



WORKING PAPER

HIGH LEVEL CONFERENCE ON COVID-19 (HLCC 2021)

SAFETY STREAM

Montréal, Canada, 12 to 22 October 2021

Agenda Item 5: Other issues to be considered by the Safety stream

SAFETY CONCERNS REGARDING INTERFERENCE TO AIRCRAFT RADIO ALTIMETERS

(Presented by International Air Transport Association (IATA), the International Business Aviation Council (IBAC), the International Coordinating Council of Aerospace Industries Associations (ICCAIA), the International Federation of Air Line Pilots' Associations (IFALPA) and RTCA)

EXECUTIVE SUMMARY

Radio altimeter is a mandated safety-critical aircraft system used to determine an aircraft's height above terrain. It is the only sensor onboard the aircraft capable of providing a direct measurement of the clearance height above the terrain and obstacles. Information from radio altimeters is essential for flight operations as a main enabler of several safety-critical functions and systems on aircraft. If not properly mitigated, harmful interference, potentially from imminent 5G C-band deployments, to the functions of the radio altimeter during any phase of flight - most critically during approach and landing phases - will pose a serious risk to flight safety. This paper outlines recommendations to mitigate the potential risks to flight safety by 5G deployment

Action: The High-Level Conference is invited to agree to Recommendation 5/x – Mitigating the risk of 5G implementation to safety-critical radio altimeter functions.

1. INTRODUCTION

1.1 Critical Roles of Radio (Radar) Altimeters on-board Aircraft

1.1.1 Radio altimeter is a mandated safety-critical aircraft system used to determine an aircraft's height above terrain. Globally operating at 4.2-4.4 GHz frequency range, the altimeter is the only sensor onboard the aircraft capable of providing a direct measurement of the clearance height above the terrain and obstacles. Information from radio altimeters is essential for flight operations as a main enabler of several safety-critical functions and systems on commercial aircraft as well as a wide range of other civil aircraft. Such functions and systems include, but not limited to, flight controls, terrain awareness, aircraft navigation and collision avoidance, wind shear detection, and functions to automatically land an aircraft.

¹ Arabic, Chinese, English, French, Russian and Spanish versions provided by IATA.

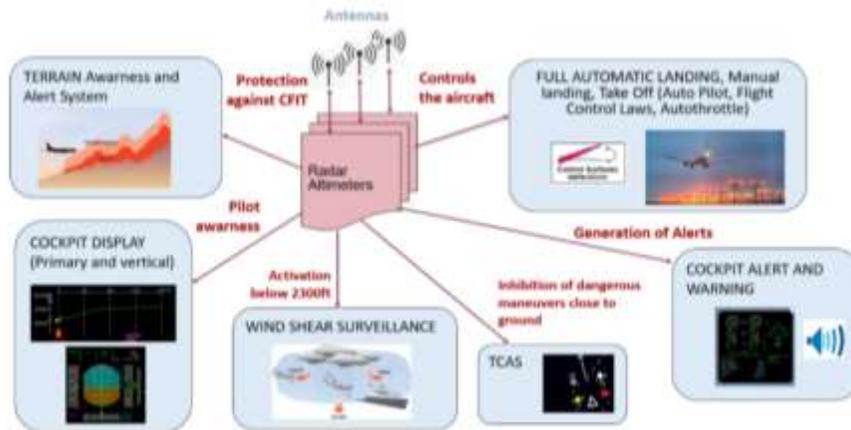


Figure 1: Functions of Aircraft Radio Altimeters

1.1.2 If not properly mitigated, harmful interference, potentially from imminent deployments of 5G telecommunication systems in C-band, to the functions of the radio altimeter during any phase of flight will pose a serious safety risk to passengers, crew, and people on the ground.

1.2 Global summary of 5G deployment proposals

1.2.1 Globally, auctions/proposals for 5G spectrum are being planned/conducted in various countries. As of this writing, the following figure summarized some 5G deployment proposals being considered.

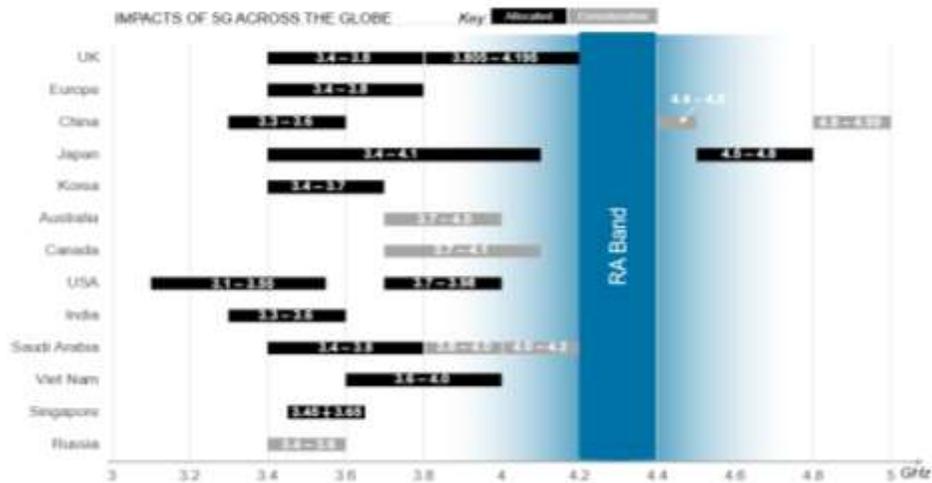


Figure 2: 5G proposals across the globe

1.2.2 Decisions on spectrum allocations rest fully within each national spectrum authorities, often the national telecommunication regulators. Adding to the complexity, 5G deployment proposals and associated conditions are varied technically from one country to another. The differences can be, for example, in terms of which spectrum will be considered for 5G, where the 5G transmitter can be located and what the maximum transmitting power 5G base station can use.

2. DISCUSSION

2.1 The collective global aviation community - through collaboration among pilots and spectrum, avionics, and aviation safety experts - formally recognizes and expresses safety concerns arising from harmful interference to radio altimeters, if not properly mitigated. Below are the concerns expressed.

2.1.1 **ICAO** — In ICAO State Letter dated 25 March 2021, ICAO Secretary General notes that *“harmful interference to the function of the radio altimeter during any phase of flight may pose a serious safety risk to passengers, crew and people on the ground”* and encourages *“Administration[s] to consider as a priority, public and aviation safety when deciding how to enable cellular broadband/5G services in radio frequency bands near the bands used by radio altimeters.”*

2.1.2 **IATA and IFALPA** — In a problem statement endorsed by ICAO Flight Operations Panel, IATA and IFALPA jointly states that *“the radar altimeter is one of the most critical components to an aircraft’s operations; and the only sensor onboard an aircraft providing a direct measurement of the aircraft’s clearance over the terrain or other obstacles. This information is the most critical information in many automated landing and collision avoidance systems. Undetected failure of this sensor can therefore lead to catastrophic results; and false alarms have the potential to undermine trust in the avionics systems.”*

2.1.3 **United States Department of Transportation** — During the hearing by the United States House Committee on Transportation and Infrastructure on the Biden Administration’s Priorities for Transportation Infrastructure, the US Secretary of Transportation Pete Buttigieg emphasized the *“very concern on the potential for harmful interference to radio altimeters”* and committed to engage with industries and in interagency conversations in upholding *“safety”* as the fundamental *“North Star.”*

2.1.4 **ICCAIA** — In its working paper to ICAO Frequency Spectrum Management Panel, ICCAIA *“strongly recommends administrations implement all practicable measures to ensure aviation safety and to provide sufficient time for the aviation industry to develop standards and implement mitigations that will permit 5G signals to be fully deployed in frequency ranges near that used by radio altimeters.”*

2.1.5 **RTCA** — The results in the recent RTCA Paper *Assessment of C-Band Mobile Telecommunications Interference Impact on Low Range Radar* *“revealed a major risk of harmful interference to radar altimeters on all types of civil and commercial aircraft caused by 5G telecommunications systems in the 3.7–3.98 GHz band in a broad range of operational scenarios. This risk is widespread and has the potential for broad impacts to aviation operations in the United States, including the possibility of Catastrophic failures leading to multiple fatalities. Further, this risk cannot be adequately mitigated by the aviation industry acting alone.”*

2.2 While the aviation community understands the economic importance of making spectrum available to support next generation commercial telecommunication systems, e.g. 5G, we insist that maintaining current levels of safety of passengers, flight crews, and aircraft must continue to be one of States’ and governments’ highest priorities.

2.3 In line with Article 4.10 of the International Telecommunication Union (ITU) Radio Regulation, we strongly urge the governments to reaffirm their commitments to aviation safety by providing all necessary considerations and regulatory measures to ensure that incumbent aviation systems and services are free from harmful interference. These measures need to be developed and deployed in consultation with aviation safety regulators, aviation subject matter experts and all impacted airspace users. Prior to making their decisions, governments should ensure that every frequency allocation/assignment is comprehensively

studied and is well proven not to adversely impact aviation safety and efficiency. Robust testing in coordination with aviation safety regulators and aviation subject matter experts is critically important in providing necessary information.

3. CONCLUSION

3.1 In closing, the aviation community would like to reaffirm its commitments in working with the Governments, aviation and telecommunication regulators and other stakeholders to ensure safe deployments of 5G. We stand ready to collaborate with government agencies and organizations to develop and identify suitable solutions and necessary mitigations.

3.2 Considering the above, the Conference is invited to agree to the following recommendation:

Recommendation 5/x – Mitigating the risk of 5G implementation to safety-critical radio altimeter functions

That States:

- a) consider as a priority, public and aviation safety when deciding how to enable cellular broadband/5G services in radio frequency bands near the bands used by radio altimeters;
- b) consult with aviation safety regulators, subject matter experts and airspace users, to provide all necessary considerations and regulatory measures to ensure that incumbent aviation systems and services are free from harmful interference; and

That ICAO:

- c) continue coordinated aviation efforts, particularly at the International Telecommunication Union (ITU), to protect radio frequency spectrum used by aeronautical safety systems.

— END —