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 State / Industry Presentations

POTENTIAL INTERFERENCE TO AIRCRAFT RADIO ALTIMETER BY 5G TELECOMMUNICATIONS SYSTEM

(Presented by Singapore, co-sponsored by Bangladesh, Fiji, Indonesia, New Zealand and Thailand)

SUMMARY

The impending rollout of 5G cellular systems worldwide may result in potential interference with the aircraft radio altimeter system. While there have been no incidents reported, States/Administrations should collaborate to prevent any potential safety risk to the aviation safety system.

1. INTRODUCTION

1.1 The 5G cellular system has brought about greater speed in data transmissions, lower latency and ability to interconnect a high number of devices. However, the 5G system may also inadvertently interfere with the normal operation of aircraft radio altimeters, which is the only system providing information to other aircraft systems on the height of the aircraft above the terrain. With the imminent push towards 5G network launches worldwide and the issue of potential interefence, States/Administrations and industry need to collectively work towards mitigating any safety risk to flight operations.

2. DISCUSSION

2.1 This issue of potential interference by 5G networks has gathered significant interest globally. Administrations and major aviation organisations have collectively published reports, and issued advisories on this issue.

2.2 In October 2020, the US Radio Technical Commission for Aeronautics (RTCA) released a report (RTCA Paper No. 274-20/PMC-2073) on its assessment of the 5G frequency band, at 3.7 to 3.98 GHz, which could potentially interfere with radio altimeter systems operating at 4.2 to 4.4 GHz. The report analysed the effects of 5G base stations, and of 5G user equipment on the ground and onboard aircraft, on aircraft in the landing phase. The report suggested for the aviation industry, mobile wireless industry and both aviation and spectrum regulators to take appropriate action to mitigate any potential interference.

2.3 At the October 2021 ICAO High Level Conference on COVID-19 (HLCC), IATA, IBAC, ICCAIA, IFALPA and RTCA presented WP/30 on safety concerns regarding 5G interference on aircraft radio altimeters. The paper stressed the importance of the radio altimeter as a mandated safety-critical aircraft system, and noted the following:

i) Cellular broadband/5G services should not be in radio frequency bands near the bands used by radio altimeters;

ii) Undetected failures can lead to catastrophic results and false alarm may undermine trust in the avionics systems;

iii) Sufficient time should be provided to develop standards and implement mitigations that will allow 5G signals to be fully deployed for frequencies near those being used by radio altimeters;

iv) Economic importance of next generation commercial telecommunication system must not compromise aviation safety; and

v) Frequency allocation/assignment should be comprehensively studied and proven not to adversely impact aviation safety and efficiency.

2.4 On 2 November 2021, the US FAA issued a Special Airworthiness Information Bulletin (SAIB) to advise the aviation community on managing this potential interference. The SAIB recommends that radio altimeter manufacturers, aircraft manufacturers, and US operators provide information to the FAA on altimeter system design and functionality, deployment and usage of radio altimeters on aircraft for further analysis.

2.5 Noting such potential interference by 5G networks, CAAS engaged its local telecommunication operator to conduct a trial in March and August 2021. The aim was to assess potential 5G interference with the radio altimeter of aircraft arriving and departing at Changi Airport. Air operators and air traffic control were notified, and a mobile 5G base station was deployed in the vicinity of the airport. The trial was completed satisfactorily without any report of anomalies to the radio altimeter system. It is however noted that the 5G frequency band used by Singapore is 3.45 to 3.65 GHz, which is further from the frequency band used by radio altimeters (4.2 GHz to 4.4 GHz) and the 5G frequency band used in some other countries.

2.6 As 5G becomes ubiquitous, it is important that frequencies used by 5G cellular systems do not interfere with well-established aviation systems. With the worldwide 5G frequency band allocation ranging from about 3.1 to 4.1 GHz and 4.4 to 4.99 GHz, consideration must be given to manage potential interference from these frequencies when developing long term solutions. While awaiting the development of hardware upgrades, for example to the frequency band filters of radio altimeters, we will need near term mitigating actions for continued safe flight operations. This could include for example coordinating with telecommunication authorities on the location of 5G installations near airports to minimise the risk of interference. Any anomaly perceived as potentially linked to 5G interference should be reported to the responsible authorities for data collection and analysis. This is important as the interconnectedness of cities and expected broad deployment of 5G systems may result in unintended consequences.

3. ACTION BY THE MEETING

3.1 The Meeting is invited to:

a) Encourage States/Administrations to share with their telecommunications authorities on possible potential 5G interference with aircraft radio altimeter for 5G installations near airports;

b) Encourage States/Administrations and industry to liaise with States of Design and aircraft manufacturers to mitigate the potential interference of 5G networks on aircraft radio altimeters; and

c) Encourage States/Administrations and industry to provide feedback on reports of interference from 5G networks.

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