



06 April 2022

Mr Arun Kumar
Director General
Directorate General of Civil Aviation
New Delhi - 110003
India.

Dear Mr Arun Kumar,

5G Interference to Aircraft Radio Altimeters

IATA would like to draw your attention to ICAO's State Letter SP 74/1-21/22 dated 25 March 2021, a copy of which is annexed. In this letter, the ICAO Secretary General had noted that harmful interference to the functioning of radio altimeter may pose a serious safety-risk to passengers, crew, and people on the ground. ICAO's letter also mentioned that "some radio-altimeters will be impacted, if high power cellular systems are implemented near the frequency band used by radio altimeters".

IATA also takes note of the reply by the Hon'ble Minister of state for Communications, tabled in the Parliament on 16 March 2022, stating that the frequency band for rollout of 5G technology in India is 3.3-3.67 GHz; and that it is sufficiently spaced out from the 4.2-4.4 GHz band used for radio altimeters in aircraft. The reply also stated that there is currently no plan to conduct a specific study on potential risks to flight-safety likely to be caused by the rollout of 5G services. We also understand that the government is planning to launch the 5G spectrum auctions in May/June 2022.

Radio altimeter is one of the most critical components to an aircraft's operations; and the only sensor onboard an aircraft providing a direct measurement of the aircraft's clearance over terrain or other obstacles. Undetected failure of this sensor can therefore lead to catastrophic results, and false alarms have the potential to undermine trust in aircraft avionics. 5G interference risk in C-Band, if not appropriately mitigated, has the potential for broad impact to aviation safety and operations¹.

IATA does recognize the economic importance of making spectrum available to support next generation commercial telecommunication systems. This however needs to be balanced with the criticality of aviation safety being accorded the highest priority. Article 4.10 of the International Telecommunication Union (ITU) Radio Regulation states that "Member States recognize that the safety aspects of radionavigation and other safety services require special measures to ensure their freedom from harmful interference; it is necessary therefore to take this factor into account in the assignment and use of frequencies."

IATA is urging State regulators, including India, to reconfirm that prior to the governments' decisions on deployment of 5G in C-Band, national telecommunication spectrum regulators have established and ensured adequate safeguards and mitigations to protect critical aircraft safety systems, such as radio altimeters, from potential harmful interference; and that appropriate technical and operational evaluations and sufficient aviation safety assessment has been conducted and accepted by aviation safety regulators. It is important to note that, to adequately mitigate aviation safety risk due to potential 5G C-Band interference, the aviation industry cannot

¹ Harmful 5G C-Band interference needs to be analysed on its impact to the use of existing radio altimeters during the Instrument Landing System (ILS) Instrument Approach Procedures (IAP) CAT-II/III, the Required Navigation Performance (RNP) procedures with Authorisation Required (AR); the use of Enhanced Flight Vision System (EFVS) to touch down; Manual Flight Control Guidance system operations to landing/head-up display (HUD) to touch down operation; and Auto landing operations.

act alone and cooperation from State spectrum and aviation regulatory bodies are necessary to put in place robust and enforceable mitigations through State regulations.

Examples of possible enforceable mitigations that have been put in place by some national telecommunication regulators to ensure safe co-existence between aircraft-safety and 5G C-Band deployments, include the combination of:

- Adequate spectral separation between 5G C-Band deployments and the 4.2-4.4 GHz being used by aircraft radio altimeters, and
- Restricting transmission characteristics, including 5G maximum power limits and antenna patterns/angle, and
- Adequate prohibition and precautionary zones around airports and runways.

IATA would request your consideration on the above. Prior to the finalization of terms and conditions for upcoming auctions of 5G C-Band roll-outs, IATA would appreciate a confirmation from the DGCA that aviation safety evaluation(s) addressing 5G interference concern has been conducted, and that appropriate national spectrum regulations have been put in place with enforceable mitigations to the satisfaction of the DGCA, such that no aviation safety will be compromised, nor flight operations will be interrupted.

IATA thanks you for your cooperation.

Yours sincerely,

Philip Goh
Regional Vice President
Asia Pacific

Encl:

Annex I – ICAO State Letter SP 74/1-21/22

Annex II – Risk Mitigation Strategies and Next Steps

SRWG/6
Appendix A to WP/12



International Civil Aviation Organization	Organisation de l'aviation civile internationale	Organización de Aviación Civil Internacional	Международная организация гражданской авиации	منظمة الطيران المدني الدولي	国际民用 航空组织
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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 altimeter¹ 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 mitigated², 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 altimeters³. 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

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 devised⁴.

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_rl.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.

: 5G interference – Aviation Risk Mitigation Strategies:

1. The ICAO High-Level Conference on COVID-19 (HLCC) recommendation for mitigating the risk of 5G implementation to safety-critical radio altimeter functions notes:

That States:

- a) *consider, as a priority, public and aviation safety when deciding how to enable cellular broadband/5G services;*
- b) *consult with aviation safety regulators, subject matter experts and airspace users, to provide all necessary considerations and regulatory measures to ensure that incumbent aviation systems and services are free from harmful interference; and*

That ICAO:

- c) *continue coordinated aviation efforts, particularly at the International Telecommunication Union (ITU), to protect radio frequency spectrum used by aeronautical safety systems.*

2. As a minimum, some actions and regulatory measures need to be taken and put in place to safeguard the use of radio altimeters. Some States have set an example by cooperating with 5G network providers with regards to provision of location information for their stations, as well as details of the transmission characteristics (e.g., antenna radiation patterns, power levels) required.

The measures adopted include:

- a) **Adequate Buffer Zones:** limiting the installation of 5G stations within 2-3 km of the approach ends of runways; declaring 'no-go zones' in the vicinity of airports; establishing permanent buffer zone safeguards.
- b) **Restricting Transmission Characteristics:** limiting 5G transmission power and the angle of antennas, i.e., low power transmission around airports with a downward-looking radiation pattern for 5G transmitting station masts.
- c) **Timely Assessment:** conducting timely surveillance and test flights to proactively ascertain the actual levels of 5G transmissions and potential harmful interference effects.
