Via Email: ic.spectrumauctions-encheresduspectre.ic@canada.ca

26 October 2020

Innovation, Science and Economic Development Canada
c/o Director, Spectrum Regulatory Best Practices
235 Queen Street
6th Floor, East Tower
Ottawa, ON K1A OH5

Re: ***Consultation on the Technical and Policy Framework for the 3650-4200 MHz Band and Changes to the Frequency Allocation of the 3500-3650 MHz Band, Canada Gazette,*** **Part I, August 2020, Notice No. SLPB-002-20.**

Attached, please find joint comments of The Boeing Company, Air Line Pilots Association, International (ALPA), Canadian Business Aviation Association (CBAA), Bombardier Aerospace, MHI RJ Aviation Group (MHIRJ), Air Canada Pilots Association (ACPA), Collins Aerospace, and the International Air Transport Association (IATA) in response to Innovation, Science and Economic Development Canada's *Consultation on the Technical and Policy Framework for the 3650-4200 MHz Band and Changes to the Frequency Allocation of the 3500-3650 MHz Band, Canada Gazette,* Part I, August 2020, Notice No. SLPB-002-20.

The undersigned aviation industry stakeholders welcome the opportunity to provide comments on the critical aviation safety issues raised in Questions 51 and 55(f) of the Consultation.

Yours truly,

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Q51 - ISED is seeking comments on its proposal to not implement any technical requirements for the coexistence between flexible use operation in the 3650-3980 MHz band and radionavigation operations in the 4200-4400 MHz band, noting the 220 MHz frequency separation between the bands of operation. If this is not sufficient for coexistence, what other measures would be appropriate?

The aviation industry stakeholders applaud the Department's recognition of the need for protection in order to prevent interference between flexible use service in 3650-3980 MHz and aeronautical radionavigation and aeronautical mobile (route) services in 4200-4400 MHz. While the Federal Communications Commission (FCC) approach to protect radio altimeters onboard airplanes and helicopters, as well as the operation of Wireless Avionics Intra-Communications (WAIC) systems onboard aircraft is by placing 220 MHz of frequency separation between the two services, studies show this is a necessary but insufficient measure to fully avoid harmful interference. ISED should consider implementing additional measures in order to protect the flying public.

As the Consultation points out in Section 180, the FCC's decision acknowledged that more study was warranted on whether the technical limits (namely, power and emissions) imposed on 5G, coupled with the 220 MHz guard band is sufficient to protect aeronautical safety services. Aviation stakeholders note that, in the time since the FCC decision was adopted, the aviation industry has further studied this issue within RTCA, Inc. (formerly known as the Radio Technical Commission for Aeronautics), a multi-stakeholder forum that develops consensus-based technical recommendations for use by government regulatory authorities and by industry.

RTCA Special Committee 239 (SC-239), which is generally focused on protecting Radar Altimeters; also referred to as radio altimeters, low range radar/radio altimeters; from existing and planned 'in band' and 'out of band' interferences, formed a 5G Task Force in April 2020 specifically to lead studies on how to adequately characterize the performance of currently fielded radio altimeters operating in the presence of radio frequency (RF) interference from 5G networks in the 3.7–3.98 GHz band, as well as to examine the risk of harmful interference and associated impacts to safe aviation operations, such that appropriate mitigations could be developed and employed.

The report, entitled "Assessment of C-Band Mobile Telecommunications Interference Impact on Low Range Radar Altimeter Operations (RTCA Paper No. 200-20/PMC-2042)" was approved by the RTCA Program Management Committee on October 8, 2020, and subsequently filed into the FCC docket on October 9, 2020. The full text of the report can be found here: https://www.rtca.org/wp-content/uploads/2020/10/SC-239-5G-Interference-Assessment-Report_274-20-PMC-2073_accepted_changes.pdf

Using technical information supplied by the mobile wireless industry and radar altimeter manufacturers, this report provides a quantitative evaluation of radar altimeter performance regarding RF interference from expected 5G emissions in the 3.7–3.98 GHz band, as well as a detailed assessment of the risk of such interference occurring and the impact to aviation safety.

This process included testing of actual radar altimeter equipment to empirically determine their tolerance to expected 5G interference signals; the development of interference models and assumptions to predict the received interference levels across a wide range of operational scenarios, such that they may be compared to the empirical tolerance limits; and a thorough study of multiple real-world operational scenarios for civil aircraft in which the presence of the expected 5G interference will result in a direct impact to aviation safety.

The results presented in this report reveal a major risk that 5G telecommunications systems in the 3.7–3.98 GHz band will cause harmful interference to radar altimeters on all types of civil aircraft—including commercial transport airplanes; business, regional, and general aviation airplanes; and both transport and general aviation helicopters. The results of the study performed clearly indicate that this risk is widespread and has the potential for broad impacts to aviation operations, including the possibility of catastrophic failures leading to multiple fatalities, in the absence of appropriate mitigations. The extent of the RF interference is summarized by the worst-case exceedance of the safe interference limit of radar altimeters by expected 5G signals in the 3.7–3.98 GHz band:

- 14 dB for commercial transport airplanes
- 48 dB for business, regional, and general aviation airplanes
- 45 dB for helicopters

Further, the impacts are not only limited to the intentional emissions from 5G systems in the 3.7–3.98 GHz band, but also the spurious emissions from such systems within the protected 4.2–4.4 GHz radar altimeter band directly. In this latter case, the worst-case exceedance of the safe interference limit is:

- 28 dB for business, regional, and general aviation airplanes
- 12 dB for helicopters

Therefore, based on the findings and conclusions in the RTCA report, the aviation industry stake holders expect that further mitigation requirements –in addition to a 220 MHz guard band—will need to be considered for the coexistence between flexible use operation in the 3650-3980 MHz band and radionavigation operations in the 4200-4400 MHz band. We look forward to working with ISED to ensure that safety-critical aviation systems will continue to be protected for the purposes of public safety.

Q55 - ISED is seeking comments on what elements from sections 7 to 10 of this consultation would still apply or need to change if ISED were to implement the Telesat proposal, in particular:

f) technical considerations for coexistence between flexible use systems and aeronautical radionavigation systems

For the reasons detailed in our response to Q51, aviation industry stakeholders strongly oppose the implementation of Phase II of the Telesat proposal, which would facilitate clearing of an additional 100 MHz (up to 4100 MHz) by 2025 for flexible use service and therefore would not provide the critical technical safety measures needed to protect the flying public. Notably, in its analysis of the various sharing scenarios with other services, Telesat simply does not consider the need to protect the public.

Radar altimeters are deployed on tens of thousands of commercial and general aviation aircraft as well as helicopters worldwide. The radar 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 the terrain or other obstacles. This information is the most critical information in many automated landing and collision avoidance systems. Undetected failure of this sensor can therefore lead to catastrophic results.