



ICAO ELEVENTH MEETING OF THE REGIONAL AVIATION SAFETY GROUP - ASIA AND PACIFIC REGIONS (RASG-APAC/11)

(Video Teleconference, 25-26 November 2021 at 10:00-13:00 hrs.
Bangkok Time, UTC+7)

Agenda Item 4 : ICAO / Member States / Industry Presentations

5G APPLICATION INTERFERENCE WITH AIRCRAFT ALTITUDE EQUIPMENT

(Presented by Hong Kong, China)

SUMMARY

Some Civil Aviation Authorities identified potential issue of 5G interference with radio altimeter (RA) and informed the aviation community. ICAO issued a State Letter SP 74/1-21/22 drawing Member States' attention about the potential safety risk related to the interference caused by 5G telecommunication signal to the aircraft on-board radio altimeters. Hong Kong, China has taken proactive actions with relevant parties. A working group consisting of subject matter experts (SME) from multiple domains was established to study and closely monitor global development of the issue. States/Administrations and industry are encouraged to share their experience under relevant contributory bodies of ICAO RASG-APAC and take early actions to manage the potential interference.

1. INTRODUCTION

1.1 The Radio Technical Commission for Aeronautics (RTCA) in the United States published a report in October 2020 revealing potential risk that 5G telecommunication systems in the 3.7-3.98 GHz band could cause harmful interference to radio altimeters (RA)¹ on all type of civil aircraft depending on the operational scenarios in the combination of 5G base station deployment configurations and aircraft operating conditions.

1.2 The French Civil Aviation Authority issued a Safety Information Leaflet in February 2021 to alert aircraft operators and air navigation service providers (ANSPs) of the potential risk of interference to the aircraft on-board RA and the associated systems caused by 5G signals.

1.3 Hong Kong, China participated in a web meeting on Asia Pacific Civil Aviation Authorities Continued Operational Safety Forum in February 2021. The topic of "5G Interference with Radar Altimeters" was presented by the Federal Aviation Administration (FAA) of the United States.

1.4 The ICAO issued a State Letter "Potential safety concerns regarding interference to Radio Altimeter" on 25 March 2021 acknowledging the concerns from CAAs, industry and public on the possible interference to RA by 5G signals. The RA, in operation frequencies between 4.2-4.4 GHz, is a mandated critical aircraft safety system used to determine an aircraft's height above terrain. Its information is essential for the normal functioning of various aircraft systems such as terrain awareness, aircraft collision avoidance, wind shear detection, flight controls, and automatic landing. The

¹ A radio altimeter, also known as radar altimeter or low range radio altimeter (abbreviate as RA, RALT or LRRR), measures altitude above the terrain presently beneath an aircraft by timing how long it takes a beam of radio waves to travel to the ground, reflect, and return to the aircraft.

interference of 5G signals to the proper functioning of the RA, if not mitigated, may pose a serious safety risk to persons on-board the aircraft and third parties, especially when the aircraft is at a critical phase of flight.

2. DISCUSSION

2.1 5G telecommunication network includes base stations and the Portable Electronic Device (PED) capable of using 5G bands and 5G cellular service in aircraft if available. In Hong Kong, China, the frequency bands allocated locally for telecommunication and wireless services using 5G technologies are 1.9-2.1, 3.3, 3.5, 4.9 and 26-28 GHz which are well within the frequency spectrum allocated by the International Telecommunication Union (ITU) and the local telecommunication authority. Despite the 5G frequency bands allocation in Hong Kong, China (or some other regions worldwide) are well away from the RA frequencies of 4.2-4.4 GHz, the CAD considered it prudent to bring the potential risk to the attention of the industry stakeholders in light of the information promulgated by the ICAO and other authorities.

2.2 The Civil Aviation Department (CAD) of Hong Kong, China has kept gathering information on the global development of the subject and convene relevant SMEs since February 2021 to conduct detailed study. It is noted that the actual effects of interference from the 5G base stations on aircraft operations are still uncertain and are under investigation by major aircraft manufacturers and industry stakeholders.

2.3 The CAD has issued an Aeronautical Information Circular (AIC) 23/19 in September 2019 (and later on an updated AIC 24/21 in August 2021) on the use of PED on Hong Kong registered aircraft to prohibit any transmission on cellular network from PED by setting to “airplane mode” whenever aircraft doors are closed, and altitude is below 10,000 feet; or can only connect to the cellular service provided by the aircraft (if available) offered by the operator when aircraft is above 10,000 feet or aircraft door is opened on the ground. At the moment, no on-board 5G cellular service is offered by any Hong Kong operators.

2.4 In April 2021, the CAD issued a Flight Operations Notice and updated it regularly to draw local operators’ attention regarding the potential interference to RA. Operators are reminded to remain vigilant on the possible harmful interference to the functioning of RA during any phase of flight by 5G signals. They were also requested to keep vigilance on possible interference on RA and report any RA anomalies to the CAD.

2.5 There is a growing trend for major airports to install 5G base stations. To properly understand, analyse and mitigate the potential risk of 5G interference, a holistic review with collaborative efforts from multiple domains are required. In this regard, the CAD has established a working group, with SMEs from flight standards and airworthiness, communications navigations and surveillance (CNS) engineering, radio frequency interference and spectrum management and 5G radio telecommunications to study the suspected occurrences and closely monitor development of the issue. Experts from aerodrome regulator and airport operator were also invited to join the working group.

2.6 Hong Kong, China noted that 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 presented a Working Paper (WP/30) on *Safety Concerns Regarding Interference to Aircraft Radio Altimeters* in the High Level Conference on COVID-19 (HLCC 2021) on 12 to 22 October 2021. HLCC 2021 agreed on the recommendations that States should consider public and aviation safety when deciding how to enable 5G services and should take measures to ensure that the aviation systems and services are free from harmful interference; and that ICAO should continue coordinate aviation efforts to protect radio frequency spectrum used by aeronautical safety systems.

2.7 It is noted that the FAA has recently issued a Special Airworthiness Information Bulletin on 2 November 2021 recommending RA manufacturers, aircraft manufacturers and operators voluntarily provide specific information to their authorities for further evaluation.

2.8 To facilitate a coordinate effort in the APAC Region, States/Administrations are encouraged to share their experience on managing the potential risk of 5G interference, take an early action to bring up the subject to the attention of their industry stakeholders (viz local operators, ANSPs, telecommunication authority, aerodrome regulator and airport operators, etc) and collect their returns on suspected occurrences, provide feedback to aircraft manufacturers to support their further studies, and keep relevant contributory bodies of ICAO RASG-APAC informed as appropriate. In the light of the wide coverage, the ICAO APAC Regional Office may wish to convene sharing opportunities.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) note the proactive actions taken by Hong Kong, China
- b) encourage States/Administrations and industry to:
 - (i) share their experience on managing the potential risk of 5G interference;
 - (ii) take an early action to bring up the subject to the attention of their industry stakeholders and collect their returns on suspected occurrences;
 - (iii) provide feedback to aircraft manufacturers to support their further studies;
 - (iv) keep relevant contributory bodies of ICAO RASG-APAC informed as appropriate; and
- c) seek assistance from ICAO APAC Regional Office to arrange more sharing opportunities.

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