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Innovation, Science and Economic Development Canada
C.D. Howe Building
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Dear Colleague,

– **CASCA Response to *Consultation on Releasing Millimetre Wave Spectrum to Support 5G* (Canada Gazette SLPB-001-17)** –

The Canadian Astronomical Society / Société Canadienne d'Astronomie (CASCA) is the organization representing the interests of professional astronomers in Canada. Our membership includes radio and millimetre-wave astronomers whose ability to execute astronomical observations through passive receivers are directly impacted by spectrum allocation decisions. Because of the power of terrestrial transmitters, which are generally orders of magnitude higher than the naturally-occurring radio emissions observed in radio astronomy, band-sharing is only possible under extremely defined conditions. Unwanted emissions from transmitters may fall in radio astronomy bands, and are subject to the protections provided by ITU Recommendation RA-769. However, unwanted emissions from sources on airborne and spaceborne platforms may enter radio astronomical antennas through the main beam or inner sidelobes of the radio telescope antenna, which are bound to exceed those levels and will obliterate data and possibly damage equipment. The key consideration in these decisions is interference with atomic and molecular species, which emit at specific frequencies dictated by quantum mechanics. Losing the capacity to carry out observations in specific bands closes scientific opportunities and diminishes the value of our investment in observatories. However, we recognize the broad public interest in commercial applications of spectrum allocation. In this context, CASCA is responding to Canada Gazette, Part I, Consultation on Releasing Millimetre Wave Spectrum to Support 5G, July 2017 (SLPB-001-17). We therefore provide our answers to specific questions below.

Question 4-1: Given the disruptive nature of 5G, will new business models and net-

work applications develop that may require policy and regulatory consideration from ISED? Please describe potential new business models and network applications as well as their benefits to Canadians.

CASCA notes that the shift of commercial applications to progressively higher frequency bands begins to develop terrestrial transmissions in bands where Canada has substantial national astronomical research interest and international telescope investment. We maintain a strong professional interest in preserving scientific access throughout the millimetre-wave band. We strongly support a clear regulatory process for allocating these bands and active monitoring of their use. In these frequency bands, satellite operations provide substantially more impact on observatories than do fixed location terrestrial observations, which tend to be short-range and mitigated by distance from transmitters. Mobile transmitters (such as automotive radar systems) may become problematic unless cars equipped with such radars can be completely excluded from geographical areas around radio telescopes or be equipped with an automatic off-switch that turns such radars off in certain geographic zones.

Question 6-1: ISED is seeking comments on the changes proposed above to introduce flexible use licensing in the 28 GHz band, including consequential changes to the CTFA domestic footnotes and the policy on this band contained in SP 3-30 GHz, Revisions to Spectrum Utilization Policies in the 3-30 GHz Frequency Range and Further Consultation.

CASCA has reviewed the proposed changes (MOD C47A, ADD C47C) and found that they do not affect current or planned domestic astronomical facilities. We believe that this band is appropriate to allocate for commercial use (see also Questions 6-2 to 6-7). There could be a need for a compatibility study to estimate the unwanted emissions falling in the 22.21 - 22.5 GHz and 23.6 - 24.0 GHz bands, which are allocated to the radio astronomy service. This should include comparison of data loss estimates with those in Recommendation RA 1513.

Question 7-1: ISED is seeking comments on the proposal to implement flexible use licensing in the frequency band 37-40 GHz, including the consequential changes to CTFA footnote C51, while continuing to allow for fixed-satellite service (space-to-Earth) in the band.

CASCA has reviewed the proposed changes, in particular MODC51, and found that this does not affect current or planned domestic astronomical facilities. We believe that this band is appropriate to allocate for commercial use (see also Questions 7-2 to 7-7). See above.

Question 8-1: ISED is seeking comments on its proposal to designate the band 6471 GHz for licence-exempt operations on a no-protection, no-interference basis.

CASCA has reviewed the proposed changes, and found that this does not affect current or planned domestic astronomical facilities. However, these bands do affect

observations in partner countries, particularly the United States and Chile, where observatories are or will soon be making use of the 68-71 GHz band. We note that atmospheric opacity precludes sensitive astronomical observations from 64-68 GHz.

Question 9-1: ISED is seeking comments on:

- *Whether flexible use access in these bands should be exclusively licenced or licence-exempt.*
- *If a licencing approach is proposed, which types of licences (radio licences, spectrum licences with user-defined licence areas, spectrum licences with service areas for competitive licensing, or others) are expected to best lend themselves to licensing flexible use in the 28 GHz and 37-40 GHz frequency bands in order to support a variety of 5G technologies, applications and business cases?*
- *Whether a licence-exempt dynamic access using data base should be implemented in all, or portions of the 28 GHz, 37-40 GHz, particularly in the band 37-37.6 GHz.*

Given the large potential impacts of frequency allocations, CASCA supports maintaining licensing throughout the proposed bands, especially with some wideband modulation methods. However, we recognize the utility of license-free access for technology deployment. Of the proposed bands, we support a policy where license-free use is dedicated to the 37-37.6 GHz band, as this is least likely to interfere with observations domestically or in partner countries. See also Questions 9-2 to 9-3.

Yours sincerely,



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