Viasat, Inc. Response

Question	Your response
Question 1: Do you have any comments on the coexistence analysis we have carried out?	Confidential? – Y [Partial Answer] Viasat welcomes the opportunity to submit comments in Ofcom's Call for Input ("CFI") on "Making more spectrum in the 1.4 GHz band available for mobile services" and commends Ofcom for its commitment to protecting satellite services in the adjacent 1518-1559 MHz band (the "1.5 GHz band"). Viasat's subsidiary, Inmarsat, conducts extensive mobile satellite service ("MSS") operations in the 1518-1559 MHz band, providing vital connectivity to the aviation, maritime, transportation, critical infrastructure, and numerous other sectors. [redacted] Viasat looks forward to collaborating with Ofcom and other key stakeholders to identify a solution that enables terrestrial mobile services in the 1.4 GHz band and simultaneously protects maritime, aviation, land-based MSS services in the adjacent 1.5 GHz band. Viasat L-band satellite terminals are used for numerous critical and day-to-day functions. In the aviation industry, Viasat terminals are integrated into aircraft to deliver voice and data communications to the aircraft cockpit, aircraft systems, and in some cases, communications to the passenger cabin. Critically, these terminals provide real-time safety information about flight progress, weather, and engine and aircraft performance. The terminals are tested before leaving the gate and may be operated on the ground, at low altitudes and cruising altitudes. Both air traffic control and airline operational communications use Viasat's L-band network for safer, cheaper, and more environmentally prudent and efficient routing, improving the communications between aircraft and their airline operations centres and as mandated by the International Civil Aviation Organization ("ICAO") for Aeronautical Mobile-Satellite (Route) Service ("AMS(R)S"). Viasat L-band terminals are also used on unmanned aircraft and Ofcom has recently introduced a regulatory framework to enable L-band MSS terminals on unmanned aerial vehicles ("UAV") to be licensed for UK operations.[1]

[1] Ofcom, *Statement: Spectrum for Unmanned Aircraft Systems (UAS)* (June 10, 2022), *available at* https://www.ofcom.org.uk/consultations-and-statements/category-1/spectrum-for-unmanned-aircraft-systems.

Viasat L-Band terminals, including Inmarsat-C and Inmarsat Fleet Broadband terminals, are also used extensively in the maritime sector. Inmarsat-C and Inmarsat Fleet Safety terminals are approved by the International Maritime Organization ("IMO") for meeting Global Maritime Distress and Safety System ("GMDSS") requirements and consequently are mandatory carriage on many vessels, including foreign-flagged vessels which operate in UK ports and waters.

Viasat also offers numerous land MSS services, which are widely used to support communications operations in industries including financial, medical, first responder, defence, and utility. There are rapidly evolving developments for land MSS services, especially relating to direct-to-device ("D2D") services, which integrate MSS services into standard mobile phones and unlocks the potential for massive Internet of Things ("IOT") automotive and defence applications. These developments, partly enabled by 3GPP-developed harmonised standards, will provide full geographic coverage across major land masses. The L-band MSS spectrum has already been included in the 3GPP standards for non-terrestrial networks ("NTN") and hence L-band MSS services may be used in mass consumer devices in the future.

As discussed further below, Viasat recommends modifying several aspects of Ofcom's methodology, including its assumptions about the nature of satellite operations, to improve the accuracy of its coexistence analysis.

I. Ofcom's Coexistence Analysis Significantly Understates the Extent of Satellite Services in the 1.5 GHz Band

As an initial matter, Viasat recommends that Ofcom expand its coexistence analysis to include the full panoply of Viasat's air, water, and land-based operations in 1.5 GHz band. As noted in the CFI, Ofcom's analysis "only considers satellite receivers carried by ships and aircraft operating from UK ports and airports,"[2] [redacted] As discussed below, Viasat offers numerous other services benefiting end users in the United Kingdom, and these should receive equal consideration under Ofcom's analysis.

A. Ofcom Should Include Land-Based Terminals in its Coexistence Analysis

Ofcom proposes to exclude land mobile earth station ("MES") terminals from the coexistence analysis because "land terminals are designed to be portable, meaning that their location and other

[2] Ofcom, *Call For Input: Making more spectrum in the 1.4 GHz band available for mobile services*, ¶ 3.6 (Oct. 18, 2023) ("*CFI*").

	technical parameters are subject to constant change."[3] Viasat disagrees with Ofcom's proposed course of action, which does not account for stationary MSS terminals operating in the 1.5 GHz band or the importance of protecting both existing and emerging mobile MSS operations, and emphasizes the need to establish protection measures for land-based satellite receivers in the country. Due to the important role that land-based MSS equipment plays in the United Kingdom's national security and economy, devices should be usable throughout the country—not just near ports and airports. Viasat's land-based MSS terminals play a crucial role in safeguarding critical infrastructure and other national interests and are used nationwide by military and security services to protect the United Kingdom, its leaders, and citizens. Numerous industries also rely on Viasat services for critical day-to-day, emergency, and backup operations. For example, utilities use Viasat's BGAN M2M service for efficient grid monitoring and control. Industry reliance on these services will also continue well into the future: in a global survey of senior professionals in the electrical utilities industry, three in four respondents cited satellite IoT as playing a crucial role in mitigating major threats to electrical utility infrastructure.[4] Scientists and emergency responders alike rely on Viasat's land-based satellite communications ("SatCom") for weather and environmental monitoring and continuity of services during natural and manmade disasters such as flooding and severe storms. Additionally, Viasat has launched D2D satellite communications services to provide: • narrowband ("NB-IOT") NTN services through partnerships with chipmakers, hardware manufacturers, service providers; and • Broadband services (NR NTN).[5] D2D satellite communications (including IoT) is considered one of the largest new growth opportunities for satellite over the coming years. This will address needs from the mass consumer market place, and mass automotive, enterprise, maritime, aviation and government applications, again leveraging a wide ecosystem and fostering innovation that will improve end user services, performance, and user experience.

[3] *Id.* ¶ 3.7.

[4] *See, e.g.*, Inmarsat, *The crucial role of satellite connectivity in safeguarding national electrical utilities infrastructure* (2023), https://www.inmarsat.com/en/insights/enterprise/2023/satellite-iot-safeguarding-electrical-utilities-infrastructure.html.

[5] NR NTN refers to "new radio non-terrestrial networks," which uses the 5G NR framework to directly connect satellites and smartphones.

Ofcom is invited to note the addition of NTNs to the 3GPP 5G standard (starting with Release 17 from 2022 and for subsequent planned releases) is expected to allow mass adoption of satellite D2D services as it gets satellite deeply embedded in the wider 3GPP 5G/6G ecosystem. Release 17 has defined L-band (Band n255) as one of the initial NTN bands. Two major NTN standards are currently defined with NB-IOT and NR NTN.

On the 16th of November 2023, Viasat, Inc. and Skylo Technologies, the leading NTN service provider, announced[6] the launch of the world's first global D2D network. This allows Mobile Network Operators ("MNO"), device makers and chipset manufacturers to take 3GPP Release 17 compliant products to market, within Viasat's global network coverage and support consumer smartphone services and unlock the potential for massive IoT, automotive and defence applications. This builds on the previous joint innovation between Viasat and Skylo to provide Narrowband IoT over satellite announced in 2021.[7]

Protecting these nascent services in the coming years will enable Viasat and its partners to bring these offerings to scale and provide increased network capacity and coverage to consumers to meet the growing demand for 5G and 6G. Providing services via satellite will, moreover, provide more ubiquitous coverage for these critical applications in areas outside terrestrial coverage areas.

Viasat's L-band service offerings are also enabling new industries to take root in the United Kingdom. In an effort to "make the UK Europe's leading provider of small satellite launch by 2030," the UK Space Agency and the European Space Agency ("ESA") have awarded contracts to Viasat's subsidiary, Inmarsat, to develop its "InRange" system, a ground-breaking in-orbit telemetry relay service for rockets.[8]

[6] Viasat, *Viasat and Skylo Technologies Launch First Global Direct-to-Device Network* (Nov. 16, 2023), *available at* https://investors.viasat.com/news-releases/news-release-details/viasat-and-skylo-technologies-launch-first-global-direct-device.

[7] Skylo, *Skylo and Inmarsat work together to enable world's first commercial narrowband IoT over satellite solution*, *available at* https://www.skylo.tech/newsroom/skylo-and-inmarsat-work-together-to-enable-worlds-first-commercial-narrowband-iot-over-satellite-solution#:~:text=solution%20%2D%20Newsroom%20%2D%20Skylo-,Skylo%20and%20Inmarsat%20work%20together%20to%20enable%20world's,narrowband%20IoT%20over%20satellite%20solution&text=Skylo%2C%20a%20satellite%2Dbased%20narrow,for%20connecting%20machines%20and%20sensors.

[8] Inmarsat, *Skyrora, Viasat, and CGI partner to develop a commercial space-based launch vehicle telemetry solution* (Oct. 11, 2023), *available at* https://www.inmarsat.com/en/news/latest-news/government/2023/Skyrora-Viasat-CGI-partner-launch.html; Asia-Pacific Satellite Communications Council, *Inmarsat Selected By UK Space Agency to Develop Satellite-Based Rocket Launch Telemetry System* (Mar. 18, 2021), *available at* https://apscc.or.kr/inmarsat-selected-by-uk-space-agency-to-develop-satellite-based-rocket-launch-telemetry-system/.

Additionally, Viasat has recently launched Velaris, a new L-band service for commercial uncrewed aviation.[9]

[redacted]

B. Ofcom Can and Should Adopt Protection Measures for Land-Based Terminals

The CFI explains that Ofcom does not intend to provide specific protection measures for land terminals because they "are designed to be portable, meaning that their location and other technical parameters are subject to constant change. . . . [and therefore] they cannot be effectively coordinated without sterilising the 1492-1517 MHz block across the whole of the UK."[10]

Viasat respectfully disagrees with Ofcom's suggestion that incorporating land-based terminals into the analysis cannot be done because of the variable locations of land MES terminals. Reasonable measures can be employed to protect both stationary and non-stationary MSS terminals. For stationary terminals, there are known locations and operating parameters that can be utilized to establish protection zones. Such protection zones, however, should be reviewed and updated to ensure the protection of future MSS terminals as well. For non-stationary (*i.e.*, "mobile") terminals, a probabilistic analysis can be used to provide reasonable protections. Although it might be difficult to predict the exact location of a mobile MSS terminal user, usage patterns are somewhat predictable (*e.g.*, around population centres, roadways, rural industrial areas, etc.) and should be identified for protection. Thus, instead of excluding land MES terminals altogether, Ofcom should establish protection criteria for stationary MSS terminals through the use of protection zones as well as pursue the use of a probabilistic analysis to identify the appropriate protection measures non-stationary MSS terminals in locations where such terminals are likely to be located.

Coexistence between land-based MSS terminals and terrestrial wireless deployments is possible. To further enable their coexistence, in addition to utilizing protection zones and conducting probabilistic analyses, Ofcom may consider adopting equivalent isotropic radiated power ("EIRP") limits for base stations, out-of-band emission ("OOBE") limits, and/or guard bands to mitigate interference concerns.

[9] *See* Inmarsat, *Velaris*, *available at* https://www.inmarsat.com/en/solutions-services/aviation/services/velaris.html.

[10] *CFI* ¶ 3.7.

C. Ofcom Must Address Maritime and Aviation Operations Outside of Airports and Ports

In addition to excluding land-based terminals from consideration, Ofcom's current analysis only examines terminals "carried by ships and aircraft operating from UK ports and airports."[11] This approach is underinclusive and disregards terminals that operate close to shore, on waterways, and on UAVs. For example, Figure 4 shows protection areas around specific ports on the Thames but ignores the vessels sailing on the Thames between ports that require fully functional terminals.[12] Similarly, Figure 8 shows the defined polygon where vessels operate in Southampton Water and the Port of Southampton but excludes the Solent to the north of the Isle of Wight, which is heavily used by ships using L-band terminals.[13]

Viasat welcomes the opportunity to work with Ofcom to define and identify ports, airports, and waterways, and other locations that are used by Viasat L-band terminals that must receive protection.

II. Ofcom's Analysis Should Incorporate OOBE Leakage into Frequencies Above 1518 MHz

Viasat receivers in the adjacent 1.5 GHz band must be highly sensitive in order to receive transmissions from satellites orbiting the Earth at altitudes of more than 35,000 km. Consequently, these receivers are susceptible to numerous types of interference caused by high power terrestrial wireless deployments in the 1.4 GHz band, namely blocking interference and OOBE interference. The analysis presented by Ofcom lacks any discussion about the latter type—interference created by OOBE into victim receivers operating above 1518 MHz.[14] Rather than focusing exclusively on blocking interference, which only provides a partial view of the interference environment, Ofcom's analysis should account for all types of interference that may harm Viasat's MSS terminals in the 1.5 GHz band.

To appropriately account for both types of interference to victim antennas in the 1.5 GHz band, Viasat recommends adopting an OOBE EIRP limit of -41 dBm/MHz. This limit accords with "Option 3" in the most recent International Telecommunication Union ("ITU") Recommendation on IMT and L-band compatibility.[15] This level would result in a probability of interference to land MSS terminals of around 1%, as shown in Table 11 of ECC Report 263.[16] For comparison, it may be noted that this proposed OOBE EIRP limit is much less stringent that the limit previously adopted by Ofcom to protect UK fixed links operating in the band 1498.5-1518 MHz.[17]

III. Ofcom Should Adopt More Conservative Assumptions with Respect to How Technological Innovations Will Improve Coexistence

Viasat disagrees with the basis behind Ofcom's statement that "coexistence will improve as the satellite receiver fleet is refreshed"

	and that "it should be possible to relax any technical conditions imposed on mobile base station installations for the purposes of ensuring coexistence of the older, more susceptible satellite receivers in the future, but this will take a number of years."[18] Although technological advances may allow for improved coexistence between Viasat's L-band terminals and mobile deployments, the decision to incorporate new technologies into devices and service offerings is primarily driven by the needs of the customer base, including airlines and shipping operators, who must make difficult decisions that impact size, weight, and cost associated with retrofitting and installing MSS terminal equipment on vessels, aircraft, and other transportation modes. Because Viasat antennas are owned, installed, operated, and maintained by each customer, it is the end users, not Viasat, who decide whether and when to upgrade their equipment. The replacement process can be especially time and resource intensive in the aviation industry, where it can take upwards of 15-20 years to develop, certify, deploy, and license a new terminal. The Viasat aviation terminals must also receive regulatory approvals from domestic civil aviation regulators prior to commercial service. Moreover, even if Viasat's customer-owned satellite terminal fleet receives significant upgrades, the improved blocking performance would do nothing to address interference from OOBE leakage from the 1.4 GHz band into Viasat's 1.5 GHz band. Viasat and its end users have made significant investments in their equipment and have reasonably relied on the premise that such

[11] *Id.* ¶ 3.6.

[12] *Id.* at 15.

[13] *Id.* at 18.

[14] *See generally id.* ¶¶ 3.11-3.15 (discussing interference caused by "blocking").

[15] ITU, Recommendation M.2159-0, *Technical and regulatory measures to provide compatibility between IMT and MSS, with respect to MSS operations in the frequency band 1 518-1 525 MHz for administrations wishing to implement IMT in the frequency band 1 492-1 518 MH* (2023), *available at* https://www.itu.int/rec/R-REC-M.2159-0-202312-I/en ("ITU-R Recommendation M.2159-0").

[16] *See* European Conference of Postal and Telecommunications Administrations (CEPT), *ECC Report 263, Adjacent band compatibility studies between IMT operating in the frequency band 1492-1518 MHz and the MSS operating in the frequency band 1518-1525 MHz*, 26 (Mar. 3, 2017), *available at* https://docdb.cept.org/download/1294 ("*ECC Report 263*").

[17] Ofcom, *OfW557 - Guidance for fixed link assignment requests in the 1.4 GHz band from 29 May 2015*, (May 29, 2015), *available at* https://www.ofcom.org.uk/__data/assets/pdf_file/0029/74639/ofw557.pdf. As shown in Table 3 of OfW557 for SDL systems operating in the band 1452-1492 MHz, the OOBE EIRP emission limit for emissions within the range 1498.5-1518 MHz is -62.5 dBm/MHz, which is 21 dB lower than the limit proposed by Viasat.

[18] *CFI* ¶ 3.3.

equipment will be usable. Ofcom's coexistence solutions should not place the burden of replacing expensive, highly complex equipment on the consumer base—and should instead require new entrants to find solutions to accommodate longstanding existing spectrum users.

Ofcom has further indicated that they believe there will be limited impact of OOBE interference on safety services, but Viasat asserts that protection of all MSS terminals operating throughout the 1518-1559 MHz should be protected. Even if Viasat's safety services receive adequate protection from IMT deployments, numerous other MSS services operated by Viasat should operate without harmful interference from the adjacent 1.4 GHz band.

IV. Ofcom Should Not Assume that Omni Antennas Are Always the Worst-Case Scenario

Statistically, omni antennas may be the "worst case" assumption across a large simulation trial, but the true worst-case scenario (despite being more unlikely) would be MES with directional antenna pointed at a base station. In this scenario, some MES and AES terminals having directional antenna gains up to 17-19 dB could receive significantly higher levels of interference due to main-beam (or near main-beam) coupling with base stations. These cases also need to be considered in any analysis. Ofcom should be careful to include all possible terminal scenarios instead of using the metrics from the best-performing MES and AES terminals in their analysis. In the particular case of aviation terminals operating in the UK, the terminals may currently operate to a Viasat GSO satellite at longitude 54W, which means the terminal antenna elevation angle from the UK is around 10-13 degrees. It is quite possible then that a mobile base station would be located very close to the direction of maximum radiation, meaning it would receive interference up to 14 dB higher than assumed in Ofcom's assessment. New ITU-R Recommendation M.2159 suggests an adjustment to the PFD limits to address this situation.[19]

V. Ofcom's Analysis Should Include Values Based on Numerous Types of Terminals

Ofcom's analysis suggests that "interference between mobile base station transmissions and the most vulnerable current satellite receivers could occur when the base stations are up to . . . 55 km away from shipborne receivers in UK ports and waterways; and 8 km away from aircraft at UK airports."[20] For satellites receivers with improved blocking performance (compliance with the latest technical standard),

[19] *See* ITU-R Recommendation M.2159-0.

[20] *CFI* ¶ 3.18.

	Ofcom estimates that these maximum distances will be reduced to 25 km and 3 km for ports and airports, respectively.[21] To reach these conclusions, Ofcom relied on blocking values from ECC 299. While there are a wide range of values provided in Tables 3 through 8 of ECC 299, it appears that Ofcom only reported on the highest performing aero MES (SB), which actually performs better than the -30 dBm specification. To ensure that all possible interference scenarios are considered, Ofcom should conduct the analysis with Viasat to ensure that all deployed MES are also considered. Picking the best-performing MES and AES characteristics would influence the results of these analyses interfering with licensees' abilities to fully deploy their services and may prevent all licensees from making the highest and best use of their spectrum.
Question 2: Do you have any comments on the proposed sizes and implementation methods for the PFD limited and coordination zones, both individually and as hybrid options?	Confidential? – N The CFI identifies specific controls that will be established to ensure coexistence between mobile base stations in the 1492-1517 MHz band and satellite receivers in the adjacent band.[22] Among these, Ofcom discusses the possibility for PFD limited zones and "coordination zones," the latter of which are "larger areas around each port and airport within which new mobile base station deployments must demonstrate that they will not breach the PFD limits within the defined PFD limited zones."[23] The size of the coordination zones must be adequate to ensure that no base station located outside the zone could cause interference higher than the defined PFD limits. The size of the coordination zone should be based, therefore, on the lowest PFD limits, conservative assumptions about terrain loss (*i.e.*, low diffraction loss) and should assume the base station transmits with maximum permissible power in the direction of the PFD limited zone. It is likely that in many cases, for a specific planned base station inside the coordination zone, a detailed assessment will show that the PFD limit will not be exceeded. Regarding the PFD limited zones, Figure 9 of the CFI shows the ports and airports identified so far. While this looks to be reasonably complete, we seek to engage with Ofcom to examine the sites in more detail to ensure the number and size of the zones is up to date. It appears that waterways may not have been identified currently and Viasat looks to discuss the identification of such waterways with Ofcom.

[21] *Id.* ¶ 3.20.

[22] *Id.* ¶ 3.26.

[23] *Id.* ¶ 3.26(ii).

Question 3: Do you consider that PDF limited/coordination zones defined using complex polygons would make deployment of this spectrum for mobile more complex than zones which are defined by simple shapes?	Confidential? – N Viasat does not have a preference between complex and simple polygons for defining PFD limited/coordination zones. The most important consideration is for services in the adjacent band to receive adequate protection, and therefore, any polygon that is able to achieve this goal will be acceptable. To ensure that licensees in the upper 1.4 GHz band are complying with PFD limits zones, coordination zones, and other terms of their licenses, Ofcom should establish official enforcement mechanisms, including but not limited to financial or regulatory penalties/sanctions against licensees for noncompliance. To the extent that there is already an overall enforcement mechanism in place, Ofcom should include that information for the record.
Question 4: Do you have any other suggestions for how we might make the 1492-1517 MHz block available for mobile while protecting satellite use of the adjacent band?	Confidential? – N Based on previous studies conducted to protect land, maritime and aero MSS operations we have identified at least one solution to provide adequate protection to Viasat L-band operations. Viasat recommends using of the band 1427-1492 MHz band exclusively for supplemental downlink ("SDL") macro base stations. For the 1492-1517 MHz band, Ofcom should postpone use of the band, or, in the alternative, limiting use to indoor base stations. This band plan would protection to current land, maritime, and aviation MSS operations, without the added complexity of compatibility restrictions and would be consistent with "supplemental" nature of SDL. Satellite-based D2D is a nascent service that did not exist when these compatibility studies were initially undertaken. Accordingly, Ofcom should conduct initial studies to determine whether these protection measures are sufficient to protect D2D services.
Question 5: What are your views on the timescales for relaxing the PFD limits and coordination restrictions?	Confidential? – N Viasat agrees with Ofcom that it is currently unclear when it will be possible to relax the Phase 1 conditions based on the risk of interference to older satellite terminals still in circulation. Viasat disagrees with the 5 to 7-year PFD limit relaxation timescale discussed in ECC Report 299.[24] Firstly, it is important to note that the reference to 5-7 years in Report 299 relates to the notice period to be provided to users in the case of closure of legacy MSS services. It does not relate to the timeframe required for replacement of equipment operating in current L-band MSS services, where users may have only recently purchased a terminal.

[24] *Id.* ¶ 3.50 ("[I]t is currently unclear when it will be possible to relax these conditions based on the risk of interference to older satellite terminals still in circulation. A period of 5-7 years is discussed in ECC report 299, but we welcome input from stakeholders on the likely timescales for this to be possible.").

	Following the request from the CEPT ECC, the IMO and ICAO have taken steps to update equipment standards to include new receiver blocking requirements. However, neither body can impose requirements on users for mandatory replacement of equipment. In fact, the IMO has warned that: "that the example timescale of 7 years is too short to be achievable, given the process required."[25] Likewise, ICAO has commented that "any timescales in transitioning to more relaxed protection measures which are derived on the anticipated performance of future satellite receiving earth stations should reflect the natural replacement cycle of aeronautical equipment, typically 25 years or more."[26] It is not currently possible to foresee when new terminals with enhanced resilience might be fully deployed. We propose that Ofcom adopts "Phase 1" PFD limits for the time being, allowing the timing for transition to "Phase 2" to be assessed at a later date, when real evidence of the take up of new terminals is available.
Question 6: Do you have any initial views on how the coordination we are proposing should be carried out? In particular, do you consider this should be conducted by Ofcom or the licensee?	Confidential? – N To ensure adequate protection of already deployed Viasat terminals, Ofcom should, as part of the "coordination" process, require terrestrial operators to provide to Viasat (and Ofcom) the models, assumptions, and calculations to show that proposed operations would meet the established PFD limits and allow Viasat validate these conclusions. This coordination approach would reduce burdens on Ofcom and maximize administrative efficiency by allowing stakeholders to engage directly with one another instead of relying on Ofcom as an intermediary. Furthermore, Viasat would be able to provide targeted feedback to mobile operators, including precise details on what areas/services/terminals need to be protected and the technical characteristics that should be used to model PFD limit compliance. This approach would be consistent with how other national administrations handle inter-service coordination involving satellite spectrum.
Question 7: Do you have any views on the potential impact of our proposed options, including impacts on specific groups of	Confidential? – Y [Entire Answer] [redacted]

[25] IMO, *Liaison Statement to CEPT ECC*, Document ECC(20)INFO 02, *available at* https://api.cept.org/documents/ecc/57514/ecc-20-info-02_liaison-statement-to-cept-ecc-protection-of-l-band-maritime-satellite-communications.

[26] *See* ICAO, *ICAO Liaison Statement to ITU-R Working Parties 4C and 5D* (2018), *available at* https://www.icao.int/safety/FSMP/MeetingDocs/FSMP%20WG8/Flimsy/FSMP-WG08-Flimsy09%20-%201518%20MHz%20protection%20LS%20to%204C%20and%205D-RevFINAL.docx.

persons or more general impacts?	[redacted]

[27] [redacted]

[28] [redacted]

[redacted]

[29] [redacted]