



REPLY COMMENTS OF TELESAT CANADA

In response to:

Canada Gazette, Part I, June 16, 2018, Addendum to the Consultation on Releasing Millimetre Wave Spectrum to Support 5G, SLPB-005-18

TELESAT CANADA

Leslie Milton
Senior Counsel, Regulatory Affairs
1601 Telesat Court
Ottawa, ON
Canada, K1B 5P4
(613) 748-8700 ext. 2263

REPLY COMMENTS OF TELESAT CANADA

1 Telesat submits this reply to comments on the *Addendum to the Consultation on Releasing Millimetre Wave Spectrum to Support 5G*, SPLB-005-18 (Addendum)¹ issued by Innovation, Science and Economic Development Canada (ISED).

I. INTRODUCTION

2 The comments filed in response to the Addendum are generally consistent with the positions submitted in response to SLPB-001-17, *Consultation on Releasing Millimetre Wave Spectrum to Support 5G* (mmWave Consultation). Accordingly, Telesat's reply in respect of the mmWave Consultation applies, mutatis mutandis, to comments filed in response to the Addendum.

3 While there is broad acceptance of coexistence of flexible use and satellite services in the 26.5-27.5 GHz band (26 GHz band) and in the 27.5-28.35 GHz band (28 GHz), there are differences on the appropriate approach to facilitate effective sharing in these bands. As Telesat and other satellite operators have underscored, 5G is expected to comprise a heterogeneous network of networks supporting a variety of evolving use cases and requirements, in which satellite services will play a critical role. While the deployment of terrestrial 5G services is expected to be focused in dense urban/suburban centres and high traffic hotspots, fixed satellite services (FSS) will play an essential role in extending 5G to the many Canadians who live and work outside these locations, and may also complement terrestrial 5G where it is deployed.

¹ Published in the *Canada Gazette*, Part I, June 16, 2018 [Addendum].

4 Satellite operators are today deploying satellites using Ka-band frequencies for both gateway earth stations and user terminals and, as recognized by ISED in its recent *Spectrum Outlook: 2018 to 2022*, are expected to exhaust the capacity of available Ka-band satellite frequencies during this period.² Telesat’s Telstar 19 VANTAGE (T19V) satellite, which successfully launched July 22, 2018, includes a sophisticated Ka-band HTS payload serving Northern Canada. While this payload will certainly serve many earth stations in the North, these services to the North rely on critical gateway facilities in southern Canada. Similarly, while Telesat’s Polarsat constellation is designed to provide Arctic coverage, it will require gateways in other parts of the country, including southern Canada. Telesat’s Ka-band LEO satellite constellation will also rely on Canadian gateways. As Telesat has previously stated, satellite gateways need to be located where there is access to fibre optic links, reliable prime power and ease of access for technical staff.

5 In these circumstances, it is critical to carefully consider sharing principles and methodologies, in order to ensure effective and efficient coexistence of terrestrial and satellite infrastructure in the 26 and/or 28 GHz bands. Arbitrary and broad prohibitions on deployment of earth stations using the 26 and 28 GHz bands that are not based on informed study could severely interfere with or in the worst case prevent the deployment of new satellite services,

² SLPB-003-18, *Spectrum Outlook 2018 to 2022* (June 6, 2018), para. 75. ISED also recognizes the requirement for dedicated spectrum, to support ubiquitous deployment of satellite user terminals. Telesat therefore strongly opposes, and is not aware of Canadian endorsement of, a “tuning range” concept for Ka-band or other frequencies. Satellite networks are inherently regional or global and therefore require harmonized spectrum allocations and protections across regions at a minimum.

contrary to the objectives of ensuring that innovative new communications services are extended to all Canadians, regardless of location.

6 For these reasons and those expressed in Telesat's previous submissions in the mmWave Consultation and as set out below, Telesat urges ISED to initiate a study or studies to assess appropriate trigger mechanisms for coordination in the 26 and 28 GHz bands, appropriate restrictions on the geographic areas in which earth stations operating in these bands may be located, and appropriate limits on skyward transmissions of terrestrial base stations in these bands. Telesat also asks the Department to continue to license earth stations in the 26 and 28 GHz bands on a case-by-case basis, considering their unique characteristics and circumstances and confirm that, once licensed, the earth station will not be subject to additional constraints (or interference) as a result of future deployment of terrestrial flexible use stations.

II. DETAILED COMMENTS

7 As with Telesat's comments, questions identified in the Addendum are highlighted in grey, with Telesat's reply comments on each issue following.

A. BACKGROUND AND CONTEXT

Question A1: ISED is seeking comment on the development of a flexible use licensing model for fixed and mobile services in the 26 GHz band (in addition to the bands currently under consultation through the mmWave Consultation), taking into account the timing of WRC-19, 5G technology standards development, international ecosystems and harmonization of spectrum use with other countries.

B. CHANGES TO SPECTRUM UTILIZATION POLICIES

Question A2: ISED is seeking comments on the changes proposed above to introduce flexible use licensing in the 26 GHz band, including the ensuing changes to the CTFA Canadian

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*.

8 As indicated in its comments, Telesat does not oppose the development of a flexible use licensing model in the 26 GHz band, provided adequate measures are taken to enable reasonable siting of Earth-exploration service (EESS) and FSS earth stations in the 26 GHz band, as well as operation of FSS earth stations and satellite receivers in the adjacent 28 GHz band. However and as discussed more fully below, several parties propose measures that are not tailored to expected deployment of terrestrial and satellite services and the technical properties of the spectrum and equipment.

C. COEXISTENCE IN THE 26.5-27.0 GHz BAND

Question A6:

A. ISED is seeking comments on the proposal to require site-by-site coordination between proposed flexible use terrestrial stations and EESS/SRS earth stations in the 26.5-27.0 GHz band when a pre-determined trigger threshold is exceeded.

B. If the proposed site-by-site coordination is supported, what coordination trigger and value would be the most appropriate (e.g. power flux density or distance threshold)?

C. ISED is also inviting proposals for specific additional technical rules for flexible use terrestrial stations and EESS/SRS earth stations (e.g. site shielding) that could facilitate more efficient sharing between terrestrial and earth stations.

9 Consistent with previous comments on coexistence in the 28 GHz band, most parties endorse ISED's proposal to require site-by-site coordination in the 26 GHz band.³ While Bell appears to have seized on the Addendum as an opportunity to articulate a new approach, Bell's proposition that site-by-site coordination would be burdensome is at odds with its statement that

³ Ericsson Comments, p.12; Rogers Comments, para. 26; SaskTel Comments, para. 37; Northstar Comments, p. 4.

the requirement for coordination should be rare, given the short-range propagation characteristics of the spectrum and line of sight requirements.⁴

10 As RABC and others have advocated for the 28 GHz band, a coordination trigger is also expected to facilitate coexistence in the 26 GHz band. However, parties recognize that there is insufficient information at this time to determine the nature (distance, PFD) or threshold for such a trigger.⁵ Rather, this matter should be studied.

Question A7:

A. ISED is seeking comments on whether there should be restrictions on the geographic areas in which new EESS and SRS earth stations can be deployed in the 26.5-27.0 GHz band.

B. If geographic restrictions on EESS and SRS earth stations are proposed, ISED is inviting detailed proposals on how they could be implemented, and what areas should be targeted.

11 No party has identified any coherent reason why, as in the case of the 28 GHz band, siting restrictions can be identified without further detailed study. As discussed below in response to Question A9, broad and loosely worded prohibitions and restrictions on earth station deployment are arbitrary and unnecessarily restrictive of earth station deployment.

⁴ Bell Comments, para. 20.

⁵ Cogeco Comments, para. 24; Northstar Comments, p. 4; Rogers Comments, para. 28; SaskTel Comments, para. 39; TELUS Comments, para. 39.

D. COEXISTENCE IN THE 27.0-28.35 GHz BAND

Question A8:

A. ISED is seeking comments on the proposal to require site-by-site coordination between proposed flexible use terrestrial stations and FSS earth stations in the frequency band 27.0-28.35 GHz band when a pre-determined trigger threshold is exceeded.

B. If the proposed site-by-site coordination is supported, what coordination trigger and value would be the most appropriate (e.g. power flux density or distance threshold)?

C. ISED is also inviting proposals for specific technical rules on flexible use terrestrial stations and FSS earth stations (e.g. site shielding) that could facilitate more efficient sharing between terrestrial and earth stations.

12 Parties continue to support site-by-site coordination and use of a coordination trigger. As most parties, including the Radio Advisory Board of Canada (RABC), recognized in their earlier comments on the mmWave Consultation, further study is required to determine the appropriate type of trigger and the trigger threshold. In this regard, Telesat agrees with Rogers that it is premature to determine a PFD value, as 5G technology is still being developed.⁶

13 Commentators suggesting that site shielding may be appropriate provide no rationale for a presumption that site shielding will be the most cost-effective means of addressing potential interference. The better approach is to let operators determine, on a case-by-case basis, the most effective and efficient technical mechanism(s) for achieving coexistence in the context of a specific deployment.⁷

⁶ For this reason, also, TELUS' proposal that the Department should rubber-stamp the PFD coordination trigger adopted by the FCC in its Spectrum Frontiers decisions must be rejected. (See also Telesat Reply Comments on the mmWave Consultation, para. 17.)

⁷ Telesat also continues to oppose TELUS' proposal that earth station contours be made publicly available, as an unnecessary and anti-competitive requirement. (See Telesat Reply Comments on the mmWave Consultation, para. 19)

Question A9:

A. ISED is seeking comments on whether there should be restrictions on the geographic areas in which new FSS earth stations can be deployed in the frequency band 27.0-28.35 GHz.

B. If geographic restrictions on FSS earth stations are proposed, ISED is inviting detailed proposals on how they could be implemented, and what areas should be targeted?

14 In previous comments in the mmWave Consultation and response to this Addendum, the RABC and others have recognized the need to base any geographic restrictions on earth stations deployed in the 28 GHz band on informed study.

15 The requirement for further study and carefully tailored siting restrictions is supported by numerous factors including the following:⁸

- Since 5G technology is under development, it is premature and impossible to engage in proper assessment of siting requirements;⁹
- Given the limited range of 28 GHz signals and the high cost of terrestrial deployment, terrestrial networks using the band are not expected to be deployed widely even in many urban areas or across existing terrestrial networks. In this regard Bell states, “it will be uneconomical to deploy this band except in a “hot-spot/hot-zone” manner” and, along with TELUS, seeks relaxed 5G deployment obligations;¹⁰

⁸ See also Telesat’s mmWave Reply, at paras. 20 and 22-27.

⁹ Rogers Comments, para. 28.

¹⁰ Bell Comments, para. 26; TELUS Comments, para. 66.

- The limited range of 28 GHz signals and the expected variability of required separation distances due geography, earth station design and other factors militate against large, blanket exclusion zones;¹¹
- Satellite networks using 28 GHz are already deployed and new innovative 28 GHz satellite networks are being built which will serve all parts of the country, not merely “rural and remote” areas. Furthermore, service to rural and remote areas relies on gateway earth stations in other parts of the country. Satellite gateways must be located where there is access to fibre-optic links, reliable prime power and ease of access to technical staff; and
- There will likely be substantial efficiencies from using existing earth station locations, which are located in the vicinity of urban areas and/or highways, for deployment of 28 GHz gateways.

16 Thus, requests for prohibitions on earth deployment in or near urban areas and existing terrestrial networks are premature, arbitrary and unnecessarily restrictive. A detailed study, led by the Department, is essential to establishing reasonable siting measures that are consistent with optimized spectrum utilization and the objectives of Canadian telecommunications policy.

¹¹ TELUS Comments, para. 49, referencing current studies suggesting distances ranging from less than 100 meters to about 10 kilometers.

Question A10:

A. ISED is seeking comments on whether it should impose any limits on the aggregate emissions of the terrestrial services in the 27.0-28.35 GHz band to ensure coexistence with FSS space stations.

B. If limits are imposed, ISED is inviting detailed proposals on why they could be implemented, and what the limits should be.

17 Serious aggregate interference into satellite receivers will affect entire satellite networks and could shut down critical communications services. It is not sufficient to ignore the possibility of this interference, simply because some *theoretical* characteristics of terrestrial 5G devices have the potential to mitigate interference into satellite receivers. In any event, Telesat's preliminary study of the potential for terrestrial stations operating in the 27.0-27.5 GHz band to cause aggregate interference into satellite receivers shows that at the base station power limits assumed by the FCC, for example, harmful aggregate interference may occur. Moreover, as Ciel notes, Globalstar is experiencing this issue now, in another frequency band.¹²

18 Furthermore, the very factors that terrestrial operators have identified as making aggregate interference to satellite receivers unlikely, such as beam forming and downward tilting antennas, should make it easy for terrestrial operators to comply with an EIRP mask. This mask would limit interference to satellite orbits and may not involve a reduction in power in the desired direction if a more directive antenna is used.

19 Further study of aggregate interference is, therefore, required.

¹² Ciel Comments, para. 9.

III. CONCLUSION

20 In view of the foregoing, Telesat reiterates its recommendations that the Department:

1. permit only licensed terrestrial use of the 26 and 28 GHz bands;
2. license future earth stations on a case-by-case basis in these bands, considering their unique circumstances and characteristics;
3. not mandate site shielding for all earth stations, when other coordination measures may be less restrictive and more effective;
4. require coordination of new earth stations with flexible use terrestrial stations only where the terrestrial station has been previously licensed, an application has previously been made to the Department to licence the terrestrial stations or where they must be built because of a terrestrial build-out requirement established pursuant to a licence previously issued by the Department;
5. ensure that licensed earth stations which have completed such coordination will not thereafter be subject to any additional constraints (including interference) as a result of future deployment of terrestrial flexible use stations in the vicinity; and
6. initiate and lead a technical study (or studies) to determine:
 - a. appropriate trigger mechanisms for coordination in the 26 and 28 GHz bands, to facilitate the determination of compatibility between earth stations and terrestrial 5G without performing unnecessary calculations;
 - b. appropriate restrictions on the geographic areas in which an earth station that transmits in the 26 or 28 GHz band may be located;

- c. appropriate limits on skyward transmissions from terrestrial base stations in the 26 and 28 GHz bands to prevent excessive interference into satellite receivers resulting from aggregate terrestrial emissions.

All of which is respectfully submitted on behalf of TELESAT CANADA

/s/
Leslie Milton
Senior Counsel, Regulatory Affairs
1601 Telesat Court
Ottawa, ON
Canada, K1B 5P4
(613) 748-8700 ext. 2263

July 31, 2018