Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

In the Matter of	)	
	)	GN Docket No. 25-59
Upper C-band (3.98 to 4.2 GHz)	)	
	)	

REPLY COMMENTS OF AEROSPACE INDUSTRIES ASSOCIATION, AIR LINE PILOTS ASSOCIATION INTERNATIONAL, AIRBUS HELICOPTERS, AIRBUS OPERATIONS SAS, AIRCRAFT OWNERS AND PILOTS ASSOCIATION, AIRLINES FOR AMERICA, ALLIED PILOTS ASSOCIATION, AVIATION SPECTRUM RESOURCES, INC., THE BOEING COMPANY, CARGO AIRLINE ASSOCIATION, FREEFLIGHT SYSTEMS, GARMIN INTERNATIONAL, INC., GENERAL AVIATION MANUFACTURERS ASSOCIATION, GPS INNOVATION ALLIANCE, HONEYWELL INTERNATIONAL INC., INTERNATIONAL AIR TRANSPORT ASSOCIATION, LOCKHEED MARTIN CORPORATION, NATIONAL AIR TRANSPORTATION ASSOCIATION, NATIONAL BUSINESS AVIATION ASSOCIATION, REGIONAL AIRLINE ASSOCIATION, RTX (COLLINS AEROSPACE, PRATT & WHITNEY, RAYTHEON), THALES GROUP, AND VERTICAL AVIATION INTERNATIONAL

February 18, 2026

EXECUTIVE SUMMARY

The Joint Aviation Community reiterates the need to ensure a coordinated rulemaking process between the Federal Communications Commission ("FCC" or "the Commission") and Federal Aviation Administration ("FAA") to avoid the divergence of rules that would negatively affect both the aviation and commercial wireless industries. This follows the nearly unanimous levels of support from numerous commenters across multiple industries for the Commission to engage and coordinate its rules with the FAA process and requirements. Failure to engage in such deliberate and careful consideration between the federal agencies poses a significant risk to aviation safety, let alone the Commission's own goals for commercial wireless spectrum in the Upper C-band.

New interference-tolerant radio altimeters designs will offer significantly improved resilience to both adjacent and in-band interference sources. Compatibility with these new interference-tolerant radio altimeter designs would require rather minimal mitigations on potential new licensees, even under worst case aviation safety conditions. The Commission should support this by implementing out of band emission limits inside the 4.2-4.4 GHz band, fundamental power limitations, and emitter height limits for commercial wireless licensees, which have been supported by many commenters as both common sense and practical methods to protect aviation safety.

To minimize disruption, the Joint Aviation Community emphasizes the importance of practicable timelines for any radio altimeter retrofit/replacement with a "one-and-done" approach. Based on the current analysis by aviation stakeholders, the retrofit/replacement of commercial transport aircraft radio altimeters to enable new commercial wireless services will be completed by mid-2032, with the remainder of the civil aviation fleet completed by 2034.

Accounting for all aircraft modifications under the FAA rulemaking, this would include all existing radio altimeter systems (nearly 58,600 individual units) across nearly 40,900 aircraft operating in the contiguous United States, at an estimated cost between $4.49 billion and slightly more than $7 billon.

The aviation industry is committed to enabling the Commission's goal of improved spectrum efficiency to expand commercial wireless services into the Upper C-band. With a coordinated federal process that takes practical measures to ensure compatibility with new interference-tolerant radio altimeters, a managed transition will facilitate the Commission's goals for new commercial wireless spectrum.

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The Aerospace Industries Association, Air Line Pilots Association International, Airbus Helicopters, Airbus Operations SAS, Aircraft Owners and Pilots Association, Airlines for America, Allied Pilots Association, Aviation Spectrum Resources, Inc., The Boeing Company, Cargo Airline Association, Freeflight Systems, Garmin International, Inc., General Aviation Manufacturers Association, GPS Innovation Alliance, Honeywell International Inc., International Air Transport Association, Lockheed Martin Corporation, National Air Transportation Association, National Business Aviation Association, Regional Airline Association, RTX (Collins Aerospace, Pratt & Whitney, Raytheon), Thales Group, and Vertical Aviation International (the "Joint Aviation Community")[1] hereby respectfully submit these reply comments on the Federal

[1] A description of all signatories is included in Exhibit 1 at the end of this submission. Note that the signatories are not identical to the Joint Aviation Community signatories of the initial comments filed on Jan 20, 2026.

Communications Commission's ("FCC" or "the Commission") Notice of Proposed Rulemaking ("Upper C-band NPRM") in the above-captioned proceeding.[2]

I. INTRODUCTION

The Joint Aviation Community continues to diligently work on enabling the Commission's goal of improved spectrum efficiency to expand commercial wireless services into the Upper C-band. Supported by a coordinated process between the Commission and other federal agencies, combined with the introduction of new interference-tolerant radio altimeter[3] designs, the Joint Aviation Community advocates for a managed transition to new spectrum for commercial wireless services. Implementing these different aspects will enable the Commission's goals for new commercial wireless spectrum beyond the minimum 100 MHz mandated within the One Big Beautiful Bill Act ("OBBB Act," "Pub. L. 119-21")[4] while maintaining a safe and efficient National Airspace System ("NAS").[5]

II. FEDERAL COMMUNICATIONS COMMISSION AND FEDERAL AVIATION ADMINISTRATION COORDINATION IS ESSENTIAL

A. Differing Regulatory Outcomes for the Aviation Industry and the Wireless Industry Are Not in the Public Interest

The record in this proceeding clearly demonstrates that the Commission and the Federal Aviation Administration ("FAA") should engage in coordinated rulemaking processes. Support for a coordinated FCC/FAA rulemaking process is voiced by many industries and organizations, including the aviation commenters. For example, CTIA, on behalf of the commercial wireless industry, states

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[2] *Upper C-band (3.98 to 4.2 GHz)*, Notice of Proposed Rulemaking, GN Docket No. 25-59, FCC 25-78 (rel. Nov 21, 2025).

[3] The radio altimeter is often known as the radar altimeter given it detects the ground directly beneath the aircraft either with frequency modulated continuous-wave or pulsed radar emissions.

[4] Public Law 119–21, § 40002(b)(2) (Jul. 4, 2025). As enacted, the law does not specify a "short title" but was commonly known as the One Big Beautiful Bill Act while being debated.

[5] Additional information can be found at FAA, Department of Transportation ("DOT"), "National Airspace System" website: https://www.faa.gov/air_traffic/nas (last visited Feb. 17, 2026).

that "the [United States ("U.S.")] government should speak with a unified voice when it comes to Upper C-band deployment. The Lower C-band transition provided lessons learned for the current proceeding—namely, the importance of ensuring that there is a whole-of-government effort to expand wireless access to promote 5G and beyond."[6] This view is similarly reflected in the individual filings of CTIA members and other stakeholders in the commercial wireless industry, noting that the success of the Commission's efforts are based on the FCC's collaboration with its federal partners.[7]

The National Telecommunications and Information Administration ("NTIA") also endorses the necessary coordination between the Commission and the FAA: "[t]o enable the rapid implementation timeframe established under [the OBBB Act], the Commission should continue to invite transparent and close coordination between the FAA, airlines, and equipment manufacturers."[8] These comments from the agency responsible for federal spectrum are aligned with many different industries' views, amplifying the need for a comprehensive approach to any new Commission rules and requirements.[9]

From the number and strength of views in the public record, the Commission should have no doubt that collaboration with the FAA is essential, requiring the regular exchange of information between both federal agencies to ensure compatible rules that do not leave multiple industries torn

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[6] Comments of CTIA on the Upper C-band NPRM, GN Docket No. 25-59 (filed Jan. 20, 2026) ("CTIA Comments") at 18. All comments cited in these Reply Comments relate to the Upper C-band NPRM, GN Docket No. 25-59, unless otherwise specified.

[7] Comments of AT&T Services, Inc. (filed Jan. 20, 2026) ("AT&T Comments") at 10 ("The Commission should continue its efforts to engage with the FAA to ensure that the agencies' proceedings are closely coordinated, timely completed, and result in compatible mandates"); Comments of Verizon (filed Jan. 20, 2026) ("Verizon Comments") at 3 ("Continued coordination and collaboration with the FAA and aviation stakeholders is critical" (emphasis removed)); Comments of Ericsson (filed Jan. 20, 2026) ("Ericsson Comments") at 2 ("[T]he Commission should coordinate with the FAA, the aviation industry, and other interested stakeholders"). *See also* Comments of Qualcomm (filed Jan. 20, 2026) ("Qualcomm Comments") at 4.

[8] Comments of the NTIA (filed Jan. 21, 2026) ("NTIA Comments") at 5.

[9] *See, e.g.,* Comments of Air Line Pilots Association, International (filed Jan. 20, 2026) ("ALPA Comments") at 7-8 at bullet "Synchronization of Rulemaking"; Comments of Aviation Spectrum Resources, Inc. (filed Jan. 20, 2026) ("ASRI Comments") at 11; Comments of The Boeing Company (filed Jan. 20, 2026) ("Boeing Comments") at 5-6; Comments of Garmin International, Inc. (filed Jan. 20, 2026) ("Garmin Comments") at 10.

between conflicting requirements. Such a divergence in federal regulations would lead to the very result the Commission has publicly stated it wants to avoid—an uncertain radio frequency environment that will suppress interest in the expected auction and require additional industry and regulatory effort to make the Upper C-band an economically productive spectrum resource.[10] CTIA supports this point, noting that "[t]he variety of steps that need to be taken highlight the need for concurrent and coordinated actions by the FCC, FAA, and the aviation industry to ensure the wireless industry has a certain timeline for access to Upper C-band spectrum."[11] Ericsson reinforces this view, stating that "[t]he success of the Upper C-band transition will also depend upon the joint effort of the FCC, the [FAA], and other stakeholders to ensure the timely establishment of new radio altimeter standards and retrofit of radio altimeters in the neighboring 4.2-4.4 GHz band."[12] NTIA also shares views similar to the industry stakeholders, stating that "[t]he Commission, by coordinating directly with federal stakeholders, can guide a smooth transition that protects aviation safety and other essential operations while strengthening U.S. leadership in next-generation connectivity."[13]

The overwhelming view from both industry and federal agencies is clear; the path to the Commission's success is through its engagement and coordination with federal and industry stakeholders, and their own engagement with the Commission's process. Any divergence of rules and/or timelines between agencies will create significant risks for all involved. As cautioned by NTIA, "[i]f the FAA final rule and FCC Report and Order are not aligned … aviation and wireless stakeholders could face significant challenges."[14]

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[10] Public comments of Arpan Sura, Senior Counsel to Chairman Carr, at the Institute on Telecommunications Policy & Regulation as reported by TR Daily, Feb 5, 2026 ("[the FCC] objective here is to maximize the amount of spectrum that we repurpose for 5G and 6G networks subject to three things: on time, on budget, no surprises…").

[11] CTIA Comments at 21.

[12] Ericsson Comments at 2.

[13] NTIA Comments at 10.

[14] *Id.* at 7.

B. FAA is the Expert Federal Agency Responsible for Aviation Safety

Recent wireless filings in the subject docket updated the Commission and its staff "on the ongoing discussions between the wireless and aviation industries regarding the coexistence analysis that is under consideration as part of the FAA's proposed rulemaking."[15] The wireless filings subsequently postulate that "[u]se of [the FAA proposed rulemaking] parameters could threaten to restrict Upper C-band access without any real world safety benefit."[16] Similarly, other non-aviation stakeholders also submitted comments to the docket questioning the FAA's and aviation industry's due diligence in assessing radio altimeter performance, opining on the application or interpretation of FAA regulations, and/or questioning aviation impacts for which the commenter lacks any factual or technical basis to address these matters.[17]

As a threshold matter, the FAA is the expert federal agency responsible for aviation safety, and, as the NTIA advises, the "Commission should complete [its] spectrum compatibility assessment based on the FAA-required [radio altimeter] performance."[18] The coexistence modeling parameters and analysis supporting the radio altimeter system performance requirements proposed by the FAA are well described within the FAA Notice of Proposed Rulemaking ("FAA NPRM")[19] and are generally aligned with industry standards development efforts underway by RTCA and EUROCAE.[20] As the safest mode of transportation, aviation is

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15 Letter of Scott K. Bergmann, Senior Vice President, Regulatory Affairs, CTIA to Marlene H. Dortch, Secretary, FCC, GN Docket 25-59 (filed Feb. 4, 2026) at 2, and Letter of Scott K. Bergmann, Senior Vice President, Regulatory Affairs, CTIA to Marlene H. Dortch, Secretary, FCC, GN Docket 25-59 (filed Feb. 12, 2026) at 2, (collectively, "Feb. 4/Feb. 12 CTIA Ex Partes").

16 *Id.*

17 The Joint Aviation Community suggests that the Commission disregard the commenters that infer that the FCC should proceed without FAA involvement or that the FAA is an unreliable partner. See, e.g., Comments of The Digital Progress Institute ("DPI") (filed Jan. 20, 2026) ("DPI Comments") at 11 ("the FCC [alone] has the relevant expertise … to repurpose the whole 180 megahertz"); Comments of The Information Technology and Innovation Foundation (filed Jan 20, 2026) at 2 ("[t]he FCC should insist, therefore, that the FAA is working in good faith"). Similarly, the Commission should disregard discussion of aviation industry intentions from commenters who lack extensive knowledge of the lower power spectral environment for which existing radio altimeter standards were developed, the fundamentals of radar design/operations and intended function of radio altimeters, and the overall efforts of the aviation industry to characterize radio altimeter performance and develop next generation standards since the initiation of the Lower C-band proceeding. *See* DPI Comments at 7-9 (describing DPI's view of various aviation filings in *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, GN Docket No. 18-122 and concluding that "the aviation industry employed an unfortunately all-too familiar campaign intended to stoke public fear").

18 NTIA Comments at 6.

19 *See* FAA, DOT, Requirements for Interference-Tolerant Radio Altimeter Systems, 91 Fed. Reg. 459 (Jan. 7, 2026) ("FAA NPRM").

20 *See* Comments of RTCA, Inc. (filed Apr. 29, 2025) on the *Upper C-band (3.98 to 4.2 GHz)*, Notice of Inquiry, GN Docket No. 25-59, 40 FCC Rcd 1807 (2025). *See also* RTCA's *SC-239, Low Range Radar Altimeter* at

built upon a safety culture which accepts almost no risk and must quantify the risks it does accept. As noted in multiple aviation industry comments, the radio altimeter is the only sensor that measures an aircraft's direct height above terrain and feeds data to numerous other safety-essential aircraft systems.[21] Many critical aircraft systems are certified on the likelihood of a catastrophic failure condition occurring no more than once in a billion flight hours, or ten to the minus nine. As such, what may seem overly conservative to non-aviation stakeholders is simply a required standard industry practice in aviation to preserve the level of safety the flying public deserves and the FAA is entrusted to maintain.

C. Congressionally Allocated Funds for Air Traffic Control Infrastructure Were Not Directed Towards Collaborative Radio Altimeter Rulemaking

The Commission should ignore the factually inaccurate suggestion that the underlying intent of the OBBB Act funds allocated by Congress to the FAA "for telecommunications infrastructure modernization and radar systems replacement" are to be directed towards collaborative interference-tolerant radio altimeter rulemaking.[22] Rather, these funds were allocated to the FAA for, among other things, improvements to its own ground-based Air Traffic Control NAS infrastructure, not for promulgating airborne interference-tolerant radio altimeter regulations.[23]

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https://www.rtca.org/sc-239/ and EUROCAE's WG-119, *Radar Altimeters* at https://www.eurocae.net/working-group/wg-119/ (last visited Feb. 17, 2026).

[21] *See* Boeing Comments at 2; Comments of Lockheed Martin Corporation (filed Jan. 20, 2026) ("LM Comments") at 4. *See also* Comments of Aerospace Industries Association, et. al. (filed Jan. 20, 2026) ("Joint Aviation Community Comments") at 5 and 22; ALPA Comments at 4; Garmin Comments at 1-2.

[22] AT&T Comments at 9, note 31 stating "Congress contemplated that the FAA would collaborate in this effort, including by allocating funding for the FAA for telecommunications infrastructure modernization and radar systems replacement" (citing OBBB Act § 40003).

[23] Section 40003 of the OBBB Act allocates funds as follows: "(a) In General.—For the purpose of the acquisition, construction, sustainment, and improvement of facilities and equipment necessary to improve or maintain aviation safety, in addition to amounts otherwise made available, there is appropriated to the Administrator of the Federal Aviation Administration for fiscal year 2025, out of any money in the Treasury not otherwise appropriated, to remain available until September 30, 2029—(1) $4,750,000,000 for telecommunications infrastructure modernization and systems upgrades; (2) $3,000,000,000 for radar systems replacement; (3) $500,000,000 for runway safety technologies, runway lighting systems, airport surface surveillance technologies, and to carry out section 347 of the FAA Reauthorization Act of 2024; (4) $300,000,000 for Enterprise Information Display Systems; (5) $80,000,000 to acquire and install not less than 50 Automated Weather Observing Systems, to acquire and install not less than 60 Visual Weather Observing Systems, to acquire and install not less than 64 weather camera sites, and to acquire and install weather stations; (6) $40,000,000 to carry out section 44745 of title 49, United States Code, (except for activities described in paragraph (5)); (7) $1,900,000,000 for necessary actions to construct a new air route traffic control center (in this subsection referred to as "ARTCC"): *Provided*, That not

III. AVIATION IS SIGNIFICANTLY IMPROVING SPECTRUM EFFICIENCY

Radio altimeters that comply with the proposed Interference Tolerance Mask ("ITM") in the FAA NPRM will be significantly improved in their spectral efficiency in both the out of band and in-band domains, as described in the following paragraphs. Even under worst case aviation safety conditions, these improvements would require minimal mitigations on potential new commercial wireless licensees. Moreover, some of these mitigations already have commercial wireless and aviation industry consensus, as discussed in more detail in Sections V through VII.[24]

The plot in Annex A shows the adjacent band and in-band ITM levels promulgated by the FAA in the 2023 Airplane Airworthiness Directive[25] to ensure safe aviation operations with Lower C-band transmissions. For comparison, this plot also shows the out of band and in-band ITM levels proposed by the FAA NPRM illustrating the significant improvement to radio altimeter spectrum compatibility from what exists with the Lower C-band (including voluntary mitigations) to what is proposed by the Upper C-band NPRM.

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more than 2 percent of such amount is used for planning or administrative purposes: *Provided further*, That at least 3 existing ARTCCs are divested and integrated into the newly constructed ARTCC; (8) $100,000,000 to conduct an ARTCC Realignment and Consolidation Effort under which at least 10 existing ARTCCs are closed or consolidated to facilitate recapitalization of ARTCC facilities owned and operated by the Federal Aviation Administration; (9) $1,000,000,000 to support recapitalization and consolidation of terminal radar approach control facilities (in this subsection referred to as "TRACONs"), the analysis and identification of TRACONs for divestment, consolidation, or integration, planning, site selection, facility acquisition, and transition activities and other appropriate activities for carrying out such divestment, consolidation, or integration, and the establishment of brand new TRACONs; (10) $350,000,000 for unstaffed infrastructure sustainment and replacement; (11) $50,000,000 to carry out section 961 of the FAA Reauthorization Act of 2024; (12) $300,000,000 to carry out section 619 of the FAA Reauthorization Act of 2024; (13) $50,000,000 to carry out section 621 of the FAA Reauthorization Act of 2024 and to deploy remote tower technology at untowered airports; and (14) $100,000,000 for air traffic controller advanced training technologies."

[24] *See* Letter of Dorothy B. Reimold, Vice President, Civil Aviation, AIA, Sharon Pinkerton, Senior Vice President, Legislative and Regulatory Policy, A4A, and Umair Javed, Senior Vice President & General Counsel, CTIA—The Wireless Association to Marlene H. Dortch, Secretary, FCC, GN Docket 25-59 (filed Oct. 2, 2025) ("Joint Aviation/Wireless Ex Parte"), attached presentation, "Consensus Parameters: 3980-4160 MHz" slide.

[25] FAA, DOT, Airworthiness Directives; Transport and Commuter Category Airplanes, 88 Fed. Reg. 34065 (May 26, 2023) ("2023 Airplane Airworthiness Directive").

As depicted in the Annex A plot, the significant improvements in spectrum efficiency by radio altimeter retrofit/replacement are summarized as follows:

- Within the Lower C-band (3.7-3.98 GHz), the FAA NPRM requirements are more than 22 dB higher than the 2023 Airplane Airworthiness Directive requirements at 500 ft above ground level ("AGL").[26]
- Within the 3.98-4.1 GHz frequency range, the FAA NPRM requirements are 49.5 dB higher than the performance of currently installed radio altimeters that comply with the 2023 Airplane Airworthiness Directive (also known as "Group 4 radio altimeters").[27]
- Within the 4.1-4.16 GHz frequency range, the FAA NPRM requirements are 73.5 dB higher than the performance of currently installed Group 4 radio altimeters.[28]
- Within the radio altimeter band (4.2-4.4 GHz), the FAA NPRM requirements are 28 dB higher than the 2023 Airplane Airworthiness Directive requirements at 400 ft AGL, and 23 dB higher than the performance of currently installed Group 4 radio altimeters at 500 ft AGL.[29]

IV. SUMMARY OF OPTIONS FOR A NEW 5G SPECTRUM ALLOCATION IN UPPER C-BAND

Regarding the total 5G spectrum allocation that will result from this proceeding, the record reflects a number of different views. Satellite industry commenters proposed clearing varying amounts of Upper C-band spectrum to be repurposed for terrestrial wireless services

[26] The FAA NPRM at 468 proposes an adjacent band power flux density ("PFD") ITM of +9.5 dBW/m^2/MHz up to 500 feet AGL in the 3.7-3.98 GHz frequency range. The 2023 Airplane Airworthiness Directive at 34078 specifies an adjacent band effective isotropic power spectral density ("PSD") limit of -22 dBm/MHz at 500 ft AGL, which when considering the additional required compliance conditions in FAA PS-AIR-600-39-01, translates to a PFD limit of -12.9 dBW/m^2/MHz. *See* FAA, DOT, PS-AIR-600-39-01, Policy Statement: Demonstration of Radio Altimeter Tolerant Aircraft (Jul. 19, 2023) ("FAA PS-AIR-600-39-01").

[27] The FAA NPRM at 468 proposes an adjacent band PFD ITM of +9.5 dBW/m^2/MHz up to 500 feet AGL in the 3.98-4.1 GHz frequency range. Further, the FAA NPRM at 466-467 indicates that the bounding performance of current Group 4 radio altimeters is a tolerance threshold of -40 dBW/m^2/MHz up to 500 ft AGL in this frequency range.

[28] The FAA NPRM at 468 proposes an adjacent band PFD ITM of +6.5 dBW/m^2/MHz up to 500 feet AGL at 4.16 GHz. Further, the FAA NPRM at 466-467 indicates that the bounding performance of current Group 4 radio altimeters is a tolerance threshold of -67 dBW/m^2/MHz up to 500 ft AGL in this frequency range.

[29] The FAA NPRM at 468 proposes an in-band PFD ITM of -82 dBW/m^2/MHz up to 500 feet AGL. The 2023 Airplane Airworthiness Directive at 34079 specifies in-band effective isotropic PSD limits of -116.5 dBm/MHz up to 400 ft AGL, and -126 dBm/MHz at 500 ft AGL, which when considering the additional required compliance conditions in FAA PS-AIR-600-39-01, translates to PFD limits of -100.4 dBW/m^2/MHz and -109.9 dBW/m^2/MHz, respectively. Further, the FAA NPRM at 466-467 indicates that the bounding performance of current Group 4 radio altimeters is a tolerance threshold of -105 dBW/m^2/MHz up to 500 ft AGL.

including 130 MHz,[30] 160 MHz,[31] and 180 MHz.[32] Alternatively, broadcast industry commenters proposed more limited clearing of 100 MHz[33] while one aviation industry commenter proposed "a limit of 120 MHz for high-power wireless use beginning at 3.98 GHz"[34] "to ensure the continued safe operation of aviation systems."[35]

The Joint Aviation Community notes that aviation and wireless stakeholders have previously submitted consensus parameters in this proceeding's record for options to provide full-power commercial wireless services in the Upper C-band, subject to certain constraints.[36] These constraints are discussed in more detail below, but notably, based on the aviation industry review of the FAA NPRM, if the Commission were to repurpose only 160 MHz (3.98-4.14 GHz) then it is expected that no polarization constraint would be required. However, if the Commission chooses to repurpose the maximum considered 180 MHz (3.98-4.16 GHz) then a polarization constraint will be required on the last 20 MHz block (4.14-4.16 GHz).

Regardless of how much spectrum the Commission ultimately chooses to repurpose, the Commission should implement NTIA's aforementioned recommendation to use the FAA-

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30 Comments of Eutelsat Communications S.A. (filed Jan. 20, 2026) ("Eutelsat Comments") at 20-22 (proposing to initially "clear a minimum of 60 MHz … within 12 months of a Commission order reallocating the Upper C-band" followed by "clearing at least an additional 70 MHz within 36 months of a Commission order").

31 Comments of SES Americom, Inc. (filed Jan. 20, 2026) ("SES Comments") at 3-4 (proposing to initially "transition … 100 megahertz within 30 months of the release of the rulemaking order" followed by "clear[ing] up to an additional 60 megahertz … within approximately 60 months from release of the rulemaking order").

32 Comments of Synamedia Ltd. (filed Jan. 20, 2026) ("Synamedia Comments") at 2-4 (proposing a two-phase transition of "at least 100 MHz … initially" followed by "clearing of up to an additional 80 MHz" without specifying a timeline).

33 Comments of ARCTEK Satellite Productions, LLC (filed Jan. 20, 2026) at 1 (urging "the Commission to adhere to the 100 MHz statutory minimum to preserve a functional 'working core' for the broadcast industry"); Comments of the National Association of Broadcasters (filed Jan. 20, 2026) ("NAB Comments") at 2 (stating the "Commission should not auction off more than 100 MHz as that assuredly would cause material disruption to broadcasters"); Comments of the North American Spectrum Alliance (filed Jan. 20, 2026) at 7 (noting that "[e]limination of over 100 megahertz of Upper C-band spectrum could render existing earth stations and related equipment unusable and replacements meaningless").

34 LM Comments at 17.

35 *Id.*

36 *See* Joint Aviation/Wireless Ex Parte, attached presentation, "Consensus Parameters: 3980-4160 MHz" slide.

required radio altimeter performance in its spectrum compatibility assessment.[37] Further, consistent with the record consensus that the FCC and FAA coordinate their final rules, the Joint Aviation Community recommends that the FCC's spectrum compatibility assessment should use the approved safety assessment contained in the final rule resulting from the FAA NPRM to verify radio altimeter and wireless compatibility.[38]

V. THE COMMISSION SHOULD IMPLEMENT WIRELESS AND AVIATION CONSENSUS PARAMETERS FOR FUNDAMENTAL COMMERCIAL WIRELESS EMISSIONS

Multiple wireless industry commenters suggest that the Commission adopt technical rules that are minimally, if any, different from the Lower C-band (3.7-3.98 GHz) Part 27 rules.[39] The Joint Aviation Community notes that aviation and wireless stakeholders have previously submitted consensus parameters in this proceeding's record that are likely to require rule changes for fundamental power and emitter height limits for both Upper and Lower C-band wireless licensees in order to ensure aviation safety.[40] These consensus constraints, which CTIA acknowledges,[41] are expanded upon below, along with proposed user equipment power limit changes.

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37 *See* NTIA Comments at 6.

38 LM Comments at 14-16 (recommending a safety-oriented framework for adjacent bands is needed); ALPA Comments at 10 (noting that "[t]o ensure that aviation safety is not compromised in the future, any national spectrum strategy should exercise due diligence to ensure that the performance of aircraft systems, including safety systems, are not compromised.")

39 *See* CTIA Comments at 32-34; AT&T Comments at 6-8; Comments of T-Mobile USA, Inc. (filed Jan. 20, 2026) ("T-Mobile Comments") at 4-5; Verizon Comments at 23-24; Ericsson Comments at 11-12; Comments of Nokia (filed Jan. 20, 2026) ("Nokia Comments") at 4-5; Comments of Samsung Electronics America, Inc. (filed Jan. 20, 2026) ("Samsung Comments") at 3; Qualcomm Comments at 4-6.

40 *See* Joint Aviation/Wireless Ex Parte, attached presentation, "Consensus Parameters: 3980-4160 MHz" slide.

41 CTIA Comments at 18 ("This [aviation and wireless industry technical] engagement has led to … agreement on safely enabling full-power access for wireless operations up to 4160 MHz … subject to … emitter height limits and certain other operational parameters"). Similarly, the Comments of WISPA – *The Association for Broadband Without Boundaries* (filed Jan. 20, 2026) ("WISPA Comments") at 9 ("WISPA agrees that the technical rules for the Upper C-Band should be generally aligned with those that were adopted for the Lower C-Band. … however, … some exceptions may be necessary to protect radio altimeters in the adjacent 4.2-4.4 GHz band" (footnotes omitted)).

A. Fundamental Power Limit

There is broad consensus regarding the need for power limitations. Specifically, wireless industry commenters unanimously supported fundamental power limits for fixed and base stations of 1640 Watts/MHz Effective Isotropic Radiated Power ("EIRP") (62 dBm/MHz EIRP) in non-rural areas and 3280 Watts/MHz EIRP (65 dBm/MHz EIRP) in rural areas.[42] Aviation commenters also mainly supported these limits, assuming they meet the FAA's safety analysis.[43]

The Joint Aviation/Wireless Ex Parte consensus parameters proposed a fundamental EIRP limit of 65 dBm/MHz.[44] However, these consensus parameters must also include an operational constraint for "[h]alf of fundamental … power in each polarization" in the 3.98-4.16 GHz frequency range.[45] This constraint was established prior to the FAA NPRM having published its proposed ITM and related rationale.[46] Based on aviation industry review of the FAA NPRM and ITM, and *provided the proposed ITM is unchanged in this frequency range in the FAA final rule*, radio altimeters meeting the ITM should be compatible with full fundamental power (65 dBm/MHz EIRP) as follows:

- Up to 4.14 GHz: No polarization constraint should be necessary.
- From 4.14-4.16 GHz: Operations should be limited to dual-polarization (or multi-polarization) emitters.
- Above 4.16 GHz: Incompatible with full fundamental power.

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42 *See* CTIA Comments at 32-34; AT&T Comments at 7; T-Mobile Comments at 5; Verizon Comments at 23-24; Ericsson Comments at 12; Nokia Comments at 5; Samsung Comments at 3; Qualcomm Comments at 4.

43 *See* Joint Aviation Community Comments at 11; Boeing Comments at 11-12; Garmin Comments at 6-7. *See also* FAA NPRM at 473-475 for FAA safety analysis.

44 *See* Joint Aviation/Wireless Ex Parte, attached presentation, "Consensus Parameters: 3980-4160 MHz" slide.

45 *Id.*

46 *See* FAA NPRM at 467-469.

B. Emitter Height Limit

Wireless industry commenters also unanimously supported adopting the Commission's proposals relating to antenna height limits.[47] Multiple commenters from both the wireless industry and aviation industry also noted the possibility of the final rules incorporating the Joint Aviation/Wireless Ex Parte consensus emitter height limit,[48] where the 5G emitter attached to an antenna would be constrained, but the antenna height would not be limited by the Part 27 rules.[49]

The Joint Aviation/Wireless Ex Parte specifies a consensus emitter height limit parameter of 450 feet AGL in the 3.98-4.16 GHz frequency range.[50] The Joint Aviation Community notes that the commercial wireless and aviation industries have reached consensus that an emitter height limit is necessary and thus urge the Commission to work closely with the FAA to harmonize and implement all necessary emitter height limits to ensure air navigation safety.

C. In-Home User Equipment Power Limit

Multiple wireless industry commenters suggest raising the power limit to 4 Watts EIRP for in-home mobile user equipment (not including handsets).[51] The Joint Aviation Community acknowledges the potential benefit of such an increase, but only if 4-Watt EIRP user equipment is required to maintain the existing Out of Band Emissions ("OOBE") limits for 1-Watt EIRP user equipment. The Joint Aviation Community also acknowledges further discussion is needed

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47 Upper C-band NPRM ¶ 62. *See* CTIA Comments at 35; AT&T Comments at 7; T-Mobile Comments at 5; Verizon Comments at 26; Ericsson Comments at 11-12; Nokia Comments at 4; Samsung Comments at 3; Qualcomm Comments at 4. While T-Mobile, Ericsson, Nokia, Samsung, and Qualcomm do not specifically mention antenna height limits, they agree with the Upper C-band NPRM proposal to align the Upper C-band technical rules with those of the Lower C-band.

48 *See* CTIA Comments at 18 (citing Joint Aviation/Wireless Ex Parte); Joint Aviation Community Comments at 11, note 38; Boeing Comments at 15-16; Garmin Comments at 2-3, 8-9.

49 However, Verizon Comments at 26 note that "[l]icensees will still need to comply with the [47 CFR] Part 17 rules governing hazards to air navigation and with field strength limits at market and international boundaries, which may as a practical matter limit some antenna heights."

50 *See* Joint Aviation/Wireless Ex Parte, attached presentation, "Consensus Parameters: 3980-4160 MHz" slide.

51 *See* AT&T Comments at 7-8; CTIA Comments at 33-34; Qualcomm Comments at 5; Verizon Comments at 24.

as to the application of an emitter height limit[52] to in-home mobile user equipment that was presented to the Commission as the commercial wireless and aviation industries consensus parameters.

VI. COEXISTENCE REQUIRES THE COMMISSION TO IMPLEMENT AN OUT OF BAND EMISSION LIMIT AS AN EIRP VALUE IN THE 4.2-4.4 GHZ BAND

As proposed by the Joint Aviation Community, and endorsed by other commenters, specifying the OOBE limit[53] as an EIRP value in the 4.2-4.4 GHz band is the only practical solution that will ensure both an adequate means of protection for radio altimeters, and flexibility for commercial wireless operators to implement their own technical solutions.[54] As the Joint Aviation Community explained, the current understanding of the active antenna system ("AAS") gain in the unwanted domain has not yet been fully agreed, let alone standardized between different wireless providers.[55] While recent information from the wireless industry has helped to further inform the aviation community, there are still numerous parameters that individual operators may change that could affect the AAS directivity and gain in the unwanted domain. ASRI's comments noted 15 different parameters that would need to be understood and assessed before an accurate gain pattern could be calculated across the 4.2-4.4 GHz band, and that would assume that all commercial wireless operators would implement the exact same configuration for each site.[56] Indeed, several commenters recognize that the current understanding of AAS

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52 *See* Joint Aviation/Wireless Ex Parte, attached presentation, "Consensus Parameters: 3980-4160 MHz" slide. The Commission "propose[d] to not restrict antenna heights for Upper C-band operations beyond any requirements necessary to ensure air navigation safety." Upper C-band NPRM, ¶ 62.

53 The term OOBE as used in the Upper C-band NPRM includes all unwanted 5G emissions that may enter the 4.2-4.4 GHz band from both the spurious and the out of band domains as applicable based on the operated commercial wireless emission bandwidths up to the edge of any proposed commercial licenses.

54 *See* Joint Aviation Community Comments at 12-14; ASRI Comments *generally*; Boeing Comments at 13-15; Garmin Comments at 7-8.

55 *See* Joint Aviation Community Comments at 12-14.

56 *See* ASRI Comments at 7.

performance is lacking or that discussions still continue on this topic.[57] Furthermore the Commission itself noted that it was seeking "…comment on whether other emissions management techniques may help to promote effective coexistence with radio altimeter operations."[58]

In light of these considerations, the Commission must implement limits for OOBE in the 4.2-4.4 GHz band as an EIRP value instead of relying solely on conducted emission limits. This will simplify the roll out of Upper C-band services and avoid the need to further investigate and address this topic as wireless technologies evolve. Regulating EIRP instead of solely conducted emissions would likewise eliminate the need for the FAA to potentially conduct ongoing information gathering whenever a new or modified AAS is deployed to accurately assess the impact to its own safety assessment. If such additional work is required by the Commission and the FAA, it risks increasing both the timelines and the unknown risks (i.e., "surprises") that may surface later.

The Joint Aviation Community advises the Commission that discussions are ongoing between the commercial wireless industry and the aviation industry regarding the OOBE limits proposed by the FAA, and how such a limit could be implemented that will ensure protection for

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[57] NTIA Comments at 8 ("Coexistence scenarios have proven to be complicated between [Lower C-band] wireless … transmissions … and the operation of critical aviation safety systems, and are likely to be similarly challenging in the [Upper C-]band due to even closer proximity to the [radio altimeter] spectrum band. Aligning on the proper framework for the [Upper C-]band will be dependent on the data developed in the record. For example, when considering spurious emissions into the [radio altimeter] spectrum band, the spurious limit may need to be informed by the NextGen [radio altimeter] standards finalized by the FAA in their regulation"); NAB Comments at 9 ("The base station conducted OOBE limit of -13 dBm/MHz adopted by the Commission in the [Lower C-band] proceeding has failed to provide adequate protection of both radio altimeters and [occasional use] satellite downlinks. … NAB generally supports the FAA's proposal to rely on radiated emission limits, … but the proposed limit of -33 dBm/MHz requires further analysis of the compatibility with satellite receiving facilities" (footnotes omitted); Ericsson Comments at 12-13 ("While existing practice has relied on voluntary agreements for the [Lower] C-band alone for further protection of that range, we are willing to discuss reasonable agreements to protect radio altimeters in the 4.2-4.4 GHz band."); Verizon Comments at 25 ("There are ongoing discussions between the wireless and aviation industries concerning the merits of a spurious emissions limit at 4.2 GHz, and Verizon will continue to engage with aviation stakeholders on that issue.")

[58] Upper C-band NPRM ¶ 123.

radio altimeters. While these discussions remain ongoing, the aviation industry continues to recommend that the FAA-proposed EIRP limits (-33 dBm/MHz per polarization) be the basis for incorporation into the Commission's rules.[59] Such a limit is lower than that proposed by the Commission because a lower limit is necessary to protect radio altimeters, including interference-tolerant radio altimeters as defined in the FAA NPRM, from harmful interference. Recent comments from CTIA, its representatives, and Ericsson have all noted that spurious limits can be significantly lower than the -13 dBm/MHz conducted that the Commission has proposed,[60] and such representations are consistent with previous filings made in the Lower C-band proceeding by Ericsson, Nokia and Samsung.[61]

By analogy, the Citizens Broadband Radio Service ("CBRS") band has significant limits placed on its OOBE to protect the Lower C-band commercial wireless operators, specifying a -40 dBm/MHz conducted limit for CBRS systems, including many of which are based on 3GPP technology.[62] Therefore, lower OOBE limits are not only feasible, but also align with the

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[59] *See* FAA NPRM at 474.

[60] Feb. 4/Feb. 12 CTIA Ex Partes at 2 ("CTIA highlighted testing data presented in the record of this proceeding that shows *radiated* measured 5G base station power suppressed to well below the tolerance that next-generation radio altimeters are expected to be able to achieve" (emphasis added; footnote omitted)); Comments of Frank Sanders as commissioned by CTIA (filed Jan. 18, 2026) at 3 ("in all cases the *radiated* measured base station OOBE power was suppressed to power levels that were somewhere below -37.5 dBm/MHz" (emphasis added)); Ericsson Comments at 12-13 ("We further acknowledge that the radio altimeter band between 4.2-4.4 GHz will warrant further protection for equipment operating in the Upper C-Band within the frequency range above 3.98 GHz. While existing practice has relied on voluntary agreements for the C-band alone for further protection of that range, we are willing to discuss reasonable agreements to protect radio altimeters in the 4.2-4.4 GHz band. The Commission should aim for certainty on the unwanted emissions expected for equipment operating in the frequency range above 3.98 GHz.")

[61] Letter of Mark Racek, Sr. Director Spectrum Policy, Ericsson to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Sep. 13, 2021) at 1-2 (stating that its "AAS products in the 3.7-3.98 GHz band have actual levels of emissions that are better than the 3GPP and ERC specifications"); Letter of Jeffrey A. Marks, Vice President, Regulatory Affairs, North America, Nokia to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Sep. 21, 2021) at 1 (reporting that its base stations "have Out of Band emissions considerably lower than 3GPP specification levels for Category B (-30 dBm/MHz)"); Letter of Robert Kubik, Ph.D., Sr. Director, Public Policy, Samsung Electronics to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Sep. 20, 2021) at 1 (noting that Samsung provided test data showing that measured emissions "are below the FCC requirements, as well as the 3GPP (TS 38.104) Category B requirements for out-of-band-emissions.")

[62] 47 CFR § 96.41(e)(2) ("the conducted power of any emissions below 3530 MHz or above 3720 MHz shall not exceed -40 dBm/MHz.")

Commission's policy of ensuring that all systems are efficient in their use of the spectrum.[63] As discussed in Section III, the aviation industry is making significant efforts to improve its own spectrum efficiency, but spectrum compatibility cannot be achieved without the commercial wireless industry making similar reasonable and achievable improvements to their own OOBE.

VII. THE FINAL RULES MUST HARMONIZE OUT OF BAND EMISSIONS LIMITS TO ENSURE LONG TERM COMPATIBILITY BETWEEN THE UPPER AND LOWER C-BANDS AND RADIO ALTIMETERS

Any claims that the Lower C-band service rules regarding OOBE within 4.2-4.4 GHz can be replicated for the Upper C-band[64] appear to ignore the needed post auction efforts by the FAA, the FCC, the wireless industry, and the aviation industry that resulted in the implementation of ongoing voluntary limitations to protect radio altimeters from harmful interference.[65] This post auction activity was not an optimal outcome for either the aviation or commercial wireless industries. Going forward, the Commission should base its analysis on the -33 dBm/MHz EIRP per polarization OOBE limits as proposed in the FAA NPRM.[66] As noted by NTIA, "[u]pdating the appropriate wireless service limits for transmissions in the lower C-band (3.7-3.98 GHz) may be necessary for long-term safe wireless and aviation coexistence."[67]

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63 *Principles for Promoting Efficient Use of Spectrum and Opportunities for New Services; Promoting Efficient Use of Spectrum through Improved Receiver Interference Immunity Performance*, ET Docket Nos. 23-122; 22-137, Policy Statement, 8 FCC Rcd 3682 (2023) ¶ 23 ("We reaffirm our long-standing approach that transmitters associated with a service should be designed to minimize unwanted emission outside of the service's authorized frequencies.")

64 *See, e.g.,* AT&T Comments at 7 ("AT&T supports adopting the out-of-band emissions limits … applicable to the Lower C-band for the Upper C-band"); CTIA Comments at 34 ("The Commission should adopt its proposal for base station and mobile OOBE limits that are consistent with the Lower C-band—i.e., a conducted power level of -13 dBm/MHz beyond the edge of the license authorization.")

65 *See* Letter of from Henry G. Hultquist, Vice President-Federal Regulatory, AT&T Services, Inc., et al. to Marlene H. Dortch, Secretary, FCC, GN Docket No. 18-122 (filed Mar. 31, 2023) Appendix at 3 (agreeing to limit OOBE as follows: "From outdoor operations, maximum -48 dBm/MHz conducted spurious emissions.")

66 *See* FAA NPRM at 474.

67 NTIA Comments at 8.

The path for the Commission is clear; the power limits inside the 4.2-4.4 GHz band and any control conditions linked to that limit that are needed to protect radio altimeter systems should be harmonized across both the Lower and Upper C-band based on the record of this proceeding. The Commission has ample opportunity and recourse to implement such a requirement, and such a change would have no impact on existing Lower C-band licensees, given the current -48 dBm/MHz conducted limits already implemented by Lower C-band licensees under the voluntary agreements mean existing Lower C-band equipment would not need to be modified.

VIII. RADIO ALTIMETER RETROFIT/REPLACEMENT TIMELINE TO SUPPORT UPPER C-BAND 5G OPERATION

Both the Upper C-band NPRM and FAA NPRM seek comments on the timeline necessary to implement interference-tolerant radio altimeters on aircraft.[68] The timeline for the retrofit/replacement of radio altimeters to accommodate the Upper C-band auction will necessarily be drastically more challenging than the timeline following the Lower C-band auction. For the Lower C-band fleet retrofit/replacement, only a portion of radio altimeters required modification with a filter to improve interference rejection in the 3.7-3.98 GHz band, while some radio altimeter models did not require additional filtering at all. Other voluntary commitments implemented by wireless carriers also limited conducted spurious emissions in the 4.2-4.4 GHz band to a level that existing radio altimeters could tolerate. As detailed in the FAA NPRM and substantiated by the NTIA and aviation industry comments, no existing radio altimeter systems are compatible with planned commercial wireless use in the 3.98-4.16 GHz band, and therefore all current radio altimeter systems will need to be retrofitted/replaced.[69]

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[68] Upper C-band NPRM ¶ 62; *see* FAA NPRM at 470.

[69] FAA NPRM at 461 ("FAA expects future wireless services in the Upper C-band aligned with service rules in the Lower C-band to cause interference to current [radio altimeter] systems. Existing [radio altimeter] systems

Filter improvements alone will not enable all existing radio altimeter equipment to operate safely in the proposed Upper C-band interference environment. Depending on the specific equipment, some radio altimeters will require complete replacement, while others may require hardware and/or software modifications to meet the interference tolerance requirements set forth in the FAA NPRM. As a result of these needed equipment changes, the scope of the required modifications to all aircraft equipped with a radio altimeter, and the associated operational and resource demands, will increase dramatically across the affected fleet.[70] To ensure continued aviation safety and operational integrity, under no circumstance should wireless licensees be permitted to utilize Upper C-band spectrum until all necessary aircraft have had their radio altimeters retrofitted/replaced. As noted in the FAA NPRM, an extension of the aforementioned voluntary mitigations to the initial performance deadline will also be necessary until this time.[71]

The FAA NPRM proposes an anticipated, initial deadline for commercial (14 Code of Federal Regulations ("CFR") Part 121 and Part 129) aircraft radio altimeters to meet new performance requirements between 2029 and 2032, with a proposed deadline for radio altimeters in all other (14 CFR Part 91 and Part 135) aircraft set for two years later.[72] The FAA

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are not compatible with this envisioned use, and airworthiness directives … issued by FAA in 2023 are insufficient to address the unsafe condition that will result from wireless services in the Upper C-band."); FAA NPRM at 466 ("The data indicate that no existing civil [radio altimeter] equipment can tolerate wireless services aligned with FCC's Lower C-band technical rules in the 100 MHz (or more) of the spectrum to be auctioned above 3.98 GHz."); NTIA Comments at 6-7 ("the current generation of [radio altimeter] is not sufficiently resilient to high-power transmissions in the proposed [Upper C-]band or the emissions into the [radio altimeter] band, even those [radio altimeters] that have been recently retrofitted.") *See also* Joint Aviation Community Comments at 7, Boeing Comments at 7.

[70] FAA NPRM at 477 ("FAA proposes requiring the replacement of all existing [radio altimeter] systems with ones that meet the new interference tolerance performance standards for aircraft operating under part 91 in the airspace of the 48 contiguous United States and the District of Columbia.") Operators of aircraft that choose not to replace the radio altimeter system to meet the new interference tolerance performance would be required to remove the radio altimeter system altogether or retire the aircraft from operations in the contiguous United States. *See* FAA NPRM at 472-473.

[71] FAA NPRM at 475 ("FAA intends to seek an extension of the terms of the voluntary commitment until the initial [radio altimeter] performance deadline.")

[72] *See* FAA NPRM at 472.

acknowledges, however, that it "does not have sufficient data to determine a specific date at this time" for the transition deadline.[73] As such, the Joint Aviation Community, which represents multiple stakeholders for each of the activities necessary to implement the retrofit/replacement of radio altimeters as defined within the FAA NPRM and the companion draft Advisory Circular 20-199,[74] has developed a schedule achievable by all aviation industry stakeholders considering the scope, complexities associated with out-of-production aircraft and radio altimeter models, and resource constraints while balancing the urgency of the Commission to implement new commercial wireless spectrum. Based on current analysis by aviation stakeholders, the retrofit/replacement of radio altimeters in the Part 121 and Part 129 fleets would be completed by mid-2032 with retrofits/replacements in the Part 91 and Part 135 fleets completed by 2034,[75] which is graphically depicted in Annex B and described below.

Developing a new equipment standard, followed by new equipment design, development, and authorization, certification of that equipment on aircraft, and manufacturing the new equipment is a multi-phase process that aligns with typical aviation practices, as described in more detail below. Once certified, the process of retrofitting the fleet and aircraft production line with the new equipment would require additional time for implementation. For comparison, in the absence of a mandate, this end-to-end process could extend until approximately 2045 to fully complete. Even with published equipment standards, equipment already authorized and being

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[73] FAA NPRM at 470.

[74] *See* FAA, Advisory Circular 20-199, Installation of an Airborne Low-Range Radio Altimeter System, open for public comment until Feb. 25, 2026, available at https://www.faa.gov/aircraft/draft_docs/ac_20_199 (last visited Feb. 17, 2026).

[75] Although the FAA NPRM proposes compliance for Part 91/135 operators be deferred by two years, the Joint Aviation Community anticipates that major business aviation and Helicopter Air Ambulance fleets will drive immediate demand for radio altimeter systems compliant with the new final rule interference tolerance requirements by the Part 121 compliance date in order to avoid flight restrictions like those included in the 2023 Airplane Airworthiness Directive. This demand will intensify radio altimeter supply-chain pressure as well as pressure for aircraft installation services.

manufactured, and an accompanying mandate for equipment installation, this end-to-end process more typically would extend to 2035.

The FAA NPRM presents several examples of other equipage timelines, including for the Automatic Dependent Surveillance Broadcast ("ADS-B") Out equipment mandate, which the aviation industry considers as the most relevant to the scope of the proposed interference-tolerant radio altimeter mandate.[76] The ADS-B Out implementation timeline was established through collaboration between FAA and the aviation industry under the Air Traffic Management Advisory Committee with an agreed upon minimum of ten years from issuance of the final rule to mandate completion of rule compliant equipage installation. The ADS-B Out implementation was focused on a fleet-wide equipment mandate for aircraft operating in the U.S. to meet FAA program objectives. By comparison, the interference-tolerant radio altimeter rulemaking has the aviation industry starting at a deficit in multiple facets including no published performance standard to allow equipment design and development to begin before publication of the final rule and a substantially shorter timeline to complete equipment installation.

The timeline presented in Annex B reflects aggregated data from aviation stakeholders integral to each activity phase and reflects data across all radio altimeter manufacturers and a significant population of aircraft manufacturers and operators. It is important to note that the scope of the overall effort includes all existing radio altimeter systems (nearly 58,600 individual units)[77] and effectively every aircraft (nearly 40,900) with a radio altimeter.[78] This broad scope encompasses a significant number of aircraft-radio altimeter combinations with associated design, development, testing, and certification activities, which must be performed concurrently

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76 *See* FAA NPRM Table 5 at 471-472.
77 *See* FAA NPRM Table 8 at 478.
78 *Id.*

across multiple stakeholders including the FAA and foreign aviation regulators.[79] Similarly, supply chain, manufacturing, and installation activities will be completed concurrently by multiple domestic and international stakeholders across the entire affected fleet.

The aviation industry has invested significant time and resources in developing prototypes to help define the best achievable ITM to expand wireless spectrum compatibility including the Upper C-band. However, this effort was not a formal design and development process since the requirements had not yet been standardized and lacked the maturity necessary to meet aviation safety and certification requirements. Thus, the FAA NPRM serves as the starting point for regulatory technical requirements and the scope of work to enable safe compatibility. Consequently, there is currently no radio altimeter system that can claim that it will meet the interference tolerance requirements that remain to be specified in the FAA final rule.

This timeline assumes there are no competing equipage requirements resulting from other aviation regulations that would require retrofit/replacement of radio altimeter systems for aircraft operated exclusively outside the contiguous United States (as discussed further in Section XI) or exclusively in the airspace of other sovereign states.[80] This timeline further assumes that radio altimeter retrofits/replacements for continued military aircraft operations within the contiguous United States do not cause manufacturing and personnel resource conflicts that adversely impact radio altimeter retrofits/replacements within the commercial and general aviation fleets. Lastly,

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[79] Many aircraft that operate within the contiguous United States are designed and certified by foreign aviation regulators such as the European Union Aviation Safety Agency ("EASA"), Brazil's Agência Nacional de Aviação Civil ("ANAC"), or Transport Canada Civil Aviation (TCCA") with validation of those designs by the FAA.

[80] The term "contiguous United States" as used in this filing includes the 48 contiguous United States and the District of Columbia as used in the FAA NPRM. FAA NPRM at 470. The term "outside the contiguous United States" is intended to include operations exclusively in the airspace over the State of Alaska, the State of Hawaii, Puerto Rico, and other U.S. territories and possessions, including territorial waters.

this timeline assumes that the radio altimeter retrofits/replacements will not be required to comply with the entirety of draft Advisory Circular 20-199 to show compliance with the FAA final rule interference tolerance requirements.

A description of the Equipment Design, Development and Authorization, Aircraft Certification, Equipment Manufacturing, and Aircraft Fleet Retrofit and Production Line Fit phases, including their respective activities, considerations, and underlying assumptions, follows.

A. Phase 1 – Equipment Design, Development and Authorization

The Equipment Design, Development and Authorization phase reflects the activities of a radio altimeter manufacturer for the design, product development, and testing of an interference-tolerant radio altimeter based on the requirements proposed within the FAA NPRM, and to obtain design and production approval from the FAA under a Technical Standard Order ("TSO") Authorization.[81] In addition to the requirements provided by an aviation authority under a TSO, a radio altimeter manufacturer must consider compatibility requirements specified by each aircraft manufacturer to support integration with the aircraft systems, which often vary across aircraft manufacturers and aircraft models/platforms. The Equipment Design, Development and Authorization phase also includes a range of formal verification and validation testing, and the documentation necessary to demonstrate compliance to the FAA.[82]

The timelines for each fleet segment are divided into two workstreams depending on the scope of the solution needed to meet the radio altimeter interference tolerance requirements. One workstream is based on an in-service upgrade solution (e.g., hardware and/or software

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[81] Foreign radio altimeter manufacturers may obtain an FAA-recognized design and production approval through their respective aviation regulator.

[82] *See* RTCA, Inc., RR-002, Report on Aeronautical Radio Frequency Systems, their Regulatory Framework, and Operational Considerations (Mar. 13, 2025) ("RTCA RR-002") at Section 5 for a more comprehensive description of the activities for the design, certification, and installation of aviation electronic systems and equipment on aircraft. Available for purchase at https://store.accuristech.com/publishers/rtca (last visited Feb. 17, 2026).

modifications) to an existing radio altimeter model under a change to a current TSO Authorization. The second workstream is based on development of a new full replacement radio altimeter design where an in-service upgrade solution to achieve the interference tolerance requirements is not feasible and thus requires approval under a new TSO Authorization. The timelines for an existing radio altimeter in-service upgrade solution under a change to a current TSO Authorization assume only an interference tolerance compliance showing would be required for installation in an aircraft, as opposed to the complete means of compliance prescribed in FAA's draft Advisory Circular 20-199, therefore expediting approvals where practicable. The timelines for a new full replacement radio altimeter development under a new TSO Authorization will inevitably require additional time to complete the necessary design, development, testing, and the documentation required to demonstrate compliance. As noted in the FAA NPRM, "the typical product development schedule for flight-critical avionics is two to four years."[83] The multi-year timelines depicted in Annex B reflect the multiple radio altimeter models that must be upgraded or newly designed concurrently.

B. Phase 2 – Aircraft Certification

The Aircraft Certification phase reflects the activities of an aircraft manufacturer or other applicant to demonstrate that any modifications to an aircraft meet FAA's airworthiness regulations, either as an amended type certificate ("TC") or a supplemental type certificate ("STC"). Depending on the scope and scale of the avionic system integration, the aircraft TC or STC process generally takes between one to three years.[84] The certification process for an in-service upgraded radio altimeter on a newer aircraft will be less complex, whereas the

[83] FAA NPRM at 471.

[84] *See* RTCA RR-002 at Section 5 for a more comprehensive description of the activities for the design, certification, and installation of aviation electronic systems and equipment on aircraft.

certification of a new full replacement radio altimeter on an older out-of-production aircraft will require a more extensive demonstration of compliance of the integrated systems. The multi-year timelines depicted in Annex B reflect the significant number of aircraft-radio altimeter combinations and associated certification activities that will occur concurrently as testable retrofit/replacement radio altimeters become available and resources allow.

C. Phase 3 – Equipment Manufacturing

The Equipment Manufacturing phase reflects the activities of radio altimeter manufacturers to adjust or increase production capabilities to the extent practicable to meet demand for retrofit/replacement radio altimeter units. Radio altimeter equipment must be manufactured under an FAA-approved quality control system to ensure every article conforms with the approved design.[85] This timeline reflects an overall increase in production to the extent practicable considering factors such as manufacturing test equipment lead times and other supply chain constraints. It is important to note that manufacturing facilities will require a significant production ramp up to meet the anticipated demand for the FAA NPRM mandate. The multi-year timelines depicted in Annex B also reflect the multiple radio altimeter models that must be manufactured concurrently.

D. Phase 4 – Aircraft Fleet Retrofit and Production Line Fit

The Aircraft Fleet Retrofit and Production Line Fit phase reflects the installation of interference-tolerant radio altimeters into the existing aircraft fleet and the introduction of interference-tolerant radio altimeters into aircraft manufacturer production lines. The implementation of interference-tolerant radio altimeter systems presents considerable operational and administrative challenges for aircraft operators. This process necessitates the expedited

[85] *See, e.g.,* 14 CFR § 21.607 and 14 CFR § 21.608.

coordination of several interdependent tasks—including engineering releases, supply chain activities, contract approvals, and maintenance planning—that typically span extended timeframes. These tasks must be condensed into shorter timelines while aircraft operators continue their routine operations, thereby imposing significant constraints, especially during peak demand periods and times of limited additional maintenance capacity.

To ensure the safety and integrity of the affected systems and the NAS, this fleet retrofit will involve the removal and replacement of essential components, such as a radio altimeter transceiver. For many Part 121 and Part 129 aircraft operators, a transceiver replacement often can be completed during an overnight maintenance visit, followed by the necessary operational tests at maintenance-staffed stations. However, more complex installations may require multi-day visits to maintenance facilities with hangar access and additional labor hours to replace cabling/antennas, support system checks, and address any issues that arise during the modification process.

The rate at which larger commercial aircraft operators may be able to install radio altimeter systems will be highly variable depending on the airframes concerned. Additionally, aircraft operators may need to update technical publications and manage mixed configuration fleets, further increasing the scope and complexity of compliance. These compounding factors—including limited hangar and workforce availability,[86] elevated overtime requirements, and a limited supply chain—highlight that installation of interference-tolerant radio altimeters impose significant and multidimensional operational demands on operators. The multi-year timelines

[86] For example, the Aviation Technician Education Council and Oliver Wyman, 2025 Pipeline Report (2025) at 3 states, "Expanding demand and worker retirements are expected to drive a 10% shortage in certificated mechanics to meet commercial aviation needs [in 2025]. This shortfall is project to soften to 6% by the end of the decade but not surpass demand, representing a gap of 4,200 certificated mechanics in 2035. This analysis does not account for business and general aviation or for emerging markets, which will place additional pressure on the technical workforce." Available at https://assets.noviams.com/novi-file-uploads/atec/Pipeline_Report_2025_web_optimized.pdf (last visited Feb. 17, 2026).

depicted in Annex B reflect these considerations as multiple aircraft operators concurrently retrofit/replace interference-tolerant radio altimeter systems.

IX. ESTIMATED COSTS FOR FULL RETROFIT

The FAA NPRM estimates "the expected undiscounted total cost of retrofitting [radio altimeters] across the civil fleet is $4.49 billion."[87] Based on recent aviation stakeholder estimates, using scope assumptions from the FAA NPRM, the Joint Aviation Community currently estimates that total costs could exceed $7 billion. The difference between the FAA's and Joint Aviation Community's estimates stems primarily from the anticipated cost of new radio altimeter systems.

As the FAA NPRM states, the primary costs to implement the radio altimeter retrofit/replacement are equipment, labor, and other associated costs (e.g., lost revenues from taking an aircraft out of service, hangar lease fees).[88] The FAA NPRM used its 2023 estimate for total equipment and labor costs of $80,000 to retrofit existing aircraft operating under Part 121 with a single new radio altimeter system meeting the FAA's new interference-tolerance performance standard.[89] However, the FAA also acknowledges that it may be underestimating these costs—because the data underlying this estimate is both outdated and does not reflect the cost of the "new and more complex [radio altimeter] units required by" the forthcoming rules.[90]

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87 FAA NPRM at 479.

88 *Id.* ("These values assume replacement of just the [radio altimeter] transceiver unit, which for most aircraft is expected to be a 'plug-and-play' operation requiring minimal labor hours, aircraft downtime, or time out of service, such as during regular maintenance.")

89 *Id.* ("When issuing [airworthiness directives] in 2023 for transport and commuter category airplanes … to mitigate interference from Lower C-band wireless services, FAA estimated that replacement of the [radio altimeter] transceiver unit for a civil aircraft would cost up to $80,000 for an airplane … inclusive of parts and labor.")

90 *Id.* ("FAA acknowledges that the unit cost of the new and more complex [radio altimeter] units required by this rule may be greater and would result in an underestimation, but does not have any alternative estimates at this time since the new products are not yet available").

To better assess the estimated unit costs for each interference-tolerance radio altimeter system, the aviation industry consulted with aircraft operators and radio altimeter manufacturers about the expected equipment and labor costs for each new radio altimeter system. That initial consultation yielded estimated equipment and labor costs up to $120,000 per new interference-tolerant radio altimeter system. With nearly 58,600 radio altimeter systems currently installed that will require a retrofit/replacement, total equipment and labor costs alone could exceed $7 billion.[91] The aviation industry continues to consult internally on these values to further refine and provide supporting information to the Commission. The Joint Aviation Community envisions the total costs will be somewhere between the FAA NPRM estimate of $4.49 billion and the aviation industry estimate of slightly more than $7 billion.

X. A PHASED APPROACH TO EARLY WIRELESS ACCESS IS NOT COMPATIBLE WITH CURRENT RADIO ALTIMETERS OR FUTURE RADIO ALTIMETER DEPLOYMENT

Multiple satellite industry commenters contemplate a two-phased approach to clearing satellite services within the Upper C-band with the intent to allow earlier access to the cleared spectrum for terrestrial wireless services.[92] In contrast, a broadcast industry commenter "urge[d] the FCC and satellite operators to pursue a single, coordinated transition."[93]

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[91] The Joint Aviation Community suggests that the Commission disregard one commenter's uninformed claim that "[a]ll told, the cost to the airline industry of retrofitting the subset of [radio] altimeters [to protect] themselves from [Lower C-band] interference was a mere $26 million." DPI Comments at 10, citing the public inspection version of FAA, DOT, Airworthiness Directives; Transport and Commuter Category Airplanes, 88 Fed. Reg. 1520 (Jan. 11, 2023). The $26 million figure captures only a thin slice of the total retrofit burden—essentially the cost of a limited subset of Lower C-band retrofits—while ignoring the far more consequential, system wide expenses now required to comply with next generation performance standards. Nor does the $26 million figure account for the substantial operational costs that dwarf the narrow hardware tally. Taking aircraft out of service for installation results in lost revenue, repositioning costs, maintenance scheduling disruptions, among other factors—all of which impose real, quantifiable burdens on aircraft operators, particularly during peak operational periods. Taken together, these realities demonstrate that the "$26 million" characterization is not just incomplete—it is misleading. The financial impact of the required next generation radio altimeter retrofits/replacements is orders of magnitude higher, extending into billions of dollars in unavoidable, system wide expenditures.

[92] *See* notes 30, 31, and 32 above.

[93] NAB Comments at 10 (noting the disruptions caused by multiple modifications to C-band user earth station installations).

While a phased approach to deploying terrestrial wireless services was used in the Lower C-band, the Joint Aviation Community notes that a phased approach is incompatible with the performance of currently installed radio altimeters. As was pointed out by NTIA, "the current generation of [radio altimeter] is not sufficiently resilient to high-power transmissions in the proposed [Upper C-]band or the emissions into the [radio altimeter] band, even those [radio altimeters] that have been recently retrofitted."[94] The FAA NPRM and aviation industry comments more specifically noted that nearly half of the currently installed Lower C-band tolerant radio altimeters are incompatible with high-power terrestrial wireless services in just the 3.98-4 GHz block, and deploying high-power terrestrial wireless services beyond 4 GHz will only further increase the number of incompatible radio altimeter units.[95] Consequently, as NTIA noted, "[a]viation stakeholders will require sufficient time to design, produce, certify, and install tens of thousands of NextGen [radio altimeters] systems before the commercial wireless operators begin transmitting on the new frequencies."[96]

Hence, the Commission should reject any notion of a phased approach to deploying high-power terrestrial wireless services in the Upper C-band and follow NTIA's recommendation to ensure that "[t]he timelines for the NextGen [radio altimeter] retrofit and Report and Order activation of new [high-power terrestrial wireless] services should align."[97]

XI. THE COMMISSION SHOULD NOT EXPAND C-BAND TERRESTRIAL WIRELESS SERVICES OUTSIDE THE CONTIGUOUS UNITED STATES

Some commenters suggested that the Commission should evaluate whether C-band terrestrial wireless services could be expanded in certain areas outside the contiguous United

94 NTIA Comments at 6-7.
95 *See* FAA NPRM at 466. *See also* Boeing Comments at 7, Joint Aviation Community Comments at 7.
96 NTIA Comments at 6.
97 *Id.*

States ("OCONUS"); specifically, areas such as Hawaii and Puerto Rico.[98] Other commenters favored preserving existing allocations and operations in OCONUS areas.[99]

The Joint Aviation Community does not support expanding terrestrial wireless services in OCONUS areas as part of this proceeding. It is important to note that the FAA NPRM only proposes "new regulations that would require all [radio altimeter systems] on aircraft operating … in the airspace of the 48 contiguous United States and the District of Columbia to meet minimum performance requirements necessary to withstand interference from wireless services in … the … Upper C-band."[100] Conversely, the FAA proposed not to apply the radio altimeter performance requirements "to operations in the airspace over the State of Alaska, the State of Hawaii, Puerto Rico, and other U.S. territories and possessions, including territorial waters"[101] specifically because the FCC's Upper C-band NPRM "is proposing to preserve the status quo regarding its current licenses outside of the contiguous United States."[102]

Against this background, should the Commission move to expand C-band terrestrial wireless services OCONUS, further coordination with the FAA and the aviation industry will be required. Such further coordination is necessitated by the unique composition of aircraft fleets and operating environment in these areas and the need to assess the impact to the implementation timeline and costs to retrofit/replace radio altimeters on aircraft that operate subject to 14 CFR Part 91, but exclusively within any OCONUS airspace where C-band terrestrial services are expanded. Expanding these service rules to OCONUS would likely jeopardize meeting the Congressionally mandated requirement for the Commission to "complet[e] a system of

98 *See* AT&T Comments at 4; CTIA Comments at 14-15; Verizon Comments at 7.

99 *See, e.g.*, Comments of Competitive Carriers Association (filed Jan. 20, 2026) at 6-7; Eutelsat Comments at 4, note 12; Comments of NCTA – The Internet & Television Association (filed Jan. 20, 2026) at 8, note 14.

100 FAA NPRM at 461.

101 *Id.* at 470.

102 *Id.*

competitive bidding not later than 2 years after the date of enactment of this Act for not less than 100 megahertz in the band between 3.98 gigahertz and 4.2 gigahertz."[103]

XII. IF PORTIONS OF THE UPPER C-BAND ARE ALLOCATED FOR NON-TERRESTRIAL WIRELESS SERVICES, THE SERVICE RULES FOR THESE SERVICES MUST PROTECT RADIO ALTIMETERS

Several commenters proposed using any remaining portion of the Upper C-band not allocated for terrestrial wireless for other services such as CBRS,[104] direct-to-device via Mobile Satellite Services,[105] and "shared use on an opportunistic basis".[106] The Joint Aviation Community takes no position on the merits of changing allocations for these other proposed services.

However, should the Commission allocate spectrum for these other services, the Commission must also promulgate service rules that will similarly ensure compatibility with radio altimeters that meet the final rule of the FAA's proposed minimum performance requirements in order to maintain aviation safety. Such technical parameters could include, for example, the same emitter height limits and OOBE EIRP limit that are finalized jointly by the FCC, FAA, and aviation and wireless industries. Additionally, such other services must be subject to a significantly lower fundamental emission EIRP limit for frequencies above 4.16 GHz.[107]

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103 Pub. L. No. 119-21, § 40002(b)(2).

104 *See generally* Comments of Professor Monisha Ghosh, University of Notre Dame, et. al. (filed Jan. 20, 2026).

105 *See generally* Comments of OQ Technology (filed Jan. 20, 2026); Comments of Space Exploration Holdings, LLC (filed Jan. 20, 2026). *See also* Comments of Open Technology Institute at New America and Public Knowledge (filed Jan. 20, 2026) at 18-26.

106 WISPA Comments at 2-3.

107 *See, e.g.*, FAA NPRM at 468-469 for proposed radio altimeter interference tolerances in the 4.16-4.2 GHz frequency range.

XIII. CONCLUSION

The Joint Aviation Community emphasizes the importance of a coordinated rulemaking process between the FCC and FAA, an essential and nearly unanimously supported concept across many industries and stakeholders in the Upper C-band. Such a process will underpin many of the points raised in these reply comments, maximizing commercial wireless spectrum while minimizing restrictions on both commercial wireless and aviation operators. A coordinated rulemaking process will ensure the "on time, on budget, no surprises" objective that the Commission desires.[108] A careful, but deliberate approach by the Commission using common sense and practical measures is key to ensuring that issues that arose during the Lower C-band commercial wireless deployment are avoided.

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[108] Sura, *supra* note 10.

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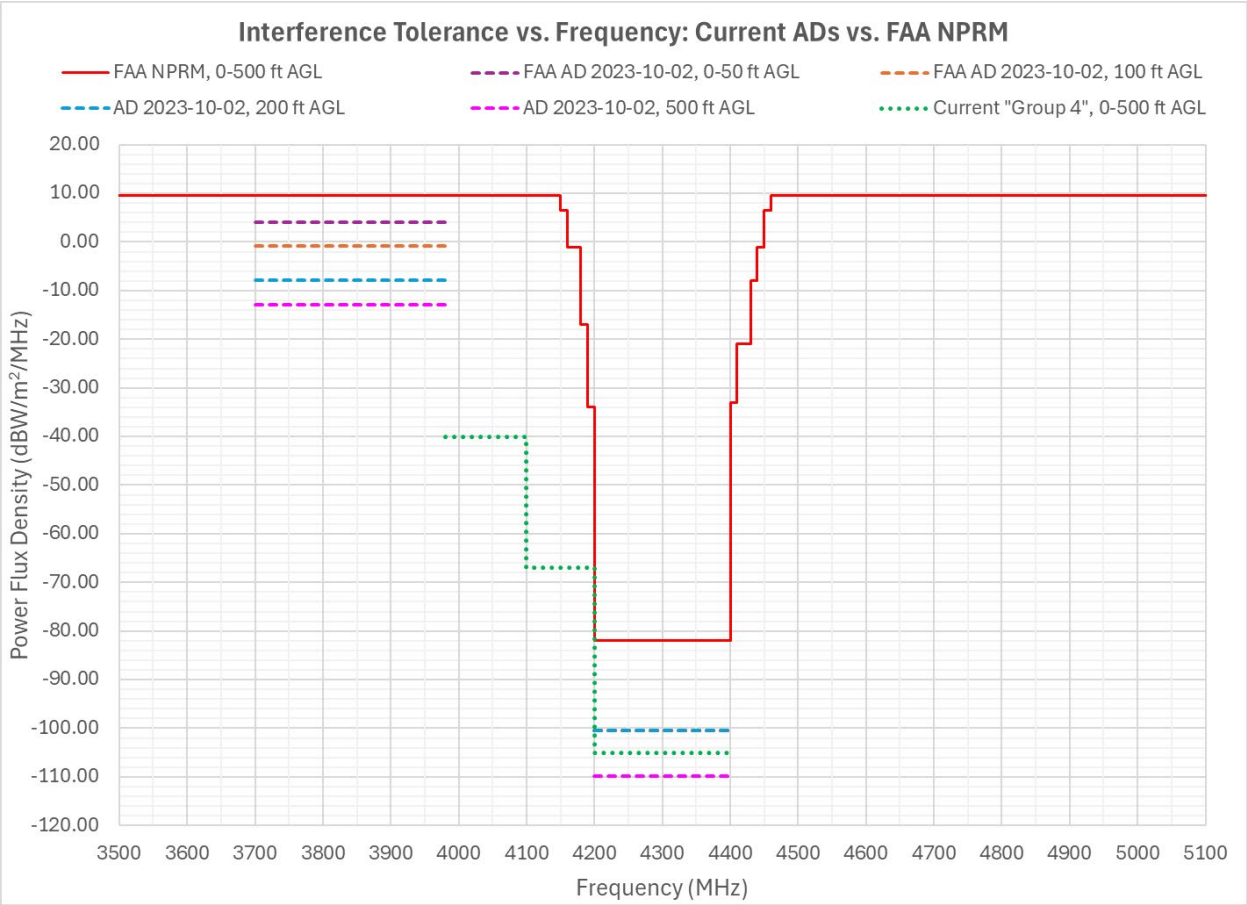
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February 18, 2026

ANNEX A – COMPARISON OF CURRENT AND PROPOSED RADIO ALTIMETER INTERFERENCE TOLERANCE



A plot showing (1) the 2023 Airplane Airworthiness Directive required interference tolerance levels (i.e., currently installed Group 4 radio altimeters, which applies for 3.7-3.98 GHz and in-band only), (2) the ITM in the FAA NPRM, and (3) the FAA's stated bounding tolerance for currently installed Group 4 radio altimeters for 3.98-4.2 GHz, also from the NPRM. Section III provides additional context.

ANNEX B – UPPER C-BAND INTERFERENCE-TOLERANT AIRCRAFT RADIO ALTIMETER RETROFIT/REPLACEMENT TIMELINE

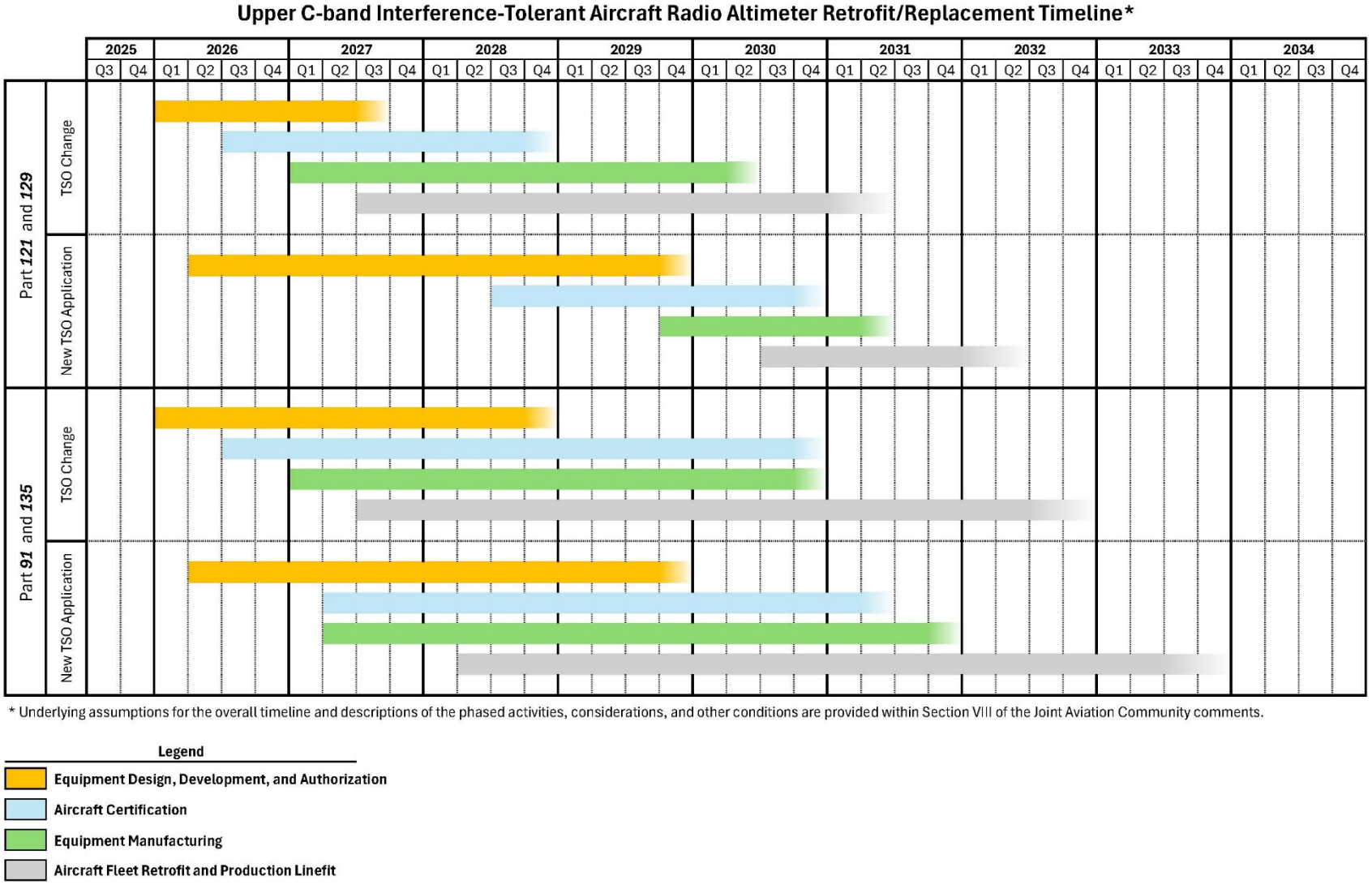


EXHIBIT 1

DESCRIPTIONS OF THE JOINT AVIATION COMMUNITY COMMENTATORS

Aerospace Industries Association ("AIA") represents hundreds of aerospace and defense companies, from America's leading manufacturers and developers of commercial aircraft, engines, avionics, and air traffic control systems to family-owned businesses across the supply chain.

Air Line Pilots Association, International ("ALPA") represents and advocates for more than 80,000 pilots at 42 U.S. and Canadian airlines, making it the world's largest airline pilot union. ALPA provides three critical services to its members: airline safety, security, and pilot assistance; representation; and advocacy.

Airbus is a global pioneer in the aerospace industry, operating in commercial aircraft, helicopters, defense and space sectors. The company is a leader in designing, manufacturing and delivering aerospace products, services and solutions to customers on a worldwide scale.

The Aircraft Owners and Pilots Association ("AOPA") is a not-for-profit individual membership organization of General Aviation Pilots and Aircraft Owners. AOPA's mission is to effectively serve the interests of its members and establish, maintain and articulate positions of leadership to promote the economy, safety, utility, and popularity of flight in General Aviation aircraft. Representing two-thirds of all pilots in the United States, AOPA is the largest civil aviation organization in the world.

Airlines for America ("A4A") is the trade association for the leading U.S. airlines, both passenger and cargo carriers, prioritizing safety and security during this time of record passenger volumes and increased reliance on air cargo shipments. Every day, U.S. airlines operate 27,000 flights carrying 2.7 million travelers and 61,000 tons of cargo while supporting 10 million U.S. jobs and 5 percent of GDP.

Headquartered in Fort Worth, Texas, near Dallas/Fort Worth International Airport, the Allied Pilots Association ("APA") serves as the certified collective bargaining agent for the 16,000 professional pilots who fly for American Airlines. Founded in 1963, APA is the largest independent pilots' union in the world. APA provides a broad range of representation services for its members and devotes a significant portion of its members' dues to advancing the cause of aviation safety.

Aviation Spectrum Resources, Inc ("ASRI") is the communications company of the U.S. air transport industry and is owned by many of the major U.S. airlines and other airspace users. ASRI draws upon expertise and opinions from across the U.S. aviation sector to act in the interests of safe and efficient operation of commercial aviation radio communications systems in the radio frequency spectrum.

The Boeing Company is a leading global aerospace company and top U.S. exporter, Boeing develops, manufactures and services commercial airplanes, defense products and space systems for customers in more than 150 countries. With corporate offices near Washington, D.C.,

Boeing employs more than 170,000 people across the United States and in more than 65 countries.

The Cargo Airline Association (“CAA”) represents the major U.S. all-cargo and express airlines to promote the safety, security, and economic growth of the air cargo market. Our carriers collectively operate in over 220 countries and territories, employing over 500,000 people and accounting for 35% of global trade value, using aircraft of various types and sizes depending on the route, airport, and cargo being transported.

FreeFlight Systems is a leader in NEXGEN aviation systems that designs and manufactures high-performance avionics with a deep-rooted history specifically in Radar Altimeter technology that enhances flight safety. Our solutions deliver substantial safety and unmatched reliability, which are critical for modern flight operations. Founded in 2001 and based in Texas, we pioneered the first certified aviation WAAS/GPS receiver and the first UAT Link 2 compliant ADS-B transmitter system. Today, FreeFlight Systems is a global aerospace leader, specializing in state-of-the-art radio altimeters, surveillance applications and navigation retrofit and line-fit solutions, along with other NextGen aerospace avionics.

Garmin International, Inc., together with its worldwide affiliates, is a leading, worldwide manufacturer of radio altimeters and other products that are enabled by radio altimeters for the aviation industry. These products serve their customers and support aviation operations in general aviation, business aviation, and other aviation sectors throughout the world.

The General Aviation Manufacturers Association (“GAMA”) represents over 150 of the world's leading manufacturers of business and general aviation airplanes, rotorcraft, engines, avionics, components and companies in the emerging sector of innovative/advanced air mobility. GAMA's members also operate repair stations, fixed based operations, pilot and maintenance training facilities and manage fleets of aircraft.

The GPS Innovation Alliance (“GPSIA”) promotes Global Positioning System (“GPS”), other Global Navigation Satellite Systems (“GNSS”), complementary space-based position, navigation, and timing (“PNT”) systems, components, products, and services, and their receivers and devices. We are firmly committed to protecting these technologies from harmful interference. GPSIA champions innovation, creativity, and entrepreneurship, which bolster the vital contributions of GPS, GNSS, and PNT-enabled technologies to public safety, critical infrastructure, and the global economy.

Honeywell International Inc. is a multinational industrial company with over 100,000 employees around the world. Honeywell Aerospace Technologies, the aerospace and defense business of Honeywell International Inc., is an industry-leading supplier of aircraft components including avionics, sensors, mechanical systems, power systems, turbine engines, and more. Honeywell develops future-shaping technology that enables reliable, effective, efficient, and safe operations for our customers. Honeywell’s avionics offerings include Radio Altimeters for civil air transport, business aviation, general aviation, and military airplanes and helicopters.

The International Air Transport Association ("IATA") is the trade association of the world's airlines, representing some 360 airlines, more than 100 of which serve the U.S. market. IATA works with its U.S. and foreign airline members to promote safe, reliable, and secure air travel.

Lockheed Martin Corporation is a manufacturer and integrator of military, civil, and commercial fixed-wing aircraft and rotorcraft for both domestic and foreign operators.

The National Air Transportation Association ("NATA") represents nearly 3,700 aviation business locations across a broad cross-section of the aviation industry, including on-demand air charter carriers and fractional ownership companies, maintenance providers, fixed-base operators, flight training providers, general aviation airports, and other key industry stakeholders. For more information, please visit NATA's website at https://nata.aero/.

The National Business Aviation Association ("NBAA") is the leading organization representing companies that rely on general aviation aircraft to help make their businesses more efficient, productive, and successful. The association represents more than 11,000 member companies and professionals operating in the National Airspace System.

Regional Airline Association ("RAA") provides a unified voice of advocacy for North American regional airlines aimed at promoting a safe, reliable, and strong regional airline industry. Regional airlines are critically important to our country's economic health and provide the lone source of scheduled passenger air service for about two-thirds of the country's airports. Regional airlines carried more than 121 million passengers last year, providing most of the connections to our nation's non-hub and small-hub airports. RAA members use specialized, small equipment to serve communities that have too few passengers to support air service with larger aircraft, but where air service is critical to economic vitality and quality of life.

RTX is the world's largest aerospace and defense company. With more than 185,000 global employees, we push the limits of technology and science to redefine how we connect and protect our world. Through industry-leading businesses – Collins Aerospace, Pratt & Whitney and Raytheon – we are advancing aviation, engineering integrated defense systems for operational success, and developing next-generation technology solutions and manufacturing to help global customers address their most critical challenges. The company, with 2024 sales of more than $80 billion, is headquartered in Arlington, Virginia.

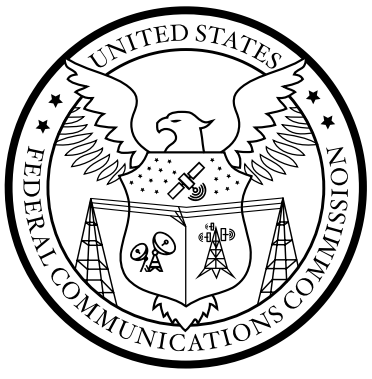
Thales Group is a global technology leader with more than 83,000 employees on five continents. In the markets of defense, aerospace and space, cyber and digital, Thales provides solutions, services and products to help its customers – companies, organizations and governments – to carry out their critical missions. Thales' multiple avionics solutions include Radio Altimeters for aviation.

Vertical Aviation International ("VAI") is the trade association for the civil vertical aviation industry, representing more than 1,000 aviation businesses and 15,000 aviation professionals in 75 nations. VAI is dedicated to fueling the growth of the vertical aviation industry through connection, education, advocacy, and safety so that communities around the world are strengthened by the power of vertical flight.

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