International Civil Aviation Organization

Twenty Fifth Meeting of the Communications/ Navigation and Surveillance Sub-group (CNS SG/25) of APANPIRG

Video Tele-Conference, 18 – 22 October 2021

Agenda Item 4: Aeronautical Mobile Communications Service and Aeronautical electromagnetic spectrum utilization

4.3 Other issues related to aeronautical communications service and aeronautical radio spectrum management, especially on 5G implementation and potential impacts to aircraft radio altimeters

5G IMPLEMENTATION AND POTENTIAL IMPACTS ON AIRCRAFT RADIO ALTIMETERS

(Presented by the Secretariat)

SUMMARY

This paper presents the information about 5G implementation and potential impacts on aircraft radio altimeters, as well as the relevant actions by ICAO at regional and global level.

1. INTRODUCTION

1.1 The potential interference to Radio Altimeters or Inmarsat terminals onboard aircraft due to pressures to implement 5G in the adjacent band was reported mainly in USA and Europe, the APAC Office was informed through the ICAO FSMP and presented to the ITU Regional Radiocommunication Seminar 2020 for Asia & Pacific in October 2020.

1.2 The Fifth Meeting of the Spectrum Review Working Group (SRWG/5) of APANPIRG was held from 15 to 17 March 2021, the meeting discussed two papers on this issue and developed one action item for the group.

1.3 A State Letter was issued by ICAO HQ on 25 March 2021 to address potential safety concerns regarding interference to radio altimeters.

2. DISCUSSION

2.1 The potential interference to Radio Altimeters due to pressures to implement 5G in the adjacent band was reported mainly in USA and Europe, the APAC Office was firstly informed through the ICAO FSMP secretary and presented to the ITU Regional Radiocommunication Seminar 2020 for Asia & Pacific in October 2020, while there has been ZERO reports to this Office from Member States or IATA.

2.2 During the SRWG/5 meeting, France presented Working Paper(08) Actions Taken in France to Mitigate Interference into the Radio Altimeters Systems from 5G/MFCN in the band 3.4-3.8 GHz, and Boeing Australia presented Information Paper(03) Protection of interference to radio altimeters from 5G applications in the Asia-Pacific.

2.3 The SRWG/5 meeting developed an action item to follow up this issue:

ACTION ITEM 5-9: to take necessary follow up action at regional level, to support CAAs working with State's spectrum regulators to avoid the future safety issues on radio altimeter due to 5G implementation.

2.4 The papers and final report of the SRWG/5 meeting is available at: https://www.icao.int/APAC/Meetings/Pages/2020-SRWG5.aspx

2.5 On 25 March 2021, ICAO issued a state letter with the S**ubject**: *Potential safety concerns regarding interference to radio altimeters (Ref.: SP 74/1-21/22),* the Member States and Administrations are encouraged 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. The state letter is provided in **Appendix** to this paper.

2.6 However, this Office has not received any reports on this issue from Member States or stakeholders in the region.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

a) note with concern on the information in this paper and in the **Appendix**;

b) report to this Office in a timely manner once the interference to radio altimeters by these broadband technologies happens; and

c) discuss any relevant matter as appropriate.

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25 March 2021

Ref.: SP 74/1-21/22

Subject: Potential safety concerns regarding interference to radio altimeters

Action required: As indicated in paragraph 5

Sir/Madam,

1. I have the honour to bring your attention to an ongoing initiative by the International Civil Aviation Organization (ICAO) to ensure continued public and aviation safety.

2. During recent meetings of ICAO experts, concerns about interference to radio altimeters on-board aircraft have been raised. A number of administrations are currently considering or have already begun deploying new cellular broadband technologies (such as 5G) in the frequency bands close to the radio altimeter's frequencies of operation (4.2-4.4 GHz), a critical aviation safety system. The international aviation industry has noted with concern that these broadband technologies may cause harmful interference to radio altimeters.

3. The radio altimeter[1] is a mandated critical aircraft safety system used to determine an aircraft's height above terrain. Its information is essential to enable several safety related flight operations and navigation functions on all commercial aircraft as well as a wide range of other civil aircraft. Such functions and systems include terrain awareness, aircraft collision avoidance, wind shear detection, flight controls, and functions to automatically land an aircraft. If not properly mitigated[2], 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.

4. ICAO has received studies from several States and organizations regarding the interference potential to radio altimeters[3]. These studies generally conclude that some radio altimeters will be impacted

[1] In some aviation publications it is also known as the radar altimeter or Low Range Radar Altimeter.

[2] General guidance on Interference Protection Considerations can be found in Chapter 9 of the *Handbook on Radio Frequency Spectrum Requirements for Civil Aviation – ICAO spectrum strategy, policy statements and related information* (Doc 9718, Volume I)

[3] Report by RTCA – https://www.icao.int/safety/FSMP/MeetingDocs/FSMP%20WG11/IP/FSMP-WG11-IP07_RTCA_Report.docx

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if high power cellular systems are implemented near the frequency band used by radio altimeters. Several States have already implemented temporary technical, regulatory and operational mitigations on new 5G systems in order to protect radio altimeters while more permanent solutions are being devised[4].

5. I encourage you and your Administration 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.

Accept, Sir/Madam, the assurances of my highest consideration.

Fang Liu
Secretary General

[3] Report of Australian national study (*IP03 WG/10 meeting – ACMA options consultation meeting*) – https://www.icao.int/safety/FSMP/MeetingDocs/FSMP%20WG11/WP/FSMP-WG11-WP13_Status%20on%20replanning%20the%203700-4200%20MHz%20band%20in%20Australia.doc

[3] Report of Japanese national study and mitigations - https://www.icao.int/safety/FSMP/MeetingDocs/FSMP%20WG11/WP/FSMP-WG11-WP30_5GJapan.docx

[3] Report of UK CAA study – https://www.icao.int/safety/FSMP/MeetingDocs/FSMP%20WG11/WP/FSMP-WG11-WP27_Mobile%20vs%20Radalt%20REv.1.docx

[3] Report of French national mitigations - https://www.icao.int/safety/FSMP/MeetingDocs/FSMP%20WG11/IP/FSMP-WG11-IP03_5G%20vs%20RA%20Actions%20taken%20in%20France%20to%20mitigate%20interference_r1.doc

[4] For example, ICAO has been informed of longer-term work being initiated by several aviation standard-making organizations to update radio altimeter standards. Part of that update will include improved tolerance of interference.