

November 18, 2021

VIA ELECTRONIC FILING

Ms. Marlene H. Dortch, Secretary
Federal Communications Commission
45 L Street NE
Washington, DC 20554

Re: **Ex Parte Letter**, *Expanding Flexible Use of the 3.7-4.2 GHz Band*, GN Docket No. 18-122

Dear Ms. Dortch:

Since October 2017, concerns have been expressed regarding the potential for the public to be put at risk due to radio altimeters being harmfully interfered with by 5G cellular service in the radio frequency band 3.7 – 3.98 GHz (“C band”).¹ The motivation was not to prevent the U.S. from benefiting from 5G, but rather to assure public safety from an interference issue not fully considered by the Commission in its rulemaking reallocating this frequency band.² In the Report and Order, the Commission encouraged discussions between the aviation and cellular industries to resolve these safety concerns.³ As a result, the aviation industry formed a Multi-

¹ Boeing comments on Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz Notice of Inquiry, GN Docket 17-183, Dated Oct 2, 2017. <https://www.fcc.gov/ecfs/filing/100385355845>. AVSI comments on Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz Notice of Inquiry, GN Docket 17-183, Dated Oct 2, 2017. <https://www.fcc.gov/ecfs/filing/1002581412700>. ASRI reply comments Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz Notice of Inquiry, GN Docket 17-183, Dated Oct 3, 2017. <https://www.fcc.gov/ecfs/filing/100358663116>. Boeing reply comments Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz Notice of Inquiry, GN Docket 17-183, Dated Oct 15, 2017. <https://www.fcc.gov/ecfs/filing/111620319247>. See also Behavior of Radio Altimeters Subject to Out-Of-Band Interference,” attachment to Letter of Dr. David Redman, Aerospace Vehicle Systems Institute, to Marlene H. Dortch, Secretary, Federal Communications Commission, Docket No. 18-122 (filed Oct. 22, 2019). See also, Aerospace Vehicle Systems Institute Feb. 19, 2020 *Ex Parte* at 12; Aerospace Vehicle Systems Institute Feb. 4, 2020 *Ex Parte*, “AFE 76s2 Report: Effect of Out-of-Band Interference Signals on Radio Altimeters, Issue 1.0” attachment to letter of Dr. David Redman; Aviation Spectrum Resources, Inc. Feb. 19, 2020 *Ex Parte*.

² See Petition for Partial Reconsideration of the 3.7-4.2 GHz Band Report and Order filed by the Aerospace Industries Association (“AIA”), the Aerospace Vehicle Systems Institute (“AVSI”), Air Line Pilots Association International (“ALPA”), Airbus, Aviation Spectrum Resources, Inc. (“ASRI”), Garmin International, Inc. (“Garmin”), the General Aviation Manufacturers Association (“GAMA”), the Helicopter Association International (“HAI”), Honeywell International Inc. (“Honeywell”), the International Air Transport Association (“IATA”), and the National Air Transportation Association, GN Docket No. 18-122 (May 26, 2020) (“Petition to Ensure Aviation Safety”); see also *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, GN Docket No. 18-122, Report and Order and Order of Proposed Modification, 35 FCC Rcd 2343 (2020) (“Report and Order”), *petitions for reconsideration pending*.

³ Report and Order ¶¶ 333-334, 395.

Stakeholder Group (“MSG”), which was publicly announced and open to all interested stakeholders. The MSG conducted a thorough technical study utilizing the best information available at the time.⁴ The RTCA study focused only on the U.S. transmission characteristics permitted by the Commission, and was not intended to be a single definitive worldwide study.⁵ However, the RTCA study and resulting report filed in this docket proves harmful interference to radio altimeters⁶ can occur, potentially impacting public safety, and requiring regulatory restrictions.⁷ As a result, the aviation industry has been consistently open to working with the cellular industry, the Commission, Congress and other parts of the Federal Government to find a way forward that enables 5G to utilize the 3.7-3.98 GHz band without impacting public safety or mobility.

Despite these repeated attempts to work with the cellular industry, CTIA has instead chosen to select out-of-context fragments of the extensive aviation technical work and use minor points to try to cast doubt on an analysis that clearly shows 5G transmissions in this band are a flight safety threat that will require severe flight limitations. As a result, the Commission, news media, Congress and the public continue to receive partial truths, the most recent being the CTIA filing about 5G deployments in other countries.⁸ CTIA states that “5G has been deployed in the

⁴ See Letter from Terry McVenes, President & CEO, RTCA, to Marlene H. Dortch, Secretary, FCC, Notice of Multi-Stakeholder Group Meeting, GN Docket No. 18-122 (filed Apr. 20, 2020). Participation was open to all interested parties, particularly telecom companies and other entities contemplating bidding for flexible use licenses in the 3700-3980 MHz band, as well as supporting equipment manufacturers. However, CTIA and its members only attended the first few sessions, and then declined to be part of the process without a given reason.

⁵ [5G Interference Assessment Report \(rtca.org\)](https://www.rtca.org/5G-Interference-Assessment-Report)

⁶ Radio altimeters are also commonly referred to as radar altimeters, as they are a radar-based system for navigation, not a communications system.

⁷ See “Assessment of C-Band Mobile Telecommunications Interference on Low Range Radar Altimeter Operations,” RTCA Paper No. 274-20/PMC-2073 (rel. Oct. 7, 2020), attachment to Letter of Terry McVenes, President & CEO, RTCA, Inc., to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Oct. 8, 2020) (“MSG Report”).

⁸ See Letter of Kara Graves, Assistant Vice President, Regulatory Affairs, and Doug Hyslop, Vice President, Technology and Spectrum Planning, CTIA, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed November 3, 2021) (“CTIA Ex Parte”).

C-Band across the globe without any evidence of harmful interference to altimeters,”⁹ and cites the FAA Special Airworthiness Information Bulletin (“SAIB”) issued November 2, 2021 as supporting this statement.¹⁰ However, CTIA does not provide critical text from the SAIB immediately preceding CTIA’s quote, that text being:

Many countries around the world are already deploying wireless networks in the bands from 3300-4200 MHz; some countries have implemented temporary technical, regulatory and operational mitigations, including temporary proximity and power restrictions, on wireless broadband networks operating in bands ranging from 3700-4200 MHz. There have not yet been proven reports of harmful interference due to wireless broadband operations internationally, although this issue is continuing to be studied.¹¹

As is typical in this proceeding, CTIA only provides information narrowly tailored to suit its needs, rather than the full picture. The aviation industry hopes the Commission, news media, Congress and the public will take the information provided by CTIA with this mind.

The deployment of 5G around the world is not as CTIA wants the Commission to believe. While many countries have adopted rules and some have begun deployment, the allocated frequencies for 5G internationally are generally farther away from the radio frequency band used by radio altimeters. In addition, the permitted power levels are often significantly lower than those authorized in the U.S. CTIA also tries to portray that no reports of harmful interference to telecommunications regulators equates to no harmful interference being experienced. As the FAA states above, there has been an absence of “proven reports.” As the Commission knows, the absence of the positive does not prove the negative.

CTIA fails to try to understand how the aviation industry focuses on public safety first and foremost, while ignoring the process by which airlines and other aircraft operators address

⁹ *Id.* at 1 (emphasis added)

¹⁰ See FAA Special Airworthiness Information Bulletin: AIR-21-18, “Risk of Potential Adverse Effects on Radio Altimeters” (issued Nov. 2, 2021) available at [https://rgl.faa.gov/Regulatory_and_Guidance_Library/rgSAIB.nsf/dc7bd4f27e5f107486257221005f069d/27ffcbb45e6157e9862587810044ad19/\\$FILE/AIR-21-18.pdf](https://rgl.faa.gov/Regulatory_and_Guidance_Library/rgSAIB.nsf/dc7bd4f27e5f107486257221005f069d/27ffcbb45e6157e9862587810044ad19/$FILE/AIR-21-18.pdf).

¹¹ *Id.* at 1 (emphasis added).

problems with their avionics. As a threshold matter, if an aircraft operator experiences an issue with a radio altimeter, it does not first file a report with the Commission. Instead, it will report the incident internally and attempt to determine if the cause of the problem is with the radio altimeter system, which consists of one or more radio altimeters, transmit and receive antennae, cabling, connectors, and other components. At a high level, a great deal of technical analysis must be performed to determine if a radio altimeter experiences harmful interference. First, it must be determined that the radio altimeter system is not operating properly. Since many aircraft utilize at least two radio altimeters, there are variations in errors that could be experienced. For example, the radio altimeters could provide different information with either or both providing incorrect data, or one or more radio altimeter could provide no information. Determining the cause of any of these possibilities is a thorough and time-consuming process.

In short, each radio altimeter and the entire system could undergo an examination as a result of just one reported radio altimeter error. As part of that examination, one or more of the radio altimeters might need to be removed and tested. Additionally, the wiring involved in sending altimeter information through the aircraft might need to be checked. Each of these tasks are time consuming and not carried out lightly. The process to determine whether the fault is with the aircraft could take many months. Only then, if it is determined that everything was working properly would an operator know to start looking at external interference sources.

CTIA's submission fails to tell the Commission that airlines or other aircraft operators are not going to immediately, if at all, file with a country's telecommunications regulator for every instance of a reported radio altimeter problem. Occurrences of altimeter problems would be submitted to a country's Civil Aviation Authority, such as the FAA, rather than to the Commission. Therefore, the Commission should reject CTIA's dubious assertion that, because

no instances of radio altimeter interference have been reported, it can be inferred no interference has occurred.

CTIA's Assertion 5G is Deployed Worldwide Should Not Be Considered a Reason 5G Will Not Impact Public Safety.

CTIA provides numerous examples of countries that have deployed 5G without causing harm to public and aviation safety. The deployments and associated power levels permitted are not consistent or the same as those in the U.S. In addition, deployments away from areas used by aviation would not be a public safety problem. Below is some additional information the Commission should take into consideration:

- a. **Japan:** While Japan has deployed 5G up to 4100 MHz, the power levels permitted for 5G are: up to 48 dBm/MHz. The macro cell power levels are 96% below or only 4% of that permitted in the U.S., while the small cell power levels are less than 1% that permitted in the U.S. If CTIA is willing to operate 5G with these limits in the U.S., then the public's safety will be better protected.
- b. **Europe:** The 3400-3800 MHz band is utilized for 5G. However, there is a separation of an additional 100 MHz than that provided in the U.S. This is not trivial. Unlike the U.S., the power levels permitted in most of Europe are 23% less than those permitted in the U.S.
- c. **France and the Prague Airport:** Both France and the Prague Airport have imposed 5G exclusion zones to protect public safety. These exclusion zones are consistent with the recommendations made by the aviation industry previously to the Commission¹².
- d. **France:** The testing by France's telecommunications regulator ANFR, of a military helicopter cannot be used as a basis for claiming the aviation industry's analysis should be ignored. The military radio altimeter used in the test was a higher performance variant than used in other helicopters. The report explicitly states that "the results of these trials cannot be used to address the cases of other type of radio altimeters much more sensitive to interferences and which have been considered under the CAT 3 of the RTCA report".¹³ As a result, the Commission should not equate a lack of operational impacts to a French military helicopter using a specific flight profile as indicative of a commercial helicopter, such as an air ambulance service.

¹² See Letter of AIA, ALPA, AVSI, the Aircraft Owners and Pilots Association ("AOPA"), Airlines for America ("A4A"), ASRI, Garmin, GAMA, HAI, Honeywell, IATA, the National Air Carrier Association ("NACA"), and the Regional Airline Association ("RAA") to Marlene H. Dortch, Secretary, FCC, Proposed Mitigations for Flexible Use Licenses to Protect Existing Aeronautical Radar Altimeters, GN Docket No. 18-122 (filed Dec. 7, 2020).

¹³ See Outcome from preliminary trial on one type of radio altimeter fitted on helicopter, ECC PT1(21)(192), dated Sept. 6, 2021. Available at https://www.cept.org/Documents/ecc-pt1/65970/ecc-pt1-21-192_france-radioaltimeter.

- e. **Australia:** Australia operates even farther away from the radio frequency band used by radio altimeters. The power levels permitted in Australia are 76% lower than those allowed in the U.S.
- f. **South Korea:** South Korea is similar to other deployments outside the U.S. where 5G is limited to 3420-3700 MHz and the maximum permitted 5G power is 95% less than the US levels.
- g. **Norway:** While the Norwegian Communications Authority conducted a test with an active 5G base station, the test is inconclusive at best since given the test setup and procedure, no interference to the altimeter should have been expected. In addition, the transmitter power was 270 times lower, or about 0.4% of that allowed in the US.
- h. **United Kingdom:** Power levels are significantly lower in both the frequency ranges 3.4 - 3.8 GHz, and 3.805 - 4.195 GHz by 62% and 99% respectively. The UK Civil Aviation Authority has stated that “5G mobile base stations operating below 3.8 GHz, especially if they use active antenna systems ... pose a viable interference threat [to radio altimeters]”. The UK CAA also stated lower power levels in 3.8-4.195 GHz range “may be an issue for helicopters, especially those used by the emergency services that could land closer to a mobile mask than would occur for fixed wing aircraft”.¹⁴ The UK CAA also commented that given the potential for interference, that additional study should be “investigated in light of the results of this study”.
- i. **Canada:**¹⁵ Introduced on an interim basis mitigations on 5G deployment consistent with the exclusion zones issued by France and the Prague Airport. The main protection measures include: exclusion and protection zones to mitigate interference to aircraft around certain airport runways where automated landing is authorized; and a national antenna down-tilt requirement to protect aircraft used in low altitude military operations, search and rescue operations and medical evacuations all over the country
- j. **US Navy AN/SPN-43 radar system:** CTIA has once again brought up this system that does not disrupt normal aviation operations due to the combination of power, duty cycle, waveform and the fact this system is deployed well away from aircraft landing and takeoff areas.

All of the above show a consistent theme in CTIA’s attacks on the aviation industry and the FAA; only a small part of the story is provided, and what is shared is twisted into favorable talking points. When lives are at stake, the technical details matter. The Commission should not

¹⁴ See ICAO FSMP WG/11 – WP27 - UK Deployment of Mobile Systems in the Frequency Range 3.6-4.2 GHz and the Theoretical Impact on Radio Altimeters. Available at https://www.icao.int/safety/FSMP/MeetingDocs/FSMP%20WG11/WP/FSMP-WG11-WP27_Mobile%20vs%20Radalt%20REv.1.docx

¹⁵ *Consultation on Amendments to SRSP-520, Technical Requirements for Fixed and/or Mobile Systems, Including Flexible Use Broadband Systems, in the Band 3450-3650 MHz* <https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11747.html>

consider CTIA's anecdotal examples as reasons to ignore the aviation industry's desire to protect public safety without debilitating impacts on travel and other critical aviation operations.

Aviation's findings of potential interference impacts require a very conservative analysis, focusing on worst case scenarios, because it could only take one instance of harmful interference to cause an accident. The fact no aircraft have crashed to date due to 5G interference in another country is not a reason to ignore the potential of it happening when 5G is deployed in the 3700-3980 MHz band in the U.S. Power levels and deployment scenarios are different than in the U.S, and even with these differences 5G deployment restrictions are in place in some countries, such as Canada and France and being considered in others.¹⁶

The FAA and aviation industry concerns should not be discounted by CTIA or the Commission. The incremental economic gain from deploying 5G in this single frequency band pales in comparison to the negative economic impact if all aviation were to stop flying or stop relying on the information provided by radio altimeters. If aircraft can only operate without utilizing their radio altimeters, then the impact to our nation's economy will dwarf the benefits claimed by CTIA. Air cargo and commercial air travel will likely cease at night and in any weather where the pilot cannot see the runway. These restrictions would apply nationwide because there is no information regarding where 5G would be deployed.

Given the nation's need to maintain a robust and safe aviation industry, the Commission should discount the inferences and claims made by CTIA against the FAA's and aviation industry's desire to keep the public safe and travel opportunities unfettered. Furthermore, the

¹⁶ "Map of Exclusion Zones and Protection Zones (SRSP-520)" <https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11725.html>

Commission should be pushing CTIA and its members to provide its own data, as repeatedly called for by aviation during the several years of this proceeding.¹⁷

Pursuant to Section 1.1206(b) of the Commission's rules, a copy of this letter is being electronically submitted into the record of this proceeding. Please do not hesitate to contact the undersigned with any questions.

Sincerely,

Aerospace Industry Association
Airborne Public Safety Association
Aircraft Electronics Association
Airlines for America
Cargo Airline Association
Experimental Aircraft Association
Garmin International, Inc.
Helicopter Association International
National Air Carrier Association
Regional Air Cargo Carriers Association
The Boeing Company

Air Line Pilots Association, Intl
Airbus
Aircraft Owners and Pilots Association
Allied Pilots Association
Collins Aerospace
FreeFlight Systems
General Aviation Manufacturers Association
International Air Transport Association
National Business Aviation Association
Regional Airline Association

¹⁷ See "Garmin Comments" seeking information on 5G services, GN Docket No. 18-122, dated Oct 29, 2018. See also Letter to Marlene H. Dortch from Andrew Roy, Director of Engineering, ASRI, et al, "Outstanding 5G Operating Models and Parameters Needed to Assess Aviation Safety" GN Docket No. 18-122, dated Nov 2, 2021.