

**57th CONFERENCE OF
DIRECTORS GENERAL OF CIVIL AVIATION
ASIA AND PACIFIC REGIONS**

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AGENDA ITEM 3: AVIATION SAFETY

5G ROLL-OUT AND AVIATION SAFETY

Presented by Bangladesh

SUMMARY

The latest generation of smartphones, 5G, has the potential to interfere with aircraft altitude equipment (radio altimeters), resulting in inaccurate altitude measurements. The potential phenomenon is due to "signal interference from a close frequency source of a strength that is similar or even superior to that of radio altimeters. Given the extent to which the safe interference limits are exceeded and the breadth of the impacts on aviation safety, the risk of harmful interference to radio altimeters cannot be adequately mitigated by the aviation industry acting alone. As such, stakeholders of the aviation industry, the mobile wireless industry, and both aviation and spectrum authorities are expected to understand and take necessary actions to limit this risk in a timely manner. This paper urges all these parties to collaborate to guarantee that safety-critical aviation systems are preserved for the sake of public safety with the Roll-out of 5G technology.

5G ROLL-OUT AND AVIATION SAFETY

1. INTRODUCTION

1.1 Radio altimeters can be used to support a variety of operations on board an aircraft and offer important data for safe aircraft operation. The roll-out of 5G telecommunications networks continues to expand globally at a rapid pace, with many nations electing to allocate currently unused spectrum that is located closer to the Aerospace Reserved Band used by Radio Altimeters, to 5G operations.

1.2 As a result, several National Aviation Authorities ("NAAs") have expressed concern that Radio Altimeters may be susceptible to interference from 5G telecommunications frequencies, resulting in the loss or failure of Radio Altimeter functioning.

1.3 To ensure aviation safety in the Overseas Territories, certain countries have imposed temporary technological, regulatory, or operational constraints on mobile telecommunications carriers and/or the aviation sector. It should be noted that other NAAs, like the FAA, CASA, and the UK CAA, have issued information bulletins on this topic.

1.4 According to information obtained from other NAAs, there have been no proven cases of 5G interference causing aircraft systems to fail or unexpected behavior. It's worth noting that 5G infrastructure isn't currently in place in certain places, and that previous performance isn't a guarantee for future applications.

2. DISCUSSION

2.1 Situational awareness of the flight crew is critical for safe flight operations on all types of aircraft, especially while flying in congested airspace, near the ground, or under low visibility conditions such as Instrument Meteorological Conditions (IMC). The Radio Altimeters, which operate at 4.2-4.4 GHz, are the only sensors onboard a civil aircraft that offers a direct measurement of the aircraft's clearance height over terrain or other impedimental operating conditions (i.e., the Above Ground Level - AGL - information). When the AGL is below 2500 feet, the Radio Altimeter systems' input is essential and utilized by several aircraft systems.

2.2 The loss of situational awareness for the flight crew is directly caused by the erroneous or unexpected behavior of the radio altimeter. This loss of situational awareness not only has an immediate impact on the flight crew's ability to maintain safe aircraft operation, but it also requires the flight crew to compensate for the lack of reliable height above ground information using other sensors and visual cues, if available. This also exposes the flight crew at risk of job saturation, particularly during operations or phases of flight that require constant crew participation, such as final approach and landing procedures. According to a 5G Task Force formed by a United States non-profit organization, namely Radio Technical Commission for Aeronautics (RTCA), there is a major risk that 5G telecommunications systems in the 3.7–3.98 GHz band will cause harmful interference to radio altimeters on all types of civil aircraft—including commercial transport airplanes; business, regional, and general aviation airplanes; and both transport and general aviation helicopters. If there is no proper mitigation, this risk has the potential for broad impacts on aviation operations in regions where the 5G network is being implemented next to the 4.2-4.4 GHz frequency band.

2.3 The RTCA report¹ provided a quantitative evaluation of radio altimeter performance regarding radio frequency interference from expected 5G emissions in the 3.7–3.98 GHz band as well as a detailed assessment of the risk of such interference occurring and affecting aviation safety, based on technical information provided by the mobile wireless industry and radio altimeter manufacturers. The RTCA does not consider the study as a final, one-time analysis, but rather as a starting point for continuing research and analysis to guarantee that radio altimeters continue to perform as intended, allowing for safe aircraft operations. The RTCA study urged more engagement with the mobile wireless telecommunications sector to enhance the analysis assumptions for such continuing work.

2.4 It should be mentioned that certain mobile phone makers are launching devices that can support 5G up to 4.2 GHz. This might pose comparable issues in any state if it decides to raise the 5G spectrum band to the 3.7-3.98 GHz range in the future. The "NAAs" must collaborate closely with the National Frequency Agency/Authority to ensure that long-term solutions for 5G and aviation safety are implemented. Furthermore, comprehensive evidence-based research is urgently needed to determine the impact of 5G on aircraft safety.

2.5 To prevent aircraft safety concerns associated with the 5G roll-out, a "whole of government" approach, as well as comprehensive stakeholder engagements, would be required for the safe and timely deployment of 5G in any county. With additional advancements in telecommunication technology, such as 6G, lessons must be learned for harmonizing other sensitive sectors. In this sense, adopting scientific regulation-making methods at the time of the spectrum auction would also be beneficial.

1 RTCA Paper No. 274-20/PMC-2073

3. ACTION BY THE CONFERENCE

3.1 The Conference is invited to:

- a) Evaluate and recognize the safety concerns as well as the potential operational consequences; abd
- b) Request states to adopt a "whole of government" approach to prioritize public & aviation safety while rolling out 5G services,

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