impacts on UK operational use in those areas?	Confidential? – Y / N
Question 3b: Do you agree that the UK should maintain its objections to changes to the regulatory environment for the band 3300-3400 MHz (in Region 1, Europe, Africa, Middle East), noting UK has interests in use of radar for both ground and airborne operations?	Confidential? – Y / N

Question 3c: What is your view on the use of 6425-7025 & 7025-7125 MHz, and what evidence do you have to support this view? How does that inform your views on a IMT identification in these bands?

Confidential? – N

In the past ten years, the IEEE 802 LMSC has overseen the development of standards (including both IEEE Std. 802.11ac-2014 and IEEE Std. 802.11ax-2021) that operate in license-exempt bands and are capable of providing gigabit throughput, i.e., provide physical layer throughput over 1 Gb/s. These technologies have become an integral part of UK citizens' lives, providing the basis of "the 5 GHz network". Next-generation technologies will utilize both 5 GHz and 6 GHz bands to satisfy new requirements in internet of things or lower latency and jitter requirements for applications such as home video, video conferencing or video gaming. Further improvements continue to be made by our hundreds of standards development contributors.

We share the hesitation of Ofcom with respect to technical capabilities of IMT to co-exist with incumbent services in the 6425-7125 MHz bands. While IEEE 802 technologies developed for unlicensed bands are specifically designed to not cause interference with other spectrum users, IMT is designed for situations where the network operator can be certain that they, through a license, have sole right to a particular band.

We believe, due to the important role IEEE 802 technologies play in UK network eco-systems, that a continued opportunity for license-exempt designation is preferred.

Developments in Wireless Access Systems (WAS) including Radio Local Area Networks (RLAN) such as Wireless Local Area Networks (WLAN) (IEEE 802.11) and Wireless Specialty Networks (WSN) (IEEE 802.15) technologies are crucial components in realizing gigabit connectivity targets, and as Ofcom has previously observed, the consumer demand for more robust unlicensed network services is only likely to increase. Current and next generations of Wi-Fi technology based on IEEE Std. 802.11ax-2021 and IEEE 802.11be, will play a critical role in achieving excellent and secure connectivity for everybody. Notably, IEEE 802.11ax and IEEE 802.11be are already designed with 6 GHz capabilities in place.

The next generation of WSN will increasingly play a role in the handset market segment. The secure digital transition of UK households, public sector and industry will critically depend on opportunities for to benefit from emerging technologies like high-precision positioning, object sensing, increased security and privacy by design feature and many other features already under development in IEEE 802. Notably, IEEE Std 802.15.4 serves billions of devices worldwide using unlicensed spectrum for many applications such as IoT sensors, monitoring, control, real-time location services, and secure access control. A major revision to the IEEE Std 802.15.4-2020 standard has commenced, rolling up several published amendments since 2020, including IEEE Std 802.15.4z-2020, which defined enhanced UWB technology. IEEE Std 802.15.4z-2020 is already widely being used in consumer, automotive, commercial, and industrial markets. In addition to the revision to IEEE Std 802.15.4-2020 a new amendment on "Next generation UWB", which will be rolled up in a future revision to IEEE 802.15.4, is being developed in task group IEEE 802.15.4ab to further enhance UWB capabilities for better performance, greater precision, and new uses such as presence detection and other sensing applications.

In its request to open the entire 6 GHz band (5925 – 7125 MHz) the RLAN industry engaged in the most comprehensive study of interference with both satellite services and fixed terrestrial networks it has ever done. As a result, regulators worldwide, agreed that sharing without harm is possible. In case of Europe, the results of these studies are encompassed in ECC Report 302. These world-wide studies showed that spreading the RLAN energy across an even larger bandwidth (such as the full 1.2 GHz) would reduce even further the interference potential (for Europe, see e.g. section 6.2.6 of Report 302). These are some of the reasons that we believe that RLAN technology is better suited for sharing with the incumbents in this band than traditional IMT networks.

To support ever increasing demands for wireless connectivity traffic in the UK as well as enterprise/commercial level scaling of performance demanding innovative applications, such as VR/AR, telepresence, e-health, e-education, Industrial IoT, HD and 3D video streaming, is only possible when multiple channels with wide bandwidth of 160 MHz and 320 MHz are available for WAS/RLAN. Extending the license exempt operation to the upper 6 GHz band (specifically, 6 425– 7 125 MHz) in the UK will make this possible.

IEEE 802 wishes to express its hope that Ofcom follows the strategy of not supporting an identification of the 6425-7125 bands with IMT. Leaving the bands unassigned for now still leaves flexibility to later consider the band for licensed 5G use, should this be deemed necessary, but for the reasons outlined above and in this consultation document (e.g. para. 4.2.8, 4.2.9 and 4.2.11) now is not the time. An IMT identification would pre-determine the future use of the band to be presumed licensed, as was the case for the many other bands that have been identified for IMT in the last 20 years. This would make the bands inaccessible to already existing technologies capable of operating in those bands, while still rendering the bands unused until such time as IMT has found a way to efficiently co-exist with incumbent FS providers.

In its July 2020 6GHz statement on “Improving spectrum access for Wi-Fi (Spectrum use in the 5 GHz and 6 GHz bands)”, Ofcom stated that it intends to continue reviewing the use of the upper 6 GHz band to determine what the optimal use may be. An IMT identification would prematurely determine the band for license use while any deployment may only be realized a number of years after WRC-23 at the earliest. On the other hands, because of the decision made in many countries to adopt the entire band for license exempt operation, the only chance for global harmonization in the band is with WAS/RLAN.

<p>Question 3d: What are your thoughts on the current UK view that IMT should not be identified in Region 2 in the band 10-10.5 GHz in order to ensure the protection of the globally operating EESS (active) systems and airborne & vessel mounted radars?</p>	<p>Confidential? – Y / N</p>
<p>Question 4: Do you agree that, where no additional technical limitations are placed on mobile services, the UK can support an upgrading of the mobile allocation, in 3600 - 3800 MHz, from secondary to primary?</p>	<p>Confidential? – Y / N</p>
<p>Question 5: What are your views on the development of regulatory conditions to facilitate deployment of high altitude IMT base stations in IMT identified bands below 2.7 GHz?</p>	<p>Confidential? – Y / N</p>
<p>Question 6: Do you agree that a formal modification to the Radio Regulations is not needed for fixed service applications that use IMT technologies?</p>	<p>Confidential? – Y / N</p>
<p>Question 7: What are you views on the proposed approach for 470-694 MHz, recognising the national decisions already in place and taken for DTT multiplex licensing in the band, and the additional and supplementary spectrum made available for UK PMSE usage?</p>	<p>Confidential? – Y / N</p>
<p>Question 8: What are your views on the need to establish an international regulatory environment that provides adequate protection of UK fixed links from earth stations in motion, in the band 12.75 – 13.25 GHz, which is also practicable from an enforcement/implementation perspective?</p>	<p>Confidential? – Y / N</p>

<p>Question 9: Do you agree that the UK continues to support the maritime distance figure for ESIMs that work to nongeostationary satellites and to test the other conditions agreed at WRC-19 for ESIMs working to geostationary satellites to ascertain whether these remain appropriate for non-geostationary satellites?</p>	<p>Confidential? – Y / N</p>
<p>Question 10: What are your views on whether an allocation to inter satellite links is necessary for existing satellite allocated bands and whether this would provide benefits internationally?</p>	<p>Confidential? – Y / N</p>
<p>Question 11: What are your views on the need for additional satellite allocations in support of narrowband IoT “M2M” type applications, noting that there remains the</p>	<p>Confidential? – Y / N</p>

<p>continued use of PMSE for wireless cameras in the band 2010 – 2025 MHz?</p>	
<p>Question 12: What are your views on the proposed approach to this agenda item concerning the fixed satellite service in 17.317.7 GHz in Region 2?</p>	<p>Confidential? – Y / N</p>
<p>Question 13a: On Topic B, what are your views on the post milestone procedures for non-geostationary satellite systems?</p>	<p>Confidential? – Y / N</p>
<p>Question 13b: On Topic L, what are your views on regulatory conditions for Telemetry, Tracking and Command (TT&C) for NGSO inorbit servicing?</p>	<p>Confidential? – Y / N</p>
<p>Question 13c: What are your views on the remaining topics currently listed for Agenda Item 7?</p>	<p>Confidential? – Y / N</p>

<p>Question 14: Noting that any UK position will be developed only after the ITU Plenipotentiary Conference, do you have any comments relating to the use of Article 48 that may be addressed at WRC-23?</p>	<p>Confidential? – Y / N</p>
<p>Question 15: What are your views on the need to establish an international regulatory environment for sub-orbital vehicles, which at the same time does not limit flexibility of spectrum options, and retains international safety considerations?</p>	<p>Confidential? – Y / N</p>
<p>Question 16: Do agree that where the adjacent band compatibility issues are addressed and ICAO coordination processes are not compromised, that the addition of an aeronautical satellite (AMS(R)S) allocation to the band can be supported?</p>	<p>Confidential? – Y / N</p>
<p>Question 17: Do agree that functions related to international aviation safety are a matter for ICAO? On this basis, and absent any contrary information from ICAO, should the UK support the development of an international spectrum regulatory framework</p>	<p>Confidential? – Y / N</p>
<p>for UA use of FSS that would support efficient use of spectrum?</p>	
<p>Question 18: Recognising the recent diminishing industry interest in this item relating to possible modification of the aeronautical HF assignment plan, and the general lack of global interest, do you agree that UK move towards a No Change proposal under this agenda item?</p>	<p>Confidential? – Y / N</p>
<p>Question 19: What are your views on the need for additional spectrum, specifically in the 15 and 22 GHz bands, for non-safety aeronautical use?</p>	<p>Confidential? – Y / N</p>

<p>Question 20: What are your views on Agenda Item 1.11 and the proposed UK position to support modernisation of GMDSS?</p>	<p>Confidential? – Y / N</p>
<p>Question 21: What are your views on the approach to the review of 1240-1300 MHz, recognising that discussions concerning future satellite navigational needs for the UK are a matter for Government?</p>	<p>Confidential? – Y / N</p>
<p>Question 22: What are your views on a new spectrum allocation in the 40-50 MHz range to support and enhance climate monitoring, such as, environmental shifts in ice sheets?</p>	<p>Confidential? – Y / N</p>
<p>Question 23: What are your views on upgrading the Space Research Service allocation, from secondary to primary, in the 14.8-15.35 GHz band?</p>	<p>Confidential? – Y / N</p>
<p>Question 24: What are your views on the potential for defragmentation in this band to facilitate both EESS (passive) use and provide for larger contiguous blocks for fixed & mobile allocations?</p>	<p>Confidential? – Y / N</p>
<p>Question 25: Do you agree that formal international recognition for Space Weather Sensors should be implemented in the Radio Regulations?</p>	<p>Confidential? – Y / N</p>
<p>Question 26: What are your views on the limits proposed to protect EESS (passive) under Agenda Item 9.1 topic d) and do you have any views on which of these limits might be accommodated in the Radio Regulations and how?</p>	<p>Confidential? – Y / N</p>
<p>Question 27: Do you agree that the formalised time reference in common global use, is not a matter of spectrum regulation?</p>	<p>Confidential? – Y / N</p>

Question 28: Do you have any comments concerning the Standing Agenda Items, where not covered elsewhere in this document?	Confidential? – Y / N
Question 29: Do you have a view on any of the footnotes to which UK is a party?	Confidential? – Y / N
Question 30: Are you aware of any specific issues, not covered elsewhere in this document, which are likely to be raised in this part of the Director’s Report and of which you think Ofcom should be aware?	Confidential? – Y / N
Question 31: Do you have any comments on Agenda Item 9.3 considering Resolution 80?	Confidential? – Y / N
Question 32: What changes to the Radio Regulations have you identified that would benefit from action at a WRC and why? Do you have any proposals regarding UK positions for future WRC agenda items or suggestions for other agenda items, needing changes to the Radio Regulations, that you would wish to see addressed by a future WRC?	Confidential? – Y / N
Question 33: What are your views on the use of IMT stations that use antennas that consists of an array of active elements, in bands shared with satellite services?	Confidential? – Y / N