International Civil Aviation Organization
North American, Central American and Caribbean Office

WORKING PAPER

Rev. NACC/DCA/10 — WP/06 **Rev.**
17/06/22

Tenth North American, Central American and Caribbean Directors of Civil Aviation Meeting (NACC/DCA/10)

Martinique, France, 21 to 23 June 2022

Agenda Item 5: NAM/CAR Regional Safety/Air Navigation Implementation
5.2 Safety Implementation Matters

INTERFERENCE IN AERONAUTICAL OPERATIONS DUE TO IMPLEMENTATION OF 5G TECHNOLOGY

(Presented by the Secretariat)

EXECUTIVE SUMMARY	
This Working paper presents a summary of the information shared to the States of the Region to pay attention to the safety of aeronautical operations due to the implementation of 5G technology.	
Action:	The suggested actions are presented in Section 3.
Strategic Objectives:	Safety
References:	• NAM/CAR/SAM Workshop on the ICAO Position for the International Telecommunication Union (ITU) World Radiocommunication Conference (2023) (WRC-23), online, 20 October 2021: https://bit.ly/3PWTND4 • ICAO Frequency Spectrum Management Panel (FSMP) and 2023 World Radiocommunication Conference (WRC-23) Workshop, Online, 21- 22 February 2022: https://bit.ly/3zf1VJt • GREPECAS Programmes and Projects Committee (PPRC) Fourth Virtual Meeting (ePPRC/04), Online, 21 – 22 April 2022: https://bit.ly/3zcJ0yG

1. Introduction

1.1 The radio altimeter is a critical and mandatory safety system on many aircraft, used to determine the height of an aircraft above the ground. Its information is essential to enable various flight operations (approaches and take-offs, mainly) and functions that support the safety of navigation, installed on all commercial aircraft, as well as on a wide range of non-commercial aircraft. Such system functions involve terrain situational awareness, aircraft collision avoidance, flight control data, and aircraft automatic landing support functions. If not adequately mitigated, frequency interference alters the operation of the radio altimeter during any phase of the flight and can pose a serious risk to the safety of operations and therefore of passengers, crew and people and facilities on land.

1.2 The ICAO NACC Regional Office has developed a series of events and has sent communications to the States of the region to consider the impact of the implementation of 5G technology for cellular telephone services in aeronautical operations, due to the fact that 5G technology operates in the frequency range 3.4 - 4.2 GHz and 4.4 - 4.9 GHz, which are bands adjacent to the frequency in which aircraft radio altimeters operate (4.2 - 4.4 GHz).

1.3 The problems affecting aeronautical operations may vary due to the technology and platform to be used, and mainly due to the avionics of the fleet. ***This is an aeronautical safety problem, which must be taken very seriously by the States.***

1.4 A serious risk for aviation safety: it implies potentially catastrophic consequences, for which States must anticipate and mitigate the following risks:

- States should consider this risk as a safety issue and consider aviation and public safety as a priority when deciding how to enable cellular/5G broadband services in radio frequency bands close to the bands used by radio altimeters.
- If not adequately mitigated, harmful interference to the operation of the radio altimeter during any phase of flight can pose a serious risk to the safety of passengers, crew and those on the ground.
- An undetected failure of the radio altimeter can lead to catastrophic results for those on board the aircraft and on the ground (ICAO); and false alarms have the potential to reduce confidence in avionics systems.
- Similar concerns have been formally expressed by the International Coordinating Council of Aerospace Industries Associations (ICCAIA), the Radio Technical Commission for Aeronautics (RTCA), and the US Department of Transportation.

2. Analysis

2.1 States must address this issue immediately and implement the necessary mitigating measures to ensure operational safety and avoid interference in the operating frequency of the radio altimeter.

2.2 If the necessary mitigations are not implemented, States may face the following problems in their operations:

- Limitation/suspension of precision approach and landing capabilities.
- Limitation/suspension of night operations, particularly for airports with challenging terrain.
- Failure to issue state regulations requiring modifications and recertification of aircraft radio altimeters and other related functions.
- Decrease in operational safety at its airports due to interference in the radio altimeter frequency.
- Incidents.

2.3 During the GREPECAS Programmes and Projects Committee (PPRC) Fourth Virtual Meeting (ePPRC/04), the following decision was made:

<table>
<tr><td colspan="2">DRAFT CONCLUSION
ePPRC/04/01</td><td colspan="2">MITIGATION MEASURES AGAINST POTENTIAL INTERFERENCE DERIVED FROM THE IMPLEMENTATION OF 5G TECHNOLOGY</td></tr>
<tr><td colspan="3">What:
That, in view of the possible impact/interference due to the implementation of 5G technology in the operations of commercial aircraft and general aviation radio-altimeters, the States/Territories of the CAR/SAM Regions:

a) conduct an analysis that includes the domestic aircraft fleet, telecommunication companies, and spectrum management agencies to assess the impact of this technology on aviation operations;
b) based on the results of the impact analysis, develop and implement the necessary mitigation mechanisms to prevent interference to radio altimeter operations; and
c) inform the NACC and SAM Regional Offices by GREPECAS/20 meeting of the measures implemented in order to share this information among the States.</td><td>Expected impact:
☐ Political / Global
☒ Inter-regional
☐ Economic
☐ Environmental
☒ Operational/Technical</td></tr>
<tr><td colspan="4">Why:
It is important for States to analyze this impact and integrate mitigation measures aimed at ensuring safety.</td></tr>
<tr><td>When:</td><td>By GREPECAS/20 Meeting</td><td>Status:</td><td>☒ Valid / ☐ Superseded / ☐ Completed</td></tr>
<tr><td>Who:</td><td>☒ States ☐ ICAO ☐ Other:</td><td colspan="2">All CAR and SAM States.</td></tr>
</table>

2.4 It is necessary for States to immediately carry out the recommendations set forth in Conclusion ePPRC/04/01, with the objective that their aeronautical operations maintain safety levels and that the implementation of 5G technology does not increase operational risks.

3. Suggested actions

3.1 The Meeting is invited to:

a) address this issue in their States immediately;
b) carry out the recommendations set forth in Conclusion ePPRC/04/01;
c) implement the corresponding mitigating measures;
d) monitor and evaluate these mitigation measures; and
e) any other corresponding activity.

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