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 Nokia broadly agrees with the prioritisation of the WRC-23 agenda items as per Annex 5 to this consultation. However, we believe that AI 10 should have a "high" priority status for the UK. AI 10 is very important for the future of telecommunication technologies and services, the evolution of which is inherently linked with the demand for additional new spectrum. With the expected arrival of IMT-2030 (6G) at the end of this decade, initiating the discussion on the need of additional new spectrum for IMT during the ITU-R study cycle 2023-2027 is of paramount importance for the evolution of 5G to 6G. As also mentioned in previous responses to Ofcom, Nokia considers that identifying and securing spectrum for 6G from within the low, medium, and high bands, as well as from within extremely high frequency bands (sub-THz spectrum) is necessary to assure that IMT-2030 will be able to be deployed in the next decade providing both expanded coverage and capacity in a cost-efficient manner. While this is a subject of international scope, we consider that Ofcom, as one of the pioneer administrations in spectrum policy development, should also consider AI 10 as "high" priority. More details are provided in our response to question 32.
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? – N Nokia agrees with the market analysis made by Ofcom regarding the interest to use this frequency range – part of the 3GPP band n79 (4400-5000 MHz) – for IMT by several countries. Noting that some of the countries already in the footnote started using and/or consult on the use of the entire or portions of band n79 for IMT, we also agree with the assessment made by Ofcom that countries will continue adding their names to the footnote. Nokia is of view that, while AMS/MMS in international airspace and waters should

	continue to be protected, the current pfd limit in the RR No. 5.441B is largely constraining nationwide IMT deployments for most countries in the footnote. Therefore, protection criteria should be revised and the overprotective limits should be lowered in order to allow IMT deployments. Nokia encourages Ofcom to support this approach.
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? – N UK, being part of CEPT and Region 1, shall not preclude any potential interest that may raise as a result of the discussions and developments in other ITU Regions, especially since some BOTs are in Region 2. Even though Ofcom is minded not to oppose any plans of Region 2 countries for IMT identification, our view is that, since the proposals for the 3600-3800 MHz band in Region 2 are similar to the usage already seen in UK and Europe, Ofcom should not be limited to a "no oppose" position but rather support the IMT identification in this band. Moreover, considering the wide use of the 3400-3800 MHz as pioneer band for 5G at global level, additional IMT identification of parts of the n78/n77 bands in Region 2 would further harmonize its usage and thus benefit the existing developed ecosystem. Nokia therefore, acknowledging the efforts for global harmonization in this band, encourages Ofcom to support the primary mobile allocation and IMT identification of this band in the Americas.
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? – N Nokia supports addition of Region 1 countries that wish to do so to the relevant footnote assuming compatibility matters are resolved. Nokia is of view that least restrictive conditions for the IMT/5G use in the band should be considered. As such, we do not see the need for UK to object changes to the regulatory environment for this band.
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 First, we would like to highlight that even though in this Call for Input, Ofcom states that "*has an open mind as to whether to support, or oppose, an IMT identification in either of the bands*

	referenced", the UK proposed "no change" as a way forward in PT1#72 regarding the AI 1.2 (U6GHz). These two statements are highly contradictive and rather confusing as to whether the UK is still open minded towards the future of these bands. Furthermore, in the statement following Ofcom's consultation on the proposals for indoor shared access licencing in the upper 6 GHz band, Ofcom recognised that they "*did not see strong evidence of stakeholder demand for Shared Access licences in the upper 6 GHz band in consultation responses*". In light of the lack of evidence of demand, Ofcom took the decision not to proceed with the proposals to add the band to the Shared Access licencing framework. Therefore, in addition to the evident lack of demand for SA licences, Nokia is of the view that Ofcom should support IMT identification in these bands under discussion for the following reasons: a) The majority of ITU studies conclude that sharing between IMT and FSS uplink is possible, a conclusion which surprisingly contradicts Ofcom's view, developed based on ITU studies, that IMT services seem unlikely to operate in band with incumbent satellite services. From the minority of studies that show coexistence is not feasible, the majority of them consider unrealistic IMT deployments (such as e.g., extensive rural BS density) and assume modelling parameter that lead to overestimating the potential interference into satellite services. As Ofcom is in favour of the use of realistic assumptions in the modelling of coexistence studies, we believe that the view on feasibility should not be heavily influence by modelling scenarios that do not reflect the reality of intended deployments. We understand and respect Ofcom's view on how the current technologies could impact incumbent satellite services, and this is probably based on previous work in ITU-R. However, it should be pointed out that those studies which reflect what could be considered as 'current technologies' is significantly different to the IMT technology that is being considered for this frequency bands under this WRC-23 agenda item. Nokia encourages Ofcom to continue the evidence-based approach supported by ITU-R studies in

	informing its view on the coexistence situation especially with the incumbent satellite services. b) The socioeconomic benefits of 5G, which are estimated to generate $960 billion GDP globally in 2030[1], are based on an allocation of adequate spectrum in mid-bands, 65% of which is expected to be a result of mid-band deployments. A significant part of such benefits could be lost if no additional mid-band spectrum is assigned to mobile services. Given the wide adoption of mobile services in the UK, an allocation of the upper 6GHz band to unlicenced services is likely to result in a missed opportunity for such benefits to be realised in the UK. c) The usage of Extended C-band (3400-3700/ 6425-6725 MHz) and Planned C-band (4500-4800/ 6725-7025 MHz) from satellite services in Region 1, is in a declining trend and is expected to decline even further by 2030[2]. Such findings shall be taken into account when Ofcom assesses the assumptions and the results of the coexistence studies presented in ITU, in order to make informed decisions, based on evidence, regarding the feasibility of coexistence between IMT services and FSS. d) Ofcom has already taken the decision to allocate the lower 6GHz band for unlicenced use. Even though our view is that this was not the optimal choice of spectrum allocation, there is still the opportunity to balance the use of the mid band spectrum and realise the full scale of socio-economic benefits of 5G, by supporting IMT identification in the upper 6 GHz band. By doing so, Ofcom will enable greater network heterogeneity avoiding the unrealistic expectation to rely on a technically challenging ultra-densification using mmWave bands in order to accommodate the increasingly high demand for data over the next years. Moreover, we also note that in June 2022, 3GPP finalised the 5G NR band n104 technical specifications as part of 3GPP Release 17 for the licensed use of the upper 6 GHz band (6425-7125 MHz) and equipment will be available to be

[1] "The socio-economic benefits of mid-band 5G services", GSMA, http://www.gsma.com/spectrum/resources/mid-band-5g-spectrum-benefits/

[2] "The use of Extended C-band, Planned C-band and the 7025-7075 MHz band for satellite service", Euroconsult, https://www.euroconsult-ec.com/connectivity-expertise/download-extended-c-band-presentation/

	deployed within 6 to 12 months following the potential assignment of the band to IMT. Several studies and interviews with mobile operators worldwide indicate that the upper 6 GHz band would be important to meet projected demand of data in the 2025-2030 timeframe. Although 6425-7025 MHz is limited to Region 1, it should be noted that the immediate adjacent range of 7025-7125 MHz is proposed for global IMT identification. Since these frequency ranges are next to one another and still a sizeable global market, it is possible to leverage the economies of scale. Considering the above, Nokia recommends and encourages UK to support the IMT identification in Region 1 for both 6425-7025 MHz and 7025-7125 MHz bands.
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?	Confidential? – N Nokia supports the primary mobile allocation and IMT identification of the 10-10.5 GHz spectrum in Region 2. As for the other mid-bands under this AI, subject to primary mobile allocation and IMT identification in Region 2, Nokia is of view that any decision concerning other regions should not be opposed by the UK.
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?	Confidential? – N Yes, we agree that the UK can support an upgrading of the mobile allocation in 3600-3800 MHz from secondary to primary with no additional technical limitations on the mobile services.

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?	Confidential? – N Nokia is a founding member of the HAPS Alliance and is actively taking part in the relevant ITU work and discussions under AI 1.4. We are supportive to establish a globally or regionally harmonized regulatory framework that allows extending the use of the terrestrial IMT spectrum in bands below 2.7 GHz, to ensure coverage of difficult to reach areas by means of high-altitude platform solutions. HIBS may provide a future economically viable option for licensed mobile network operators to deliver coverage and capacity for underserved areas, while ensuring the protection of ground based IMT without any additional technical or regulatory constraints in their deployment.
Question 6: Do you agree that a formal modification to the Radio Regulations is not needed for fixed service applications that use IMT technologies?	Confidential? – N Nokia sees the IMT technologies as an option for FS, especially in the context of Fixed Wireless Access and certain backhaul applications. In either case, the need to protect incumbent FS using other technologies is important. Nokia supports the exploration of IMT/FWA possibilities in bands allocated to fixed services while ensuring the adequate protection of the incumbent fixed services using other technologies. We are of view that the use of IMT technologies to provide fixed wireless broadband applications can be achieved under the existing RR framework, and therefore we agree that no formal modifications of the RR are required under this topic.
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?	Confidential? – N Nokia supports a co-primary allocation of the band 470-694 MHz to mobile services at WRC-23 in Region 1. We highlight that the longer term (2030's horizon) DTT demand is declining (according to Ofcom, only 4.4m households in UK are using exclusively on DTT as means of TV consumption) corresponding to a reduction in the use of the spectrum dedicated to broadcasting. This trend is recognised by the UK Government in its decision to renew multiplex licences until 2034

	as it includes provision in licences for the possibility of early termination from 2030. Ofcom's Media Nations Report 2022 confirms a steady increase of non-linear viewing share, exceeding 50% of total video minutes for all audiences. Figure 37 indicates that live TV as the only linear element caters for 46 % of the viewing minutes for all audiences and 19% for audiences 16-34 years old. DTT as a purely linear platform cannot provide the delivery paths to cope with that trend. As such, a primary mobile allocation in the 470-694 MHz band at WRC-23 will provide greater flexibility and support an eventual migration of the band (or parts thereof) from broadcasting to other uses, with the principal new application being mobile services. Also the evolution of new converged mobile video distribution systems like a 5G Broadcast complemented by individual downstream capabilities via mobile SDL could greatly benefit from a co-primary mobile allocation of the band. We would also like to highlight the importance of the UHF spectrum for the current and future development of the mobile networks and the role that the low bands play in assuring broad and affordable connectivity, wide coverage for ever more demanding services including video delivery and deep indoor penetration. Access to additional low band spectrum can provide 5G speeds in rural areas, helping to deliver a consistent 5G user data rate at the edge of cells with less dense, more efficient networks, enabling more efficient power consumption. Nokia recognises PMSE needs in the band, mostly confined to very local use, often time-wise confined to specific events, mostly in populated areas. Nokia believes that additional mobile use in e.g. rural areas can well co-exist with e.g. urban PMSE use. Consequently, Nokia believes that a co-primary mobile allocation can open smooth migration paths accommodating for use of DTT and PMSE where and as long as needed while opening opportunities for additional mobile use and thus more efficient use of the precious UHF resources and innovation around convergent AV delivery

	extending to mobile use cases such as in-car entertainment.
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?	Confidential? – Y / N
Question 9: Do you agree that the UK continues to support the maritime distance figure for ESIMs that work to non-geostationary 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?	Confidential? – Y / N
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?	Confidential? – Y / N
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 continued use of PMSE for wireless cameras in the band 2010 – 2025 MHz?	Confidential? – Y / N
Question 12: What are your views on the proposed approach to this agenda item concerning the fixed satellite service in 17.3-17.7 GHz in Region 2?	Confidential? – Y / N
Question 13a: On Topic B, what are your views on the post milestone procedures for non-geostationary satellite systems?	Confidential? – Y / N
Question 13b: On Topic L, what are your views on regulatory conditions for Telemetry, Tracking and Command (TT&C) for NGSO in-orbit servicing?	Confidential? – Y / N

Question 13c: What are your views on the remaining topics currently listed for Agenda Item 7?	Confidential? – Y / N
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?	Confidential? – Y / N
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?	Confidential? – Y / N
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?	Confidential? – Y / N
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 for UA use of FSS that would support efficient use of spectrum?	Confidential? – Y / N
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?	Confidential? – Y / N
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?	Confidential? – Y / N

Question 20: What are your views on Agenda Item 1.11 and the proposed UK position to support modernisation of GMDSS?	Confidential? – Y / N
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?	Confidential? – Y / N
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?	Confidential? – Y / N
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?	Confidential? – Y / N
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?	Confidential? – Y / N
Question 25: Do you agree that formal international recognition for Space Weather Sensors should be implemented in the Radio Regulations?	Confidential? – Y / N

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?	Confidential? – Y / N
Question 27: Do you agree that the formalised time reference in common global use, is not a matter of spectrum regulation?	Confidential? – Y / N
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? – N ITU-R has already started a forward-looking work in 2021 by examining future trends in technology and ITU-R 6G Vision Group has been tasked with defining the technology and its capabilities as the industry moves towards 6G standardisation. Applications and services enabled by future IMT systems will connect not only humans, but also machines altogether through new interfaces and future IMT systems need to play an important infrastructure role in this interconnection of the digital and physical worlds. To enable the 2030 capacity-demanding use cases, no single frequency range can satisfy all the criteria required to deploy future IMT systems. Spectrum from within the 7.125-24 GHz range is essential to serve emerging services and applications. This range, complemented by

	spectrum from within the sub-THz range are expected to enable and address the rapid data growth of the future, through broader and contiguous channel bandwidths. As a result, since in the UK demand for data is expected to continue to grow with rapid pace (40% year-to-year as a medium growth scenario) and in order for the UK to continue to stay at the forefront of technology and service innovation, enabling even higher infrastructure investment and ecosystem development, we would wish to see Ofcom supporting changes in the Radio Regulations that would enable the use of IMT within the ranges 7.125-24 GHz and sub-THz for 6G.
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? – N Article 21.5 specifies the limit to the power delivered by a transmitter to the antenna of a station in the fixed or mobile services. This provision was introduced way back by EARC-63 (below 10 GHz) and WARC-71 (above 10 GHz) in the effort to limit emissions from fixed and mobile services to satellite services. Nokia would like to highlight two aspects on this subject: i. the notification of 26 GHz IMT AAS stations to the Radiocommunication Bureau of the ITU (BR), and ii. the application of 5G/IMT AAS for 26 GHz as given in the scope by WRC-19 through document 550 (and the expansion of this scope to 42 GHz or 66 GHz, which could become relevant to the Electronic Communication and Connectivity EU policy area). **i. The notification of 26 GHz IMT AAS stations to the BR** Nokia understands that the BR does not check the compliance of 5G/IMT station against Article 21.5, but instead verifies the notification submitted by Administrations against the limit in Article 21.5. In our understanding, compliance is usually a matter for the national Administrations against ETSI standards and the role of ITU on this matter is to verify the notification submitted to them before the inclusion of these terrestrial

	stations into the Master International Frequency Register (MIFR). The antenna systems of these services have been well understood over the years and it has not been an issue to apply such limits especially when terrestrial stations are notified to the BR. The emergence of IMT AAS is thought to pose some difficulties to the notification procedure. However, the BR has already successfully verified a large number of notifications by some Administrations on IMT stations using AAS in the mmWave frequency band. The FXM Guidelines document provided by ITU has provided guidance to Administrations on the notification and these guidelines contain examples of notification with multiple transmitting antennas like in the situation that WRC-19 requested to study, i.e., IMT AAS. Therefore, we see no problems for the notification process to continue without posing any future issues. **ii. The application of 5G/IMT AAS** Nokia also understood that the scope of the work from WRC-19 was on the application of 5G/IMT AAS in the 26 GHz band, and consideration of the 42 GHz or 66 GHz is an expansion of the scope of the original task. It is Nokia's interest to protect other services (including satellite) and the sharing studies during the WRC-19 study cycle indicated that there is at least a 12 dB protection margin against the most limiting satellite service (i.e., FSS). As the ECP for WRC-19 AI 1.13 part 1 on 26 GHz did not include any in-band power limit, no such restriction is required for the 5G/IMT. It has been shown in some technical studies in ECC PT1 that limiting the power delivered to the antenna (understood to be the power limit defined in Article 21.5) does not directly relate to the interference towards the satellite. On the other hand, incorrect application of Article 21.5 to IMT AAS could stifle innovation and development of technology. It could also reduce coverage and the necessary data throughput that the 26 GHz IMT system can offer, and lead to a negative impact in serving the UK public. Nokia is of view that while protection of incumbents should be an important objective of

	the Administrations, such protection should be assured based on realistic scenarios rather than on worst case approaches. We encourage Ofcom to avoid unnecessary restrictions that would hinder the development, innovation, and deployment of mmWaves 5G/IMT AAS in the UK.

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