

ADVISORY CIRCULAR

Subject	Date	AC Number	Version
UNDESIRED IMPACT OF 5G NETWORKS ON AIRBORNE RADIO ALTIMETERS	Jan 6 th , 2022	091-01	1.0

Note: This Advisory Circular is published to provide additional information and recommended actions that further elaborates on provisions or concepts prescribed in the GACAR.

1. Introduction.

1.1 Purpose.

The purpose of this advisory circular is to:

- elaborate on the risk of interference from cellular broadband technologies 5G signals on airborne radio altimeters and on-board equipment;
- inform aircraft operators and air traffic service providers about this risk; and
- recommend precautionary operational measures before confirmation of impact of 5G radio waves on radio altimeters.

1.2 Applicability.

This advisory circular is applicable to all operators of aircraft equipped with radio altimeters and air traffic service providers within the Kingdom of Saudi Arabia.

1.3 Cancellation.

This is the first official version of this advisory circular, and it cancels no other advisory circular on the subject matter.

1.4 Related Regulatory references

- GACAR Part 5, § 5.71
- GACAR Part 4, § 4.25

1.5 Related Reading Materials

- a) RTCA report “Assessment of C-Band Mobile Telecommunications Interference Impact on Low Range Radar Altimeter Operations” (RTCA Paper No. 274-20/PMC-2073) available at: https://www.rtca.org/wp-content/uploads/2020/10/SC-239-5G-Interference-Assessment-Report_274-20-PMC-2073_accepted_changes.pdf
- b) FAA Statement on 5G available at: <https://www.faa.gov/newsroom/faa-statement-5g>
- c) FAA Special Airworthiness Information Bulletin (SAIB AIR-21-18 Date: Nov 2, 2021) available at : [https://rgl.faa.gov/Regulatory_and_Guidance_Library/rgSAIB.nsf/dc7bd4f27e5f107486257221005f069d/27ffcbb45e6157e9862587810044ad19/\\$FILE/AIR-21-18.pdf](https://rgl.faa.gov/Regulatory_and_Guidance_Library/rgSAIB.nsf/dc7bd4f27e5f107486257221005f069d/27ffcbb45e6157e9862587810044ad19/$FILE/AIR-21-18.pdf)
- d) FAA Safety Alert for Operators (SAFO 21007 Dated Dec 23rd,2021) available at : https://www.faa.gov/other_visit/aviation_industry/airline_operators/airline_safety/safo/all_safos/medi_a/2021/SAFO21007.pdf
- e) French DGAC SAFETY INFO LEAFLET N° 2021/01 available at: https://www.ecologie.gouv.fr/sites/default/files/Safety_Info_Leaflet_2021_01_5G_interferences.pdf
- f) UAE GCAA SAFETY ALERT 2021- 03 available at: <https://www.gcaa.gov.ae/en/epublication/admin/Library%20Pdf/Safety%20Alerts/SAFETY%20ALERT%202021-03%20-%20REQUIREMENTS%20TO%20MITIGATE%205G%20INTERFERENCE%20OPERATIONAL%20RISKS%20-%20ISSUE%2001.pdf>

1.6 Definitions of Terms Used in this Advisory Circular.

5G networks - Digital cellular networks operating in bands 3.7 – 4.2GHz
For other definitions, refer to Subpart A of GACAR Part 1.

1.7 Approval

This advisory circular has been approved for publication by the Assistant President Aviation Standards Sector of the General Authority of Civil Aviation.

2. Background

- a) Since the introduction of new cellular broadband technologies (such as 5G) in the frequency bands close to the airborne 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.
- b) In ICAO state letter (ref: SP 74/1-21/22 Dated 25 March 2021), the ICAO indicated that it received studies from several States and organizations regarding the potential interference with radio altimeters. These studies generally conclude that some radio altimeters will be impacted 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 to protect radio altimeters operations while more permanent solutions are being devised.
- c) Upon acknowledgment of the above, GACA has been in synchronization with the development of the international efforts aimed towards mitigating the potential risks of airborne radio altimeter interference imposed by 5G cellular broadband technologies. Moreover, GACA is working closely with the Communications and Information Technology Commission (CITC) of the Kingdom of Saudi Arabia to continuously evaluate and devise the most effective mitigation means.
- d) Hence, this advisory circular is aimed to raise the awareness of all affected parties of the potential safety hazards imposed on airborne radio altimeters due to interference from 5G cellular broadband technologies and to provide operational recommendations for effective mitigation.

3. Operational Recommendations

- a) Operators and pilots of aircraft equipped with radio altimeters:
- 1) Remind passengers that all portable electronic devices allowed for transport in checked baggage (including smartphones and other devices) should be turned off and protected from accidental activation.
 - 2) Remind passengers to set all portable electronic devices in the cabin and any carried on the aircraft to a non-transmitting mode or turn them off.
 - 3) Instruct crew to use 3G or 4G communication devices only when essential communication is required, such as during emergency medical service operations.
 - 4) Operators should ensure their pilots are aware of the potential degradation of the radio altimeter capabilities and any means to compensate for in-flight radio altimeter anomalies. Consider both erroneous altimeter readings and loss of altimeter function.
 - 5) Operators should ensure their pilots are aware of the potential degradation to the capabilities of safety systems and other equipment dependent upon radio altimeters and any means to compensate for resulting anomalies. Consider both the loss of function of the safety systems and other dependent systems and the manners in which they may malfunction.
 - 6) Operators should consider the potential loss of pilot trust in dependent aircraft safety systems in the assessment of existing and the development of new crew procedures. Moreover, they should use SMS promotion channels or standard operating procedure to inform pilots about this phenomenon's details and its effect on the operations.
 - 7) Operators should seek information from the manufacturers of the aircraft and the radio altimeter on possible effects of harmful interference due to wireless broadband deployment in (5G) and possible pilot interventions.
 - 8) Operators should evaluate the geographical areas of the aerodromes/ heliports used, with attention to those aerodromes where Low Visibility Operation Cat 1/2/3 is possible with 5G network base stations in the approach area. If a 5G network is present, operators should make pilots aware of the hazard of RA malfunction.

- 9) Operators and pilots who experience radio altimeter anomalies should notify air traffic controllers as soon as practical. Reports should include as much details as possible and include information to describe radio altimeter anomalies. A copy of the report must be sent to GACA.
 - 10) Operators with established Flight Data Analysis Systems (FDA) should adapt their FDA to identify (5G) interference events on airborne radio altimeters and report such events to GACA.
- b) Air Traffic Service Providers should inform their controllers or AFIS staff regarding the possibility of receiving pilot reports on (5G) interference events on airborne radio altimeters and to promptly report such events to GACA.