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Via E-Mail

Spectrum Awards
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Re: Award of 1492-1517 MHz Spectrum for Mobile Services: Consultation on Ofcom's Proposals

To the Spectrum Awards team, Ofcom:

Viasat, Inc. ("Viasat") is pleased to respond to the Ofcom consultation entitled "Award of 1492-1517 MHz spectrum for mobile services."[1] In addition to the narrative response provided below, we attach a completed response form. Viasat would be pleased to discuss any of our responses with Ofcom.

I. INTRODUCTION AND SUMMARY

Viasat fully supports Ofcom's objectives to "further the interests of citizens and consumers," "promot[e] competition," and "secure the optimal use of spectrum" in 1492 to 1517 MHz (the "upper 1.4 GHz band").[2] Viasat advances these same goals over land, in the air, and on the waters in and around the United Kingdom by delivering unique mobile-satellite services ("MSS"), including safety-of-life and national security services, in the adjacent 1518-1559 MHz band ("1.5 GHz band")—and is actively developing and advancing next-generation MSS services and capabilities to do even more with the 1.5 GHz band. With appropriate compatibility measures, Viasat believes that Ofcom can enable terrestrial mobile deployments in the 1.4 GHz band in a manner compatible with existing and evolving adjacent-band MSS services. Viasat offers its recommendations here to ensure that citizens and consumers benefit from the multiple applications supported by both terrestrial and mobile satellite services.

Viasat delivers secure and reliable connectivity in the 1.5 GHz band in ways that are not fully captured by the Consultation's draft proposals. Its vital and unique services fall into three broad categories: aeronautical, maritime, and land-based services. These services support aviation safety before, during, and after flights across the UK, and maritime activities at sea, up and down the Thames, through other inland waterways, and along the coast. Land-based services support the construction, operation, and maintenance of critical infrastructure, including power

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[1] Ofcom, *Award of 1492-1517 MHz spectrum for mobile services*, Consultation (4 Feb. 2025) ("Public Consultation").

[2] *Id.* at 6.

generation and transmission across the UK (including within areas served by terrestrial MNOs), and also support a variety of essential operations of the British Armed Forces. They also include direct-to-device ("D2D") and internet of things ("IOT") applications that have emerged as a centerpiece of UK National Space Policy, and that are uniquely suited to satisfy Ofcom's public interest objectives and drive future innovation powered by mobile satellite connectivity.

As an operator committed to the UK, Viasat is positioned to ensure that UK consumers benefit from the continued provision of existing MSS services as well as the benefits of new services. Next-generation MSS applications include 3GPP-based D2D and IOT services, as well as more advanced Uncrewed Aerial Vehicle ("UAV") missions that protect critical infrastructure and strengthen our national defence and D2D services that power reliability and safety, among other capabilities. Viasat's commitment to enhancing investment, fostering innovation, and promoting competition within the UK remains steadfast. With continued reliable availability of 1.5 GHz MSS spectrum without harmful interference, Viasat will be able to deliver new satellite services, all while maintaining our dedication to the UK market.

However, the current proposals under consultation pose challenges to these initiatives. Instead of fostering growth, they risk creating issues for both existing and evolved MSS. Viasat appreciates and agrees with Ofcom's recognition that unfettered deployment of IMT services would create harmful interference to MSS services. Our concerns fall into three specific areas:

1. Land mobile and UAV MSS services which are used throughout the UK are not addressed in the proposal

2. Proposed list of sites around airports and ports where IMT PFD limits would exist does not encompass all the areas where maritime and aero services are provided.

3. The proposed duration of Phase 1 does not reflect a realistic period for MSS terminal upgrades and standard approval cycle timing, and needs adjusting consistent with ICAO and IMO recommendations.

We expect that each of these issues can be easily addressed with the right mix of tools. We are putting forward a tool box of three example approaches that combine the mechanisms listed below to provide different options to enable coexistence of IMT and existing and evolved MSS services to deliver value to the UK, its citizens, and industry. These mechanisms include:

1. Applying PFD limits on IMT operations to a full list of aeronautical and maritime sites with a realistic phase-in for MSS terminal upgrades.

2. Adopting additional power limits on IMT base stations.

3. Adopting an out-of-band EIRP of -41 dBM/MHz for IMT base stations.

4. Adopting frequency separation of SDL blocks and MSS spectrum.

5. Adopting down-tilt obligations for IMT base stations.

Viasat looks forward to further constructive discussions to achieve a successful outcome.

II. VIASAT'S MSS SERVICES ARE CRITICAL FOR UK CITIZENS, THE UK GOVERNMENT, AND COMMERCIAL USERS AT SEA, IN THE AIR, AND ON LAND—INCLUDING FOR SAFETY-OF-LIFE COMMUNICATIONS.

As Ofcom is aware, Viasat has an unrivaled track record of operating the world's most reliable global mobile satellite telecommunications networks, sustaining business and mission critical safety and operational applications for more than 40 years. Inmarsat, Viasat's wholly owned subsidiary, was founded as the International Maritime Satellite Organization ("INMARSAT") in 1979—a non-profit intergovernmental organization, based out of London and created by the United Nations' International Maritime Organization ("IMO") to improve safety at sea.[3] INMARSAT was so successful at providing critical safety communications in the maritime sector that in 1985, the Convention was amended to include the provision of aeronautical safety services.[4] As a result, INMARSAT became a mainstay for safety-of-life communications at sea and in the air. It has continued that role through its privatization as UK-based company Inmarsat in 1999 and Viasat's acquisition of Inmarsat in 2023.

Today, Viasat offers unparalleled global satellite connectivity that provides critical services to customers, including the UK government, on land, at sea, and in the air, and no matter where the customer is located. Viasat continues to innovate, bringing cutting-edge, highly reliable services to a wide range of UK customers. Each of these services is critical for serving the public interest in the UK and must remain operational in a way that retains trust in the reliability of these services for UK citizens and global visitors—which means they must remain free from harmful interference. Viasat invites Ofcom to recognize and take into account the value of Viasat's services to government and commercial users in the UK, and around the globe, including United Nations peacekeepers and NATO forces, and including for critical safety-of-life communications.

A. Land-Based MSS: Viasat's Land-Based Services Serve Critical Functions Throughout the UK.

Viasat provides critical land-based communication services to commercial and governmental (including the Ministry of Defence) users in the and for global operations in support of national security interests and emergency preparedness.[5]

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[3] *See generally* Convention on the International Maritime Satellite Organization (INMARSAT), 20 Aug. 1979, 1143 U.N.T.S. 106.

[4] Inmarsat, *Celebrating 35 years of aeronautical satellite communications* (16 Oct. 2020), *available at* https://www.inmarsat.com/en/news/latest-news/aviation/2020/celebrating-35-years-of-aeronautical-satellite-communications.html.

[5] *See generally* Viasat Inc., *L-band Terminal Summary*, *filed in* Viasat Response to Ofcom (1 Apr. 2024) ("L-band Terminal Summary").

Critical Infrastructure & Resilient Communications. Viasat's land-based services support critical national infrastructure and utilities and provide backup communications in the event of primary communications failures. For example:

- UK Power Networks ("UKPN") utilizes BGAN terminals in its Supervisory Control and Data Acquisition ("SCADA") network to enable engineers to remotely operate equipment to quickly restore power to customers during outages and monitor and receive status updates from the field.[6]

- RWE, Wales's largest electricity generator, uses Viasat's L-band land terminals to transmit data from its automated hydrology stations to prevent water wastage, maximise the amount of energy it generates, and safeguard its people and the surrounding landscape and infrastructure.[7]
- Numerous other companies in the UK rely on Viasat's L-band MSS services for tracking hazardous materials and other high value assets.

Other use cases include:

- Back-up communications services for the UK's Army, including Royal Marines' joint exercises and trainings;
- Telemetry, rail signaling, and push-to-talk capabilities for train operators;
- In-field connectivity for agricultural industry workers and vehicles;
- Office connectivity and video conferencing for remote workers; and
- Facilitating the transmission of media for live video broadcasting.

Government Applications. Viasat land-based L-band terminals include those used by the UK Parliament, the Maritime and Coastguard Agency, UK Border Force, Territorial Army, Royal Air Force, Royal Navy, Royal Marines, Special Forces, British Army, and other specialized governmental and military units and branches for a vast array of applications.

Emergency Preparedness and Response. Viasat's BGAN service offers on-the-go broadband connectivity using small, portable terminals, helps protect UK citizens and workers by facilitating access to emergency services[8] and enabling first responders to communicate from

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[6] *Arqiva delivers new satellite solution for UK Power Networks to replace legacy paging-based system with portable terminals*, IoTNow (23 May 2019), *available at* https://www.iot-now.com/2019/05/23/96095-arqiva-delivers-new-satellite-solution-uk-power-networks-replace-legacy-paging-based-system-portable-terminals/.

[7] Viasat, *Case study: RWE's connected hydrological stations* (2021), *available at* https://www.viasat.com/perspectives/enterprise/2021/case-study-rwe-connected-hydrological-stations/.

[8] *See, e.g.*, Department for Business & Trade, *First Responders: An introduction to UK capability*, 18, *available at*

disaster scenes and conduct situational analysis. Viasat debuted its L-band D2D services to provide satellite SOS services for Google Pixel 9 devices (3GPP Rel.17 Band 255), in August 2024. Beyond Pixel, subscribers also use Viasat services for SOS, tracking, and messaging on other Release 17 smartphones and consumer devices.

As these examples show, there are a wide range of both safety and operational requirements for the use of Inmarsat's MSS land terminals within the UK.[9]

Viasat invites Ofcom to consider how to best provide certainty that these systems are going to continue to operate using steps to be implemented in the upcoming IMT regulatory framework for the upper 1.4 GHz band.

B. Aviation: Viasat Enhances Aviation Safety through Its Aeronautical Services.

Viasat's Classic Aero, SwiftBroadband ("SBB"), and SwiftBroadband Safety ("SB-S") terminals provides numerous safety services before, during, and after flights.[10] Within the UK, SBB is used by both the Royal Air Force and Special Forces, including on the Boeing P-8 Poseidon military aircraft for Anti-Submarine Warfare ("ASW"), [11] and for transportation and surveillance purposes by other government users. Furthermore, many aircraft used by Heads of State and other high ranking public officials, which routinely operate in UK airspace, are fitted with SBB as either a primary or secondary communications link. Viasat's aeronautical terminals are also used in UAVs for critical national security and infrastructure missions. Such use is not just restricted to the vicinity of the airports listed in the proposal, but rather occurs more broadly within the UK.

Viasat emphasizes that SwiftBroadband-Safety ("SB-S"), which is a high-priority application that sits on top of SBB, exists *solely* for safety and operational purposes.[12] As an example, SBB

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https://assets.publishing.service.gov.uk/media/67c712f1750837d7604dbe42/ukdse-first-responders-an-introduction-to-uk-capability-accessible-version.pdf.

[9] The comments in Public Consultation that there are no "safety or operational requirements for the use of Inmarsat's MSS land terminals" (at 32) and that Ofcom has "not been made aware of any" critical safety uses of land terminals (at 36) thus are inaccurate).

[10] These applications include Future Air Navigation System ("FANS"), Controller Pilot Datalink Communications ("CPDLC"), Voice and Automatic Dependent Surveillance ("ADS"), as well as Aircraft Communications Addressing and Reporting System ("ACARS").

[11] In June of last year, one of the Royal Air Force's Poseidon P8 aircraft—which utilize Viasat's L-band Swift Broadband terminals for transportation and surveillance purposes—detected a Russian nuclear submarine off the coast of Scotland. *Russian submarine spotted near west coast of Scotland*, BBC News (16 June 2024), https://www.bbc.com/news/articles/cpvvp3xwwnxo.

[12] *See* L-Band Terminal Summary, Aircraft Tab ("Like Classic Aero terminals, SB-S terminals support AMS(R)S and FANS safety-of-life services, which are tested on the ground and may be

is used for receiving Air Traffic Control ("ATC") clearances, which are instructions from ATC to a pilot that typically relate to routes, altitude, speed, etc. In addition to safety-of-life applications, SBB is used for communications with airline operations centers ("AOC") for sending and receiving weather information, weight and balance, passenger connection information, preferred routing, etc.

Therefore, there are several "safety and operational requirements for Inmarsat's SwiftBroadband services."[13] Interference to these terminals at airports therefore could cause "disruption" in flight plans, expense to the airlines and traveling public and possible impact to the environment.[14]

VHF links traditionally used for aviation links are being stretched to their limits requiring plane operational communications to switch to L-Band MSS services such as CPDLC and ADS.[15] Indeed, this saturation will be most severe around airports. Thus, the importance of L-band MSS for these safety messages will become highest around airports as that will be where the most congestion occurs and other communications links will become saturated.

Failing to adequately protect these services would have implications for safety of life and domestic security.

C. Maritime: Viasat Provides Essential Maritime Services.

Viasat L-Band terminals, including Inmarsat-C and Fleet Broadband ("FBB"), FleetPhone, and BGAN, are used extensively in the maritime sector. Inmarsat-C and Inmarsat Fleet Safety terminals are approved by the IMO for meeting Global Maritime Distress and Safety System ("GMDSS") requirements and, as a result, are considered mandatory carriage on many vessels, including vessels that operate in and around British ports and waterways including up and down the Thames. Additionally, because the IMO encourages vessels not subject to the SOLAS Convention to use GMDSS, a significant number of non-SOLAS vessels participate in GMDSS, and thus use Viasat GMDSS terminals, either on a voluntary basis or as required to by their respective flag states.[16]

Most Royal Navy vessels use FBB for back-up communications connectivity. Commercial and private maritime vessels use these terminals for Viasat's Distress Priority calling service, which

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operated on the ground, at low altitudes, and at cruising altitude. If the AMS(R)S fails (e.g., due to receiving interference), the affected aircraft must return to the ground. The failure of an individual AMS(R)S creates delays, stresses air-traffic management, and inconveniences passengers and crew aboard that aircraft. At scale (e.g., if an entire fleet is affected), the airline industry would be brought to a standstill.").

[13] Public Consultation at 21.

[14] *Id.* (questioning whether disruption would occur).

[15] *See, e.g.*, EUROCONTROL, *CNS Evolution Plan 2024*, 11, 20, 30 (2024); SESAR, VDL Mode 2 Capacity and Performance Analysis (Nov. 2015).

[16] CEPT, *Considerations on Draft ECC Report 299*, ECC (19)INFO 01, 4 (4 Mar. 2019), *available at* https://cept.org/documents/ecc/49764/ecc-19-info-01_imso-information-document-on-report-ecc-299 ("IMSO Letter on ECC Report 299").

directly and automatically routes an emergency voice call and vessel position information to a Rescue Centre. FBB also enables two-way weather reporting and transmits real-time safety information about potentially dangerous weather conditions to mariners across the globe. FleetPhone likewise supports emergency calling and enables remote tracking of vessels that have failed to arrive or report their position at the appropriate intervals.

At other times, Viasat's maritime terminals are used to provide backup communications during emergencies or communications outages. In 2024, for example, shipping giant Maersk suffered a cyberattack that disabled its onboard communications systems. Maersk relied on its L-Band terminals to provide connectivity and avoid creating global shipping disruptions. As previously noted, this back up function serves government and enterprise users in other sectors via its land terminals.

As the Maritime and Coastguard Agency ("MCA") noted in its January 2023 CFI response,[17] the International Mobile Satellite Organization ("IMSO") has emphasized the dire consequences of adopting policies that would cause overloading of maritime satcom terminals:

- "[S]eafarers may not be able to test the operation of satellite safety equipment during a Port State Control inspection or prior to departure from port, and it may not be possible to carry out maintenance or mandatory surveys as required."
- Improperly functioning satcom terminals could render vessels noncompliant with regulatory obligations and therefore unable to operate.
- "[S]eafarers may be unable to receive information (e.g. EGC, MSI) requests, making route planning difficult and posing a risk to maritime safety."
- "[S]eafarers may use applications that require reliable communications over all coastal areas ***and along connecting rivers and waterways to marine facilities, including all types of ports, harbours, marinas, berthing areas, which may be situated some way from the coast and will usually be near centres of populations***."[18]

Satcom is widely used in the maritime industry, including on the Thames in London. As IMSO highlights, many countries, including some CEPT members, provide only partial radiocommunication coverage of waters off their coasts; some provide no coverage at all. Accordingly, there is a clear user preference for satcom over other available options because "the unrestricted availability and dependability of satellite communications, coupled with ease of use, are attractive features" and satcom terminals can be used regardless of the communications infrastructure in host countries.[19]

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[17] *See generally* Comments of the Maritime and Coastguard Agency, Ofcom 1.4 GHz CFI (30 Jan. 2024), *available at* https://www.ofcom.org.uk/__data/assets/pdf_file/0028/276346/maritime-and-coastguard-agency.pdf ("MCA Comments").

[18] IMSO Letter on ECC Report 299 at 4 (emphasis added).

[19] *Id.* at 3.

While Ofcom notes that "alternative means of communications [are] available" to fill the gap if maritime satcom were disrupted,[20] this is not practical in reality. For that to be the case, a mariner coming into a country would need to carry various communications devices and be aware of the preferred communications network for each country on its entire route. Such a solution would be unmanageable and dangerous during emergencies and other high-stress situations.

D. Viasat's UAV And Next Generation Technologies Provide Enhanced Connectivity

Viasat continually expands its satellite service offering to accommodate exciting new use cases that take advantage of breaking technological developments. Viasat's next-generation technologies include UAV applications and innovative space technologies, including advanced 3GPP-based D2D services.

Uncrewed Aerial Vehicles. Viasat's aeronautical terminals are used for its global, reliable UAV satcom service, Velaris, which allows for economies of scale and new standards of safety and productivity for civil, government, and military users. In the UK, these terminals support UAV use cases that are poised to develop further and expand including:

- Channel migrant surveillance and security;
- Remote package delivery in the Scottish Islands and Highlands;
- Remote powerline and infrastructure inspection;[21] and
- British Army and Royal Air Force operations.

All these operations can be expected to occur in and around populated parts of the UK, including within MNO service areas. Notably, UAVs operate at low altitudes where interference from adjacent-band IMT is highly likely unless suitably managed. The L-band communications link is

[20] Public Consultation at 32; *see also* Letter from Pole Star Global to Ofcom at (dated 8 Apr. 2025, filed 25 Apr. 2025) (supporting Viasat's submissions and "emphasizing that Pole Star's Inmarsat-C services are utilised, both from a regulatory and operational perspective, not only in ports but also around the UK coastline and throughout the UK territorial seas and EEZ").

[21] *See* Mark Holmes, *Gotonomi is Now Taking Orders for its new UAV Satellite Terminal*, ViaSatellite (29 Aug. 2024), *available at* https://www.satellitetoday.com/technology/2024/08/29/gotonomi-is-now-taking-orders-for-its-new-uav-satellite-terminal/ ("[Viasat partner Gotonomi's UAV satcom terminals] enabl[e] scalable beyond visual line of sight operations (BVLOS) for drone operators for purposes of inspection, surveillance, and delivery.").

used to transmit flight instructions to UAVs from the ground, and if there is interference into the 1.5 GHz band, these instructions cannot be sent to the vehicle to move it to another location.[22]

Direct-to-Device. Viasat has committed to work with the European Space Agency ("ESA") to accelerate the development and deployment of Non-Terrestrial Network ("NTN") LEO D2D systems in Europe and across the world for the benefit of consumers.[23] Viasat will be deploying its expertise alongside a host of European partner companies, with a significant UK contribution. Under the agreement, Viasat, supported by European-based partners, will submit a formal Partnership Project under ESA's Advanced Research in Telecommunications Systems ("ARTES 4.0") programme for the detailed design and procurement of an Open Architecture LEO network, capable of providing 5G non-terrestrial network services directly to handheld devices. These initiatives align with the goals set out in the UK National Space Policy, which identifies "broadband for mobility applications (including maritime, aeronautical, and land mobile)" as one of the "existing areas of deep commercial and technical expertise" that will be important for realizing the strategy's first pillar, "growing existing competitive strengths."[24]

Viasat is on the cutting edge of D2D technologies and Viasat's satellite SOS services for Google Pixel 9 devices (3GPP Rel.17 Band 255) have been available since August 2024. Viasat has also conducted real-world demonstrations and trials of its D2D devices in the automotive sector to be used for autonomous vehicles, emergency calling, and anti-collision detection and avoidance.[25] As the D2D ecosystem matures, and as consumer devices increasingly incorporate the

[22] Thus, it would be incorrect to conclude, as the Public Consultation suggests (at 23), that "any potential disruption to UAV use would be more limited than for international flights from commercial airports," and that "given the flexibility with which [UAVs] may be used, it is possible for users to move to another location should they encounter an [interference] issue."

[23] *ESA and Viasat to explore advanced satellite direct-to-device connectivity*, European Space Agency (28 Jan. 2025), *available at* https://www.esa.int/Applications/Connectivity_and_Secure_Communications/ESA_and_Viasat_to_explore_advanced_satellite_direct-to-device_connectivity; *European Space Agency (ESA) and Viasat Partner on D2D*, Viasat (28 Jan. 2025), *available at* https://www.viasat.com/news/latest-news/corporate/2025/european-space-agency--esa--and-viasat-partner-on-d2d/.

[24] HM Government, *National Space Strategy*, 14 (Sept. 2021), available at https://assets.publishing.service.gov.uk/media/6196205ce90e07043d677cca/national-space-strategy.pdf ("National Space Strategy").

[25] Viasat, *Demonstrating the power of Direct-to-Device (D2D) for the automotive sector* (4 Mar. 2025), *available at* https://www.viasat.com/perspectives/enterprise/2025/demonstrating-d2d-for-automotive-sector/; Viasat, *Viasat Joins 5G Automotive Association to Support Satellite-Enabled Autonomous Vehicles and Predictive Safety* (21 Nov. 2024), *available at* https://www.viasat.com/news/latest-news/enterprise/2024/viasat-joins-5g-automotive-association-to-support-satellite-enabled-autonomous-vehicles-and-predictive-safety/.

capabilities enabled by 3GPP Rel. 17 and subsequent releases as well, Viasat expects that the use cases for its D2D service offerings and technologies will broaden considerably.

A significant portion of this D2D demand will be for land mobile-based—that is supplementing and enhancing the capabilities of terrestrial MNO systems.

For these reasons, without the types of adjustments recommended in these comments, Ofcom's proposal would likely constrain the deployment of next-generation D2D, UAV, and other space services and technologies in the UK, all to the detriment of consumers.

III. KEY TECHNICAL ASPECTS WARRANT REVIEW AND CLARIFICATION.

Viasat appreciates and agrees with Ofcom's recognition that adjacent-band MSS services should be protected from harmful interference generated by use of the upper 1.4 GHz band. Absent adjustments, however, Ofcom's proposal would put both existing and new MSS services at risk. Viasat seeks clarification on some additional technical matters raised by the coexistence analysis contained in the proposal.

A. Studies Limited to 4G/LTE Systems May Not Capture a 5G Environment.

The Consultation considers interference risks based on test results that assume 4G/LTE deployments.[26] With Ofcom's leadership, however, the UK and its operators have successfully evolved to 5G. It is clear that the sun is setting on 4G/LTE supplemental downlink ("SDL") networks as operators move to 5G and future technologies. 5G network technologies and deployments have clearly evolved over what 4G/LTE networks offer, including changes in the air interface, modulation scheme, carrier spacing and bandwidth, as well as introducing completely new types of connected devices. Viasat believes that these changes may mean that additional testing of MSS terminal receiver resilience against the specific transmit characteristics of 4G/LTE technology over the last 10 years may need to be considered.

B. While MSS Services Bridge Connectivity Divides, They Also Support Critical Applications in Population Centres.

Viasat agrees with Ofcom that unlike traditional terrestrial communications infrastructure, L-band MSS services are "useful in areas where terrestrial networks are unavailable, specifically rural areas and stretches of road in areas away from population centres or where

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[26] *Compare* Public Consultation at 4 ("This document sets out our proposals to auction the upper block of the 1.4 GHz band (1492- 1517 MHz) for 4G and 5G mobile use") *and id.* at 40 (noting that Ofcom's "coordination proposals are based on ECC Report 299, which recommends measures to address potential blocking of satellite mobile earth stations ("MES") operating in bands above 1518 MHz") *with* ECC Report 299 at 9 (noting that the blocking performance was determined by taking measurements from each MES terminal using single and multiple LTE channels).

telecommunications redundancy and security is needed."[27] Just because L-band MSS services are useful in bridging connectivity gaps does not imply that they are *unuseful* in supporting critical applications in the rest of the country. Notably, some of the densest concentrations of land-based MSS terminal use in the UK exist in the Southeast of England and especially near London. At Ofcom's request, Viasat has painstakingly collected, analysed, and produced evidence showing that Viasat terminals *do not* "primarily operate in very remote areas."[28] Viasat respectfully requests Ofcom to consider the full scope of Viasat's deployments across all manner of locations in assessing interference protection needs. In particular, Viasat urges Ofcom to take into account the need to ensure the continued successful operation of Viasat's land-based MSS services, which include existing and emerging D2D services for the benefit of consumers, including by adopting the types of mitigation strategies recommended in these comments.

C. ATC Resiliency Does Not Imply LTE Resiliency.

An aspect of cellular to satellite interference analysis that is often misunderstood is the relationship of (i) a satellite terminal's resilience to Ancillary Terrestrial Component signals ("ATCt") to (ii) and that terminal's ability to withstand signals from LTE. The ATCt and LTE terminal resiliency are not interchangeable and do not provide equivalent interference protections to terminals. As a result, any analysis that assumes ATCt resiliency would also automatically deliver LTE resiliency may greatly overestimate the number of Viasat terminals that would be protected at Ofcom's proposed "Phase 2" limits.

ATCt and LTE are two different interferers, and the signals exhibit different characteristics that have differing effects on L-band MSS terminals.[29] ATCt is an in-band (relative to Viasat terminals) interference source that operates between 1526 MHz and 1536 MHz. Interference due to ATCt was studied in RTCA DO-262 and made entirely different assumptions about the interference level expected to be received by Viasat terminals, both from a blocking and OOBE interference mechanism standpoint. Furthermore, the frequency separations for ATCt and LTE with respect to the Viasat receiver frequencies are also different.

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[27] Public Consultation at 31.

[28] *Id.* at 35 ("We note that a risk of interference to Inmarsat land terminals could only arise if: (i) land terminals are not suitably resilient to blocking from adjacent band mobile; and (ii) mobile operators roll out this spectrum in areas where those land terminals are used").

[29] *See, e.g.*, ICAO Frequency Spectrum Management Panel, *Update on the potential for interference from the planned introduction of IMT in the band 1 492-1 518 MHz on aeronautical satellite communication receivers in the adjacent band 1 518-1 559 MHz*, ¶ 4.9 (Feb. 2018), *available at* https://www.icao.int/safety/FSMP/MeetingDocs/FSMP%20WG6/WP/FSMP-WG06-WP20_LTE%20interference%20to%20Satcom.doc ("[A]nalysis has shown that certain types of user equipment designed to be compatible with ATC would not be resilient to LTE as currently proposed, due to these substantial differences in radiated power, out-of-band emission limits and physical separation in the vicinity of ports and airports.").

IV. VIASAT INVITES OFCOM TO CONSIDER ADDITIONAL MITIGATIONS THAT ENABLE THE CONTINUED OPERATION OF MSS IN THE ADJACENT 1.5 GHZ BAND.

In establishing a framework for the upper 1.4 GHz band, various mechanisms can be used to ensure the continued successful operation of MSS services in the adjacent 1.5 GHz band. These mechanisms include indoor or small-cell deployment of IMT, a suitable guard band within the upper 1.4 GHz band, IMT PFD limits, IMT base station EIRP limits, and IMT base station antenna down-tilt. These mechanisms are explained below. Three possible examples of how to combine these mitigations are also provided.

A. Establish Appropriate Limits or a Guard Band on IMT Deployments

Ofcom could limit IMT deployment in the upper 1.4 GHz band to indoor/small cell use. This would allow IMT full, or nearly full, use of 20 megahertz of spectrum while also ensuring the continued successful operation of all of land, maritime and aeronautical MSS services in the 1.5 GHz band. Indoor use would provide the required attenuation of base station signals to mitigate harmful interference to MSS users, who will typically be outdoors. A suitable guard band in the upper 1.4 MHz band also may be necessary to accommodate edge cases, such as indoor transmitters installed on outer walls of an airport terminal that could potentially impact MSS terminals on aircraft parked at the gate.

In absence of the above, Viasat believes that Ofcom could limit the assignment of spectrum for IMT base station transmissions to the 1492-1502 or 1492-1507 MHz frequency range in order to provide a sufficient frequency separation for land terminals.

In conjunction with this guard band, Phase 1 PFD limits at protected sites (discussed in Section IV.B below) would apply.

B. As Proposed, Adopt PFD Limits that Protect Maritime and Aviation MSS Terminals.

In the Consultation, Ofcom proposes PFD limits for IMT operations of -74.9 dBW/m^2 in the 1492-1512 MHz band and -85.9 dBW/m^2 in the 1512-1517 MHz band at ports, and PFD limits of -53.5 dBW/m^2 and -63.4 dBW/m^2 in those frequency ranges at airports, consistent with Table 13 of ECC Report 299.[30] Ofcom also proposes to extend these protections to "approximately 10 military sites."[31] These "Phase 1" PFD limits would be reduced to limits of -30.9 dBW/m^2 at ports and -40.9 dBW/m^2 at airports ("Phase 2"), uniform across the entire upper 1.4 GHz band, after a period of time.[32]

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[30] Public Consultation at 8.

[31] *Id.* at 10.

[32] *Id.* at 7-8.

In provisionally deciding to provide protection to certain sites, Ofcom correctly observes that "making this spectrum available for mobile use without protection around certain ports and airports could cause significant disruption which could have an adverse effect on consumers."[33]

We agree that Ofcom should adopt the proposed Phase 1 limits, but Viasat believes that Ofcom should revise this proposal in three ways to ensure sufficient protection at critical sites.

The list of protected sites should be updated to include all ports, waterways, and airports used for adjacent-band MSS services. Viasat has submitted to Ofcom comprehensive information about the ports, waterways, and airports that need protection from IMT operations in the upper 1.4 GHz band.[34] These were identified based on use of the terminals at these locations to provide services to customers. Further, as Ofcom acknowledged, "Viasat, the Maritime and Coastguard Agency ("MCA") and John Shaw advised that uninterrupted MSS communications must be maintained for maritime vessels navigating through inland waterways."[35] As such, the Consultation's proposal to protect only certain airports and ports, but not to protect inland waterways should be revised to reflect the attached Annexes to these comments.[36] Inland waterways should be protected by Phase 1 PFD limits consistent with those that apply to ports.

Keep Phase 1 PFD limits in place for a period consistent with IMO, ICAO, AEEC recommendations for the band. As explained above, the Consultation proposes moving from Phase 1 PFD limits to Phase 2 limits over a set transition period, and seeks comment on the length of the transition. Viasat respectfully requests that Ofcom consider the state of the market for 1.4 IMT services and 1.5 GHz MSS services, and then extend the transition period accordingly.

In requesting feedback on the length of the transition period, Ofcom "provisionally" notes its preference for a 5-year transition, stating that "it would be inefficient to allow investment and improvements in the quality in mobile phone services used by millions of consumers to be held back by outdated technology in some MSS terminals while up to date more resilient alternatives are available."[37] Ofcom must also account for the lead time to retrofit aviation and maritime equipment on airplanes and ships owned and operated by third parties—a complex process that Viasat does not control. It is clear that five years would be wholly insufficient for globally upgrading MSS terminals that support critical maritime and aviation services and MNOs must be fully informed of what the realistic timescales are likely to be.[38]

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[33] *Id.* at 14.

[34] L-Band Terminal Summary. *See also* Annexes 1, 2, *infra*.

[35] Public Consultation at 34.

[36] *See* Annexes 1, 2, *infra*.

[37] *See id.* at 15, 134, 142.

[38] IMSO Letter on ECC Report 299 at 4-5 ("ICAO has advised that any timescales in transitioning to more relaxed protection measures which are derived on the anticipated

In the maritime sector, the cost of equipment and installation are the largest barriers to replacing maritime terminals. It is extremely burdensome for vessel owners to replace working, SOLAS-compliant terminals with new LTE resilient terminals, to the point that IMSO has suggested that these costs might constitute non-tariff barriers to trade under the World Trade Organization ("WTO").[39] Furthermore, as IMSO has noted, unilateral replacement of maritime satcom terminals would require the IMO to institute special regulatory requirements to enforce terminal replacement.[40]

In the aeronautical sector, retrofitting a diplexer or filter on an existing installation aboard an aircraft is a hardware replacement. There can be several steps in this process. First, the DLNA itself must go through Viasat's type approval process ("DLNA Type Approval"), which includes comprehensive successful testing of an aeronautical system permutation, which includes the DLNA (a "system permutation" comprises of four components: the avionics, DLNA, high power amplifier, and antenna). A Type Approval for the entire system permutation may also be required. Second, once this process is complete, the type approved DLNA can be integrated into additional system permutations. At a minimum, each additional system permutation must undergo a level of integration testing which will depend on the extent of the re-use of previously type assessed components. Once this second step is successfully completed, a type approval for the system permutation under consideration will be needed. For Aeronautical Safety terminals, the above Viasat Type Approval process is a pre-requisite for obtaining any additional regulatory certifications or authorizations (e.g., from the UK CAA or US FAA) that may be needed to install a production system permutation on an aircraft. These are some of the steps a system permutation including the DLNA must go through before being installed on an aircraft.

Once the system permutation and DLNA are type approved, there is still an immense number of dependencies and a massive effort is needed to replace anything on an aircraft, even if the hardware is not on the fuselage (like an antenna, for example): downtime, re-certification required by regulatory or certification bodies (e.g., new supplemental type certificates), integration testing, and associated costs and efforts. Furthermore, because only one system permutation with a DLNA resilient to Phase 2 PFD levels has received a type approval, Ofcom's

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performance of future satellite receiving earth stations should reflect the natural replacement cycle of aeronautical equipment, typically 25 years or more. This long lifecycle, which is the same as the lifecycle of commercial aircraft, is due to the very high cost associated with any upgrading of the equipment on-board aircraft, due to, inter-alia, revenue lost due to loss of aircraft flying time, airworthiness, and re-certification issues.").

[39] *Id.* at 4 ("Although the extent of interference and its impact on maritime communications has been underplayed in the mitigation measures proposed in ECC Report 299 for ships trading around Europe, these envisage the unilateral replacement of satellite communication terminals operating within the bands 1 518-1 559 MHz that are actually fully compliant with current international requirements. As well as raising questions of whether this constitutes a non-tariff barrier to trade, in WTO terms, the financial and practical impact of such an imposition has been all but ignored.").

[40] IMSO Letter on ECC Report 299 at 4.

provisional view that "it is possible to upgrade the DLNA module on these terminals without modification to the fuselage"[41] does not appear to be substantiated; a sample size of 1 is insufficient to extrapolate the characteristics of other future system permutations.

Given these complexities, in both the aeronautical and maritime sectors, installation schedules often stretch over the course of several years, with terminals being ordered years in advance to meet future expected needs.

Viasat notes that the ITU has only just finished its studies regarding continued protection of 1.5 GHz earth station terminals from adjacent band interference. In the case of a global MSS system, it is simply infeasible to plan for terminal updates before the ITU has set standards for the operations in the band.[42] Both ICAO and IMO have stressed the need for longer implementation timescales than under the current Ofcom proposal.[43]

C. Adopt an OOBE EIRP limit of -41 dBm/MHz for IMT Base Stations.

Adopting appropriate OOBE EIRP for IMT base stations would protect adjacent-band MSS services, including land mobile. A limit of -41 dBm/MHz accords with "Option 3" in ITU Recommendation M.2159-0.

D. Ensure Adequate Down-Tilt of IMT Antennas.

IMT base station antennas could be deployed with minimum down-tilt angles in the range of 6 to 10 degrees for example. Report ITU-R M.2529-0 considered this range of values when modeling and assessing IMT interference to MSS terminals. Down tilt of base station antennae

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[41] Public Consultation at 140.

[42] *See* IMSO Letter on ECC Report 299 at 4 ("At the present time [in 2019], no type-approved replacement equipment is available because there is no design specification or test standard based on international maritime regulations under development.").

[43] *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 (emphasizing 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."); 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 ("Regarding the timeline for replacing MSS terminals on vessels with GMDSS equipment, IMO considers that the example timescale of 7 years is too short to be achievable, given the process required.").

is especially important for to ensure that IMT operations are compatible with MSS-equipped UAVs and aircraft operating at low altitudes.

E. Mitigation Tool Box Examples

The mitigation tools described above can be used holistically to ensure the continued successful operations of MSS services in the adjacent 1.5 GHz band. Three such examples follow.

Option 1: IMT allowed for indoor use only (1492-1512 MHz), with 6 MHz guard band (1512-1518 MHz). In this scenario, IMT operates in 20 MHz of spectrum. Indoor use would be expected to attenuate IMT base station emissions by at least 15 dB in most cases, and as much as 30 dB or more in many cases. The 6 MHz guard band would provide extra margin for edge cases, for example, transmissions from an installation on the outer wall of an airport terminal adjacent to the gate at which an aircraft with a 1.5 GHz band MSS terminal is parked. Alternatively, the entire 1492-1517 MHz band could be limited to indoor use (i.e., no guard band other than 1 MHz), and Phase 1 PFD limits could be applied to airports/ports to deal with the above "edge" cases.

Option 2: IMT base station transmissions allowed in the 1492-1502 MHz band, with 16 MHz guard band (1502-1518 MHz). This approach is similar to the deployment scenario being used in Japan, in which there is effectively 14.1 MHz of guard band between the IMT deployment below 1509.1 MHz and MSS deployment above 1525 MHz. As Viasat has demonstrated in the earlier stages of this proceeding, some MSS terminals remain susceptible to blocking even with 15 MHz of frequency separation, so Phase 1 PFD limits would still be required.

Option 3: IMT base station transmissions (small cell only) allowed in the 1492-1507 MHz band, with 11 MHz guard band (1507-1518 MHz). Under this approach, IMT base stations would be limited to "small cells" in which the base station EIRP is limited to the "small cell" limits proposed by Ofcom, i.e., maximum EIRP of 58 dBm/5MHz instead of the 68 dBm/5MHz allowed for large cells. Phase 1 PFD limits would be needed at ports/airports, since again, small guard bands are not sufficient to protect against blocking for many existing 1.5 GHz band MSS terminals.

F. Changes in Spectrum Demand

Now more than ever before, UK citizens and consumers stand to benefit from a calibration of the rules governing new terrestrial mobile operations that ensures adjacent-band satellite services continue to thrive. Safety, security, ubiquitous communication, and innovation in the UK depend on MSS services even more so than it did in years past, a trend that will only continue given what next-generation MSS services have to offer. At the same time, growth rates for terrestrial mobile services "are on an S-curve" and may even "reach zero before the end of the decade,"[44] as former Ofcom official Professor William Webb has explained. Other industry experts have agreed that Professor Webb's "forecasts have been unerringly accurate so far,"[45] and have similarly observed that "a downward trend in data growth has been evident for at least the past decade."[46] The technological progress made over the five cellular network generations has led to a world where today's users already have the bandwidth and speed they need, and new generations of wireless service will not meaningfully change the user experience.[47]

Thus, while "[t]elecommunications has historically been a high-growth industry," "current trends suggest that it is heading toward something more static—more like a public utility, where in this case the public good is delivering data connectivity reliably."[48] Further, "[e]xtrapolating these trends, equipment suppliers will not need to invest as much on bandwidth expansion but instead will focus on improving the margins on existing lines of products."[49] And providers will be able to expand mobile data capacity "using existing spectrum and sites," leaving "little or no need for extra exclusive-licensed, wide-area spectrum for 5G and 6G."[50] These developments should be considered as Ofcom weighs its approach to mitigations.

V. CONCLUSION

Viasat is committed to serving UK government and commercial customers and continuing to provide unparalleled satellite services in the UK and around the globe. Consistent with this commitment, Viasat urges Ofcom to take actions regarding the Upper 1.4 GHz band that will best serve the interests of the UK by revising its proposal to include protections for all adjacent band MSS services.

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[44] William Webb, *The history of telecoms is at an end*, InterMEDIA, Vol 52 Issue 3 (September 2024), *available at* https://iicintermedia.org/vol-52-issue-3/the-history-of-telecoms-is-at-an-end/.

[45] Ian Morris, *Data traffic growth or decline – there's no upside for telecom*, LightReading (8 November 2024), *available at* https://www.lightreading.com/5g/data-traffic-growth-or-decline-there-s-no-upside-for-telecom.

[46] William Webb, *It's Time to Rethink 6G*, IEEE Spectrum (10 Feb. 2025), *available at* https://spectrum.ieee.org/6g-bandwidth.

[47] Webb, *The history of telecoms is at an end*.

[48] Webb, *It's Time to Rethink 6G*.

[49] *Id.*

[50] Dean Bubley, *5G/6G network efficiency may grow faster than data demand. Overcapacity is a serious risk*, LinkedIn (24 Mar. 2025), *available at* https://www.linkedin.com/pulse/5g-6g-network-efficiency-may-grow-faster-than-data-demand-dean-bubley-7bzfe/.

Respectfully submitted,

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Your response

Question	Your response
Question 1: Do you agree with our proposal that 'Phase 1' protections would be required to avoid the potential for significant disruption at ports and airports?	Confidential? – No. Yes, multiple studies over many years, as reported in ECC Report 263 and Report ITU-R M.2529, have determined that very low PFD limits are required to avoid harmful interference at ports and airports. Furthermore, ECC Report 299 and Recommendation ITU-R M.2159 incorporated the conclusions from these studies to develop necessary PFD limits similar to the proposed Phase 1 limits to achieve the desired protection. However, Viasat supports the claim from Recommendation ITU-R M.2159 that specifies more stringent PFD limits in order to protect aviation and maritime MES terminals that employ highly directional antennas that may have their main beam pointed in the direction of an interfering base station. These PFD limits are provided in Table 5 of the Recommendation (with special attention to the table footnote addressing this issue). In support of these studies, Viasat has provided evidence that a significant number of its MES require Phase 1 protection limits.
Question 2: Do you agree with the list of airports we propose to protect, in Annex A8?	Confidential? – Narrative Response: No; Referenced Annex: Yes No, Viasat believes the list is incomplete. In Viasat's response to Ofcom's first information request included lists of the airports that needed protection.[51] As Viasat stated in the *UK Airports* tab of its response, Viasat only included airports where there were active SwiftBroadband terminals within the last year. This list is likely underinclusive because it

[51] *See* UK Airports Tab *in* L-Band Terminal Summary.

Question	Your response
	excludes Classic Aero terminal users.[52] Viasat again includes this list in Annex 1, attached hereto.
Question 3: Do you have any comments on the two options we have proposed for the ports which would require protection, noting the further detail (and requests for specific evidence) in Annex A7?	Confidential? – Narrative Response: No; Referenced Annex: Yes. No, Viasat disagrees with the list of ports Ofcom has included in Annex 7. Viasat's response to Ofcom's first information request included lists of the ports that needed protection.[53] As Viasat stated in the *UK Ports* tab of its response, Viasat only included ports where there were active Inmarsat-C terminals within the last year. This list is likely underinclusive because only includes FleetBroadband and a subset of Inmarsat-C terminals.[54] Viasat again includes this list in Annex 2, attached hereto. Inland waterways should also be protected from IMT interference. Viasat provided maps of the waterways in which it provides services.[55] We invite Ofcom to revise Annex A7 to include all ports and waterways previously identified by Viasat.
Question 4: Do you agree with our preference to reduce these restrictions to 'Phase 2' levels over a shorter timeline than the natural lifecycle of the terminals?	Confidential? – No. Viasat objects to the shorter, 5-year timeline and has provided supporting evidence as to why 5 years is unrealistic for replacing maritime and aviation equipment. The redesign and replacement process is a complex system of interdependencies across companies and a break in the chain by one party can

[52] Unlike SBB, Classic Aero terminals do not provide positioning data.

[53] *See* UK Ports Tab *in* L-Band Terminal Summary.

[54] Unlike SBB, Classic Aero terminals do not provide positioning data.

[55] *Waterways* in Viasat, Response to Ofcom (1 Apr. 2024).

Question	Your response
	delay the whole process and has knock-on effects for the others involved. As terminal design requirements evolve, parts become obsolete requiring further redesign, type approval process timelines vary by manufacturer (who are faced with making business decisions regarding redesigns), manufacturers have their own resource limitations that can push delivery deadlines, and then the airlines and shipping companies need to make the decision to replace terminals and/or external components. Therefore, 5 years is not a realistic time frame given the number of manufacturers, model types and external components, and the time to design, develop, manufacture and install such equipment. As such, Viasat believes Ofcom should retain Phase 1 limits for a duration consistent with IMO, ICAO, and AEEC recommendations regarding realistic MSS terminal phase-out periods. Viasat also believes that Ofcom should explore additional interference mitigation including the use of a guard band and reduced OOBE limits in conjunction with its proposed PFD limits to ensure protection of MSS services.
Question 5: Taking into account the further detail in Annexes A7 and A8, please provide any evidence: • that a shorter period, around five years, for the relevant receivers to be replaced or upgraded is not technically or practically feasible; or • of the impact that a longer period of up to 20 years may have on the ability of MNOs to use the spectrum	Confidential? – No. It is not correct that Viasat has been producing resilient terminals for over 10 years and therefore a 5-year period here is reasonable. Viasat has produced some MSS terminals that have varying levels of resilience over the last 10 years, but that resiliency does not imply resilience to Phase 2 limits, since desired resilience is determined by design, development, and cost trade-offs. Furthermore, "resilience" was not, in many cases, tested and evaluated by manufacturers at relevant power levels and offset frequencies. Some terminals

Question	Your response
and the benefits to consumers and citizens that would be foregone. [Can Ericsson and Qualcomm meet the numbers we propose?]	that started to be type approved up to 10 years ago were, in fact, designed to be ATCt resilient. As previously discussed, ATCt resilience may provide some LTE interference robustness, but will not provide complete protection. Moreover, LTE robustness was not a design requirement 10 years ago, was not made a requirement until 2019, when LTE resilience was introduced as a system design requirement for Type Approval. IMO and ETSI introduced requirements later than Viasat did, so until very recently manufacturers did not have a regulatory framework requiring them to design LTE resilient terminals. Viasat also notes that building in resilience through external filters to the design has consequence: higher power consumption (i.e., need for highly linear LNAs, additional insertion loss SAW filters), high cost (higher performing components cost more), and bigger form factor (cavity filters may not fit inside the existing encasing and may make the terminal not fit for purpose anymore). So, manufacturers often have difficult decisions to implement these design changes and may choose not to adopt them if they can. Viasat also wants to make clear that obtaining a type approval from Viasat for a new a system does not mean that manufacturers must stop selling systems which were type approved before and have orders that are still in the process of being fulfilled–Viasat is not the entity responsible for the placement on the market of a terminal, the manufacturer is. As such, there is no process in place for reversing a type approved terminal once it has been approved. Regarding the life cycle of maritime terminals, it's Viasat's experience that the <u>average</u> life of ships now

Question	Your response
	is 22 years; therefore equipment is not often getting replaced on timelines shorter than that.
Question 6: Do you agree with our proposal not to put in place restrictions on IMT use of this spectrum to protect: (a) land terminals; (b) potential future uses of the 1.5 GHz spectrum; or (c) PMSE users. In this regard, we particularly welcome: • any evidence that Inmarsat's land terminals are used for the operation of critical national infrastructure or safety purposes; • any evidence that it is not technically or practically feasible to replace Inmarsat land terminals, including through alternative solutions or upgrades; and • any evidence on the impact of protecting land terminals on the ability of mobile network operators ("MNOs") to use the spectrum and the benefits to consumers and citizens that may be foregone.	Confidential? – No. Viasat objects to Ofcom's proposal to not protect MSS land terminals, which are a vital part of Viasat's current and future business. Viasat remains concerned about the proposal's assertion that there are no "safety or operational requirements for the use of Inmarsat's MSS land terminals." Viasat provides critical communication services on land in support of national security interests related to supporting infrastructure and the government (including the Ministry of Defense) that need protection from adjacent terrestrial services. In the United Kingdom, BGAN provides services to critical national infrastructure in support of the utilities industry, including UK Power Networks (UKPN) and RWE, and potentially Scotia Gas, and Wessex Water. Viasat has also launched its L-Band D2D service across Europe in support of providing satellite SOS services for Google Pixel devices (3GPP Rel.17 Band 255). Beyond Pixel, Viasat subscribers are using land terminal services for SOS, tracking, and messaging on Release 17 smartphones and consumer devices.
Question 7: Are you able to provide any evidence on the likelihood of audio links suffering	Not applicable.

Question	Your response
interference from IMT use of 1492-1517 MHz?	
Question 8: Do you agree with our proposed approach to coordination?	Confidential? – No. Viasat agrees that defining coordination zones around ports and airports is a necessary step towards ensuring that IMT deployments do not produce emissions that exceed the required PFD limits in these areas. Since Viasat believes that the coordination parameters do not sufficiently represent all interference scenarios, we generally support the more conservative approaches to coordination, including larger coordination areas and the need to review the coordination analyses produced by the licensees.
Question 9: Do you agree with our proposal to define PFD limited zones as complex polygons? Would defining them as a set of points, rather than an entire boundary, make coordination calculations easier for licensees?	Confidential? – No. Viasat supports Ofcom's original proposal to use simple polygons to define PFD limited zones, since more complex polygons may be too optimistic (i.e., under-represent interference) in cases where analyzed interference depends too heavily on analytical propagation model assumptions.
Question 10: Do you agree with our provisional view that not defining coordination zones around ports may be simpler for licensees than complying with multiple different coordination zones, particularly while Phase 1 PFD limits are in place?	Confidential? – No. Viasat objects to the notion that coordination zones aren't necessary because it's "simpler" for licensees to not generate them. Defining coordination zones is a necessary step towards ensuring PFD limits are met to protect MSS service in these areas. As Viasat states in response to Question 13 below, transparency by MNO's in meeting PFD limits is paramount to the implementation of these measures and removing the requirement for coordination zones

Question	Your response
	removes what little transparency there is for ensuring the protection of Viasat's maritime terminals.
Question 11: Do you have any feedback on the coordination procedures (as set out in Annex A10) or the specific parameters proposed?	Confidential? – No. Viasat has concerns with using a statistical model such as ITUR P 452-18 to draw conclusions in terms of interference against safety services. Ofcom sets the "time percentage" for the propagation model to be 20%. However, Safety systems have far more stringent availability requirements than accepting harmful interference for 20% of the time. As a minimum the same percentage of time statistic should be used. Furthermore, Viasat believes use of the clutter datasets in Table A10.4 is in many cases not appropriate at airports and ports and does not take into account the many occasions in which LTE base stations of up to 30 meters in height will have direct line of sight to aviation and maritime terminal installations (on top of aircraft fuselage or on top of shipping structures). In such cases a free space loss model should be used as in reality there will not be obstacles in the propagation path.
Question 12: How difficult would you find it to comply with our proposed coordination requirements? In particular, we are interested in information from potential licensees on how the proposed coordination zones would affect their deployment processes and decisions.	Confidential? – No. IMT operators already have the ability to conduct these coordination procedures. Any potential burden on licensees would be lessened through the implementation of simplified polygon coordination regions.

Question	Your response
Question 13: Do you have any comments on our proposal that licensees should carry out their own coordination, on the basis of coordination parameters set by Ofcom?	Confidential? – No. Viasat believes that transparency is key to ensuring compatibility such that proposed IMT systems do not cause harmful interference to MSS terminals. Operators who conduct coordination analyses should share the results with Viasat and work with Viasat and Ofcom to resolve any shortcomings in the assumptions, methodology and results of the analysis. Note that this would place a burden on Viasat to review the coordination analyses and resolve any disputes.
Question 14: Do you have any comments on our proposed technical licence conditions?	Confidential? – No. Viasat believes that multiple mitigations, including a guard band, deployment restrictions and PFD limits, are required to adequately protect MSS, as indicated in Section IV.
Question 15: Do you have any comments on the non-technical licence conditions that we propose to include in the award licences?	Not Applicable.
Question 16: Do you have any comments on the proposed format for the auction?	Not Applicable.
Question 17: Do you have any comments on the proposed bidding options for the auction? Do you believe we have excluded any bidding options which would be worth identifying?	Not Applicable.

Question	Your response
Question 18: Do you have any comments on our proposed information policy or reserve price?	Not Applicable.
Question 19: Do you have any other comments on the proposals or analysis set out in this consultation document?	Not Applicable.

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