



AIR LINE PILOTS ASSOCIATION INTERNATIONAL

THE WORLD'S LARGEST PILOTS UNION • WWW.ALPA.ORG

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May 29, 2018

VIA ELECTRONIC FILING

Marlene H. Dortch
Federal Communications Commission
Office of the Secretary
445 12th St SW
Washington DC 20554

Re: GN Docket Nos. 17-183, 18-122

Dear Ms. Dortch:

The Air Line Pilots Association, International (ALPA), representing the safety interests of over 60,000 pilots flying for 34 air carriers in the US and Canada, and a member of the International Federation of Air Line Pilots Associations representing 100,000 pilots worldwide, submits the following comments regarding the potential assignment of wireless broadband in the 3.7-4.2 GHz band. ALPA urges the Federal Communications Commission (FCC) to fully analyze the potential impact of such an assignment on flight safety critical systems in commercial aviation and potential mitigations prior to making a final decision.

The adjacent band of 4.2-4.4 GHz is a protected Aeronautical Radionavigation assignment used by radio altimeters aboard civilian air transport aircraft. Radio altimeters are devices installed on the airframe, which determine the height of the aircraft above the terrain by bouncing a radio signal off of the ground and measuring the round-trip time. These are the only devices installed on the aircraft which can directly measure the height above ground. Radio altimeter systems are universally installed in air transport (passenger and cargo) aircraft and are a critical component for both all-weather instrument approach and landing procedures as well as Terrain Awareness and Warning Systems (TAWS).

The radio altimeter system is used as part of all-weather approach and landing procedures as a means for pilots to verify their progress on an approach and to detect an unsafe situation. These procedures are critical in enabling safe arrivals to airports especially during periods of poor visibility and low cloud layers ("low ceilings"). Interference from adjacent bands on the radio altimeter system could pose a hazard to aircraft in flight if they were to cause faulty radio altimeter readings to be reported. For example, in 2009 a Turkish Airlines flight experienced faulty radio altimeter readings while on approach, which contributed to a crash landing with fatalities at Amsterdam-Schiphol Airport¹.

Because there is no other source of height-above-terrain information, radar systems onboard aircraft are not capable of validating the data that they present. In other words, interference may not be detectable,

¹https://web.archive.org/web/20120322020140/http://www.aviationweek.com/aw/generic/story_generic.jsp?channel=comm&id=news/ALT030509.xml&headline=Boeing%20Warns%20of%20Possible%20737%20Altimeter%20Fault

and would likely cause hazardously misleading information to be presented to the flight crews. Misleading information would easily increase the likelihood of approach and landing accidents and incidents.

Even if the interference were known to the flight crew, its presence would require pilots to disable or otherwise eliminate reliance on the radio altimeter, which would effectively prevent these procedures from being used. This would in turn prevent access to airports during periods of low ceilings or visibility, and would not only cause significant disruption to individual flights as they divert to other airports, but also to the broader air transportation system which relies upon flight schedule integrity to efficiently serve the flying public and transport air cargo.

In addition, 14 CFR Part 121.354 requires that air carrier aircraft be equipped with an approved Terrain Awareness and Warning System. A critical data input to TAWS systems on air carrier aircraft is height-above-terrain information provided by radio altimetry equipment.

Terrain warning is required in the US for air carrier operations as the result of numerous fatal Controlled Flight Into Terrain (CFIT) accidents² and has been the subject of several National Transportation Safety Board recommendations. TAWS is also an internationally required aircraft equipment as standardized in the International Civil Aviation Organization (ICAO) Annex 6, "Operation of Aircraft." Thus, TAWS is considered a critical safety net for accident prevention worldwide.

As a measure of its effectiveness, there has not been a single passenger fatality due to a CFIT accident on an US Part 121 aircraft equipped with TAWS since the system became available in the late 1990s³. Prior to this date, CFIT was the leading cause of fatalities in commercial aviation.

In 2014, working paper ACP-WG-F30/WP-14, "Preliminary Study into Radio Altimeter Adjacent Band Compatibility,"⁴ was presented at ICAO. This study detailed an analysis of the interference on radio altimetry systems that could be caused by International Mobile Telecommunications (i.e. wireless broadband). The study concluded that, "there is the potential requirement for nearly 64 dB of [Out-Of-Band] isolation at the band edge to properly [protect] the receiver from false altitude errors."

While this preliminary analysis was made using several simplifying assumptions, it does indicate that the potential interference on radio altimeters from adjacent band wireless broadband equipment warrants close and careful analysis. The public interest would not be served if tens of thousands of existing aircraft worldwide were inadvertently no longer provided the safety protection enabled by radio altimetry equipment due to interference from adjacent bands, or were required to have existing equipment replaced with new equipment to tolerate the interference. Such a retrofit would require millions of dollars and years to accomplish.

² For example, Trans World Airlines Flight 514 on 1 December 1974: <http://libraryonline.erau.edu/online-full-text/ntsb/aircraft-accident-reports/AAR75-16.pdf> and American Airlines Flight 965 on 20 December 1995: https://www.nts.gov/safety/safety-recs/RecLetters/A96_90_106.pdf

³ See [https://www.skybrary.aero/index.php/SE001: Terrain Awareness Warning System \(TAWS\) - Final Report](https://www.skybrary.aero/index.php/SE001:Terrain_Awareness_Warning_System_(TAWS)_-Final_Report) and subsequent analysis of aircraft accident databases since 2006.

⁴ <https://www.icao.int/safety/acp/ACPWGF/ACP-WG-F-30/ACP-WGF30-WP14%20Radio%20Altimeter%20Adjacent%20Bands%20Compatibility%20Study%20with%20IMT-FINAL%20Rev1.docx>

Therefore, in consideration of the safety of over 60,000 ALPA pilots and the flying public at large, given (1) the critical contribution of radio altimeters to both safety of flight and efficiency of operations, (2) the universal installation of radio altimeters over several decades on domestic and international air transport aircraft, and (3) the potentially serious impact of interference from wireless broadband on radio altimeter systems, ALPA urges that:

- The Federal Aviation Administration (FAA) be included in any activity to assess wireless broadband use in the 3.7-4.2 GHz band
- FAA, FCC and National Telecommunications & Informational Administration (NTIA) take steps to ensure that interference on radio altimeters by mobile wireless systems in the 3.7-4.2 GHz band is fully analyzed and mitigated through appropriate technical and spectrum allocation regulation

If you have any questions, please do not hesitate to contact Randy Kenagy at 703.689.4388 or Randy.Kenagy@alpa.org. I thank you and the commission for your consideration of our comments in this matter.

Sincerely,

A handwritten signature in blue ink, appearing to read 'S. Jangelis', with a stylized flourish at the end.

Capt. Steve Jangelis
National Aviation Safety Chair
Air Line Pilots Association, International