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Gaetano A. Sciortino
Deputy Director for Strategic Initiatives,
Compliance & Airworthiness Division
Federal Aviation Administration
800 Independence Avenue S.W.
Washington, D.C. 20591

*Submitted via Regulations.gov in Docket No. FAA-2021-0953*

**Re: Comments of Airlines for America and the International Air Transport Association Regarding Airworthiness Directive 2021-23-12 (Docket No. FAA-2021-0953)**

Airlines for America ("A4A") and the International Air Transport Association ("IATA"), on behalf of their respective members,[1] appreciate the opportunity to provide comments to Federal Aviation Administration ("FAA") Airworthiness Directive 2021-23-12 ("AD") for transport and commuter category airplanes equipped with a radio (also known as a radar) altimeter.[2] We also appreciate the FAA's extensive engagement with stakeholders in both the aviation and the telecommunications industries to address well-founded aviation safety concerns regarding interference to radio altimeters from wireless broadband operations in the 3.7-3.98 gigahertz (GHz) frequency band ("5G C-Band"). Accordingly, and based on our uncompromisable commitment to safety, we support the AD as a *preliminary* response to mitigate the threat of 5G C-Band to aviation safety. Because the AD essentially functions as a "stopgap" triggered by the Federal Communication Commission's ("FCC") failure to acknowledge risks to aviation and participate in meaningful mitigation, it does not establish a sufficiently comprehensive and predictable framework for permanently addressing imminent and potential hazards to aviation caused by 5G C-Band interference. Therefore, we submit the following comments to raise continuing concerns that the AD does not adequately address the underlying root cause of the 5G C-Band threat to aviation safety nor the severe operational restrictions on passenger and cargo services.

[1] A4A's members are: Alaska Air Group, Inc.; American Airlines Group, Inc.; Atlas Air Worldwide Holdings, Inc.; Delta Air Lines, Inc.; FedEx Corp.; Hawaiian Airlines; JetBlue Airways Corp.; Southwest Airlines Co.; United Airlines Holdings, Inc.; and United Parcel Service Co. Air Canada is an associate member. IATA is the trade association for the world's airlines, representing some 290 airlines or 83% of total global air traffic.
[2] FAA, Airworthiness Directives; Transport and Commuter Category Airplanes, 86 Fed. Reg. 69,984 (Dec. 9, 2021) (Docket No. FAA-2021-0953, AD 2021-23-12) (hereinafter "AD 2021-23-12").

The FAA, by amending the AD among other actions, can better mitigate such on-going concerns in a manner that more closely achieves the mutual goal of all stakeholders: the safe and seamless implementation of 5G services with no safety risks or operational impacts to aviation. Specifically, the FAA should continue its collaboration with stakeholders to find and implement permanent, more efficient, and more accurate risk evaluation tools and mitigations, including fixes to 5G C-Band deployment, as well as FAA's notification and limitations process. In addition, FAA's processes for evaluating and communicating the Alternative Means of Compliance (AMOCs) and the Notice to Air Missions (NOTAMs) should be improved to ensure that the evaluation of AMOC applications is efficient and results can be communicated clearly. The FAA should also work with the FCC and other stakeholders to establish a process with telecommunication companies for a phased-in deployment of 5G C-Band towers that affords all affected parties sufficient opportunity to understand and mitigate risks before additional towers are activated.

**BACKGROUND**

In late 2017, the FCC signaled its intention to auction underused C-Band spectrum that would reallocate a portion of the 3.7-4.2 GHz frequency band, making the frequency spectrum from 3.7-3.98 GHz available for flexible use, including 5G applications. The resulting deployment of 5G C-Band in the United States is significantly distinguishable from deployments of 5G C-Band in other countries because the FCC licensed the use of the 5G C-Band at exponentially higher power levels than power levels for 5G C-Band outside the United States (which still prompted countries to impose restrictions on antenna placement and shielding and on notices to aircraft operators about potential radio altimeter interference).

Before the FCC's auction, the FAA and the U.S. Department of Transportation ("DOT") wrote to the National Telecommunications and Information Administration expressing interference concerns.[3] Despite being aware of the concerns, the FCC auctioned spectrum to new licensees in December 2020 in a manner that did not adequately address the core concerns. Particularly, but not exclusively, the FCC failed to impose limitations on deployment directed at mitigating hazards to air safety and threats to operational efficiency similar to those imposed by regulators in other countries that have introduced 5G C=Band service.

As the FAA is well aware, our first commitment is to the safety of our passengers, our crewmembers, and the public. Commercial aviation has achieved historical levels of safety due, in part, to technology investments made to enhance landing safely and

[3] *See* Letter from S. Bradbury, General Counsel, DOT, and S. Dickson, Administrator, FAA, to Adam Candeub, NTIA (Dec. 1, 2020). *See also* RTCA Paper No. 274–20/PMC–2073, Assessment of C-Band Mobile Telecommunications Interference Impact on Low Range Radar Altimeter, Options, page I (Oct. 7, 2020) (RTCA Paper No.274–20/PMC–2073) (concluding that C-Band mobile telecommunications signals would interfere with low range radio altimeter operations) *available at* Regulations.gov, Docket No. FAA–2021–0953 *and at* https://www.rtca.org/wp-content/uploads/2020/10/SC-239-5G-Interference-Assessment-Report_274-20-PMC-2073_accepted_changes.pdf.

which rely on the radio altimeter, such as Enhanced Ground Proximity Warning Systems, auto throttle, Head-Up Display, stability augmentation, tail strike warning, windshear warning, braking scale and pointer. Our concerns center around radio altimeters providing erroneous information to these critical onboard aircraft systems when the aircraft is in the vicinity of 5G C-Band broadcasting towers, especially but not exclusively for flights operating in Instrument Meteorological Conditions ("IMC").

Accordingly, early and often through meetings and filings with the FAA, the aviation industry has long conveyed its safety concerns with the FCC's implementation of 5G C-Band and the potential consequences. The aviation industry has also consistently attempted to engage the FCC and 5G telecommunications operators to discuss aviation safety risk mitigations and allow for the safe and efficient deployment to 5G technology. *See* Timeline of Aviation Industry Engagement (2018-2021) at **Appendix A**. Despite this extensive engagement, the FCC not only failed to implement mitigations for aviation safety, but ignored the aviation industry's request for reconsideration. Only through last-minute executive-level government involvement and delays in full implementation by the telecommunications providers did constructive action in response to the aviation industry's concerns take place, forestalling major disruptions to the traveling and shipping public at the eleventh hour.

Specifically, as a result of FCC's failure to take reasonable and necessary action to address aviation safety concerns, the FAA took action by issuing the AD. As the AD recognizes, the FAA determined that "radio altimeters cannot be relied upon to perform their intended function if they experience interference from wireless broadband operations in the [5G C-Band]."[4] The FAA's AD requires revisions to airplane flight manuals to incorporate limitations prohibiting certain radio altimeter-dependent operations in the presence of 5G C-Band interference from known or suspected 5G C-Band deployments near airports, which the FAA identifies on a case-by-case basis through NOTAMs. Accordingly, operational prohibitions are the new operating baseline at airports with nearby 5G C-Band deployments under low visibility conditions, resulting in operational impacts. However, pursuant to its AMOC process, the FAA has permitted (on a time-limited basis) certain aircraft that are equipped with radio altimeters capable of functioning without adverse interference to operate without restrictions at airports with known 5G C-Band deployments.

The impacts to aviation have already been realized and will, more likely than not, grow with the continued deployment of 5G C-Band. For example, the FAA has issued AMOCs that approve operation of regional jets in conditions that require radio altimeters at far fewer airports as compared to larger aircraft.[5]

[4] *See supra* note 2, AD 2021-23-12, 86 Fed. Reg. 69,984.

[5] *Compare* FAA Doc. No. 720-22-1372-RL (Jan. 18, 2022) (providing AMOC for Boeing aircraft) *to* FAA Doc. No. 720-22-1451-RL (Jan. 20, 2022) (providing AMOC for Embraer aircraft).

**COMMENTS TO THE AIRWORTHINESS DIRECTIVE AND FAA'S PROCESSES**

The FAA's use of case-by-case NOTAMs to designate airports and airspace that are subject to operating restrictions under the AD and as the sole resource for aviation operators to determine operating access is a complex and unwieldy method for communicating critical safety information about airports and airspace that are subject to interference from 5G C-Band broadcast. In fact, the use of NOTAMs in such a manner is unprecedented and introduces operational complexity and therefore potential risk to flight operations and dispatch functions. This especially true when the NOTAMs (and AMOCs) are issued shortly in advance of flights, which is totally avoidable and substantially disrupts critical flight planning (*e.g.*, personnel and aircraft positioning, flight scheduling, gate/slot availability, passenger itineraries, etc.). Further, unlike the AMOCs, the NOTAMs are a "one-size-fits-all" approach that has created considerable workload and confusion among air carriers. The complexity of the numerous lists needed to determine what aircraft equipped with what altimeters can land at which airports has created an enormous workload and pressure on the dispatch function to ensure that accurate information is being relayed to pilots.

Because the AD is targeted at addressing the risks associated with low-visibility approaches, it does not account for or mitigate other potential technical operational and human factor risks caused by 5G C-Band interference. Adding additional types and layers of mitigations to address inadvertent encounters with 5G C-Band interference, on top of the complexity of limitations imposed by the AD and related NOTAMs, is a further safety concern.

The best solution is apparent and attainable: the FAA should work with the FCC to find mitigations that address the root cause of 5G C-Band interference for the areas that will impact radio altimeters and maintain an uninterrupted aviation operational experience. This includes deployment of 5G C-Band at lower power levels that allow 5G C-Band service while still supporting aviation safety in conjunction with minimized exclusion zones near airports. Accordingly, we strongly urge the FAA to continue its engagement with the FCC, National Economic Council, telecommunications industry, aircraft and avionics original equipment manufacturers ("OEMs"), and aircraft operators to expeditiously mitigate the impact of 5G C-Band deployment and significantly limit the operational impact to aviation. Such progress will inherently require a comprehensive examination of the technical conditions, as well as the deficiencies in coordination and processes that necessitated the AD.

Also, the 5G C-Band service providers are currently unaccountable to the government for the quality and accuracy of the data being provided to the FAA to form the foundation of the FAA's response. As standard practice, aviation safety regulators, including the FAA, rely on verified data from accountable private entities to develop material safety-related requirements. The absence of accountability and verifiability with respect to 5G C-Band deployment information contributes to the risks under the AD framework and will continue to contribute such risk until it is addressed. The FAA

should consider updating its requirements in its aeronautical hazard determination process, 14 C.F.R. part 77, to mandate that 5G C-Band service providers directly provide it with accurate information on 5G C-Band tower locations, transmitter power, and antenna angle, when airport sponsors submit notices of proposed on-airport construction or alterations.

Moreover, minimizing any remaining operating restrictions is possible with a more permanent solution and narrowly tailored methodology for restricting airspace. First, based upon reliable data, the FAA should narrow the operating restrictions by developing and adopting an enhanced airspace evaluation and restriction method that uses the actual performance capabilities of the radio altimeters, rather than a "worst case scenario." Currently, the FAA applies broad circular airspace restrictions that could be narrowed to corridors. This would also facilitate the deployment of more proximate 5G C-Band deployments without affecting aviation safety. Second, the FAA should establish a more transparent, permanent and certain evaluation and restriction process. For example, to avoid difficulties with future deployments and AMOC renewals, the FAA, in conjunction with all stakeholders, should establish a data sharing architecture that allows for more permanent and certain evaluations and solutions. Third, stakeholders, including the FAA, should identify and adopt solutions that do not require repeated executive-level negotiations and crisis-driven agreements between industries and government entities to mitigate safety risks on an emergent and piecemeal basis.

In consideration that several tranches of 5G C-Band deployment are already scheduled for the near future,[6] we strongly encourage the FAA develop a transparent and formal risk mitigation process, through collaboration between all stakeholders—including the FAA, FCC, aviation industry, telecommunications industry, and others—at the principal decision making level that sets cardinal goals, priorities, and structure. Key outcomes should include clear lines of communication and verifiable data sharing, refinement of the current risk mitigation process (including AMOCs and FAA's assessment tools to address immediate operational issues), and the establishment of certification standards and pathways for longer term integration of 5G C-Band and aviation operations.

**CONCLUSION**

We thank the FAA for its extensive work and consideration and hope that FAA leadership and coordination with all stakeholders will ensure that aviation safety is maintained and operational impacts minimized with the deployment of 5G C-Band. We respectfully request that the FAA immediately consider our concerns and adopt our recommendations herein to plan for the coexistence of 5G C-Band and aviation safety while avoiding the unnecessarily frantic efforts that were most recently required by stakeholders to avoid massive air service disruptions. We also respectfully request that,

[6] *See e.g.,* Dan Jones, *The status of 5G rollouts in 2021 and 2022,* TECHTARGET, *available at* https://www.techtarget.com/searchnetworking/answer/What-is-the-status-of-5G-rollouts-in-2020.

as FAA considers whether to issue further, or amend existing, ADs, NOTAMs, and AMOCs for 5G C-Band, it coordinates in advance with stakeholders and provides implementation time to avoid unnecessary disruption to aviation passenger and cargo operations. If you have any questions, please feel free to contact Andy Cebula at acebula@airlines.org.

Respectfully submitted,

/s/ Patricia Vercelli_____
Patricia Vercelli
Senior Vice President & General Counsel
AIRLINES FOR AMERICA

/s/ Andy Cebula_____
Andy Cebula
VP, NextGen and New Entrants
AIRLINES FOR AMERICA

/s/ Doug Lavin_____
Doug Lavin
Vice President, North America
INTERNATIONAL AIR TRANSPORT ASSOCIATION

# APPENDIX A

## Timeline of Aviation Industry Engagement on 5G Concerns (2018-2021)

### 2018

- **March 2018** – The Mobile Now Act is enacted, authorizing the Federal Communications Commission (FCC) through notice and comment on the feasibility of allowing commercial wireless services, licensed or unlicensed, to use or share use of the frequencies between 3700 megahertz and 4200 megahertz.
- **April 2018** – **FCC** issues public notice encouraging the public to comment on potential for more intensive use of the 3.7-4.2 GHz Band to submit those filings in this docket.
- **May 2018** – **A4A** files comments in response to FCC public notice raising radio altimeter and satellite communication (SATCOM) interference concerns.
- **July 2018** – **FCC** issues Order and Notice of Proposed Rulemaking on Expanding Flexible Use of the 3.7 to 4.2 GHz spectrum band.
- **October 2018** – **AVIATION SPECTRUM RESOURCES, INC. (ASRI)** files comments to FCC reiterating aviation industry concerns on the potential impact to radio altimeter and SATCOM.

### 2019

- **October 2019** – **AEROSPACE VEHICLE SYSTEMS INSTITUTE (AVSI)** files "Behavior of Radio Altimeters Subject to Out-Of-Band Interference" report in FCC rulemaking docket, raising the potential for interference issues affecting the 4.2-4.4 GHz band start for commercial aircraft.
- **November 22, 2019** – **HOUSE TRANSPORTATION AND INFRASTRUCTURE (T&I) COMMITTEE** Chair DeFazio sends letter to FCC warning of potential interference to radio altimeters from 5G deployment in the C-Band.

### 2020

- **February 21, 2020** – **AVIATION INDUSTRY COALITION** sends ex parte letter and presentation to FCC raising safety concerns.
- **February 28, 2020** – **FCC** issues Order to move forward with auctioning "C-band" spectrum.
- **May 2020** – **AVIATION INDUSTRY COALITION** files petitions for reconsideration of the FCC Order.
- **October 7, 2020** – **RTCA** completes a six-month assessment of interference from 5G network emissions with radio altimeter performance, revealing a "major risk that 5G telecommunications systems in the 3.7-3.9 GHz band will cause harmful interference to [radio] altimeters on all types of civil aircraft."
- **December 2020** – **AVIATION INDUSTRY COALITION** submits letter of support for petition for reconsideration.
- **December 1, 2020** – **DOT AND FAA** submit joint letter voicing interference concerns to the National Telecommunications and Information Administration (NTIA)and request NTIA to submit their letter to the FCC public docket. NTIA did not submit the letter to the FCC docket.

- **December 7, 2020** – **HOUSE T&I COMMITTEE** Chair DeFazio sends letter to FCC asking the agency to delay its C-Band auction.
- **December 8, 2020** – **FCC** begins auction of the 3.7-3.98 GHz frequency band.

**2021**

- **February 2021** – **FCC** completes $81 billion auction of the 3.7-3.98 GHz frequency band and subsequently issues licenses to Verizon and AT&T to begin deployment on December 5, 2021.
- **May 2021** – **AVIATION INDUSTRY COALITION** sends letter to FCC supporting aviation petition for reconsideration and responding to Cellular Telecommunications Industry Association (CTIA) FCC filing.
- **July 2021** – **AVIATION INDUSTRY COALITION** sends letter to DOT raising imminent safety risk facing aviation industry.
- **August 2021** – **AVIATION INDUSTRY COALITION** sends presentation to FCC raising safety concerns and asking for a taskforce to resolve concerns.
- **November 2, 2021** – **FAA** issues Special Airworthiness Information Bulletin alerting manufacturers, operators and pilots that action might be required to address potential interference with aircraft radio altimeter caused by the rollout of 5G wireless broadband on December 5, 2021.
- **November 3, 2021** – **FAA and FCC** announce that AT&T and Verizon have agreed to delay the 5G C-band deployment from December 5, 2021 to January 5, 2022.
- **November 5, 2021** – **AVIATION INDUSTRY COALITION** sends letter to National Economic Council (NEC) urging it to "work with the FCC and FAA to convene a joint industry working group and continue to delay the deployment of 5G technologies in this band until the safety and efficiency of the [National Air Space] is ensured."
- **November 19, 2021** – **HOUSE T&I COMMITTEE** Chair DeFazio and Aviation Subcommittee Chair Larsen send letter to FCC urging the agency not to go through with any 5G C-band deployments until the FAA conducts a risk assessment that proves no further "mitigations are necessary or that all necessary mitigations are in place," and requesting FCC to provide FAA with any technical data related to aviation and 5G broadband service.
- **December 7, 2021 – FAA** issues two Airworthiness Directives (ADs) identifying safety concerns and outlining potential flight restrictions. The ADs state that "radio altimeters cannot be relied upon to perform their intended function if they experience interference from wireless broadband operations in the 3.7-3.98 GHz frequency band (5G C-Band)."
- **December 22, 2021** – **A4A, AEROSPACE INDUSTRIES ASSOCIATION (AIA) AND CTIA** announce agreement to work together in coordination with the FAA and FCC to "identify a path forward."
- **December 23, 2021 – FAA** issues second Special Airworthiness Information Bulletin and a Safety Alert for Operators regarding the "Risk of Potential Adverse Effects on Radio Altimeters when Operating in the Presence of 5G C-Band Interference."
- **December 30, 2021** – **A4A** files emergency petition with the FCC to stay initiation of the deployment of 5G around certain airports until a solution can be identified.