Consultation on the Licensing Framework for Non-Geostationary Satellite Orbit (NGSO) Systems and Clarification of Application Procedures for All Satellite Licence Applications

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Reply Comments of The Boeing Company

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Introduction

1. This reply is submitted by The Boeing Company ("**Boeing**") in response to comments filed in the proceeding initiated by the Department of Innovation, Science and Economic Development Canada ("**ISED**" or the "**Department**") by *Consultation on the Licensing Framework for Non-Geostationary Satellite Orbit (NGSO) Systems and Clarification of Application Procedures for All Satellite Licence Applications*, Canada Gazette, Part 1, March 4, 2017, Notice No. SMSE-009-17 ("**SMSE-009-17**").

2. There is broad-based recognition in the submitted comments of the global nature of NGSO systems and the resulting requirement to consider both Canadian-licensed and foreign licensed systems authorized for use in Canada in the development of an appropriate regulatory framework. There is also widespread agreement that ISED should not limit the number of licensed or authorized systems, mandate the use of third party arbitration of coordination disputes or require foreign NGSOs to complete international coordination prior to being authorized for use in Canada.

3. There are, however, considerable differences on the approach to domestic coordination requirements and procedures, as well as Canadian coverage and capacity requirements. Moreover, notwithstanding the recognition of the global nature of NGSOs, only Boeing has proposed a spectrum licensing model for service providers authorized to provide fixed satellite services ("**FSS**") in Canada using a foreign NGSO. Boeing's proposed model will facilitate regulatory and administrative efficiency and efficient and effective use of the spectrum. These issues are addressed below.

Domestic Coordination (SMSE-009-17, items E, H and I)

4. Items E, H and I of SMSE-009-17 concern the requirement to address co-existence with Canadian licensed and approved systems as part of the licence application process, mechanisms for resolving domestic coordination disputes, and the requirement for

foreign NGSOs to complete coordination prior to being authorized for use in Canada respectively.

5. The comments on these coordination issues express a range of positions. Notably, however, many respondents reject the notion of blanket application of coordination obligations based on date priority, and recognize that mandated sharing in the absence of a coordination agreement prevents systems with date priority from acting as "gatekeepers" that control the use of valuable NGSO spectrum.[1] A number of respondents also note that other considerations, such as spectrum efficiency, capacity and value of services may be relevant to determining how spectrum should be shared.[2]

6. Boeing continues to recommend that ISED mandate equal sharing of spectrum in the absence of a coordination agreement between NGSO systems or operators, without reference to date priority. This is necessary to ensure efficient and effective spectrum usage, given the wide range of possible characteristics of future NGSO systems. In making this recommendation, Boeing also recognizes and agrees that considerations such as capacity, spectrum efficiency, coverage diversity, and the ability to share spectrum are highly relevant to ISED's assessment of coordination disputes. Consideration of these factors, including in particular, efficient spectrum utilization, is consistent with Minister Bain's recent statements recognizing the need to use technology to maximize spectrum and "what that means is more competition, that means better service and better price points for consumers,"[3] NGSO satellite technology is evolving rapidly and application of a date priority system in this context will bar Canadian consumers from reaping the benefits of technological advancements, efficient spectrum utilization, better service and better prices.

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[1] Comments of O3b Limited ("**O3b**") at paras. 8-9; Comments of Planet Labs Inc. ("**Planet Labs**") at paras. 17-18; Comments of Kepler Communications Inc. ("**Kepler**") at para. 42; Comments of Microsat Systems Canada Inc. ("**Microsat**"), Section H, page 3, para. 3.

[2] Microsat comments, Section H, page 3, para. 3; Kepler comments, para. 42; NorthStar Data ("**NorthStar**"), page 5, Item H.

[3] Navdeep Bains, Minister of ISED, as quoted in "Feds launch research lab aimed at maximizing Canada's wireless spectrum", The Toronto Star, May 8, 2017, https://www.thestar.com/business/tech_news/2017/05/08/feds-launch-research-lab-aimed-at-maximizing-canadas-wireless-spectrum.html

7. It is generally understood that coordination agreements are preferable to in-line conjunction spectrum sharing rules. In light of this, the purpose of sharing rules is to create strong incentives, for all systems, not just those with lower date priority, to enter into coordination agreements. The clearest approach, as stated by O3b, is to have "… mandated spectrum sharing for in-line events" since "… such a clear backstop will encourage all operators to find an appropriate negotiated solution" and ensure that Canadian licensees cannot "prevent foreign NGSO systems from having competitive access to the Canadian market to the detriment of Canadian consumers". O3b further notes that mandated sharing "would provide a straightforward technical solution when coordination cannot be achieved".[4]

8. It appears that Telesat Canada ("**Telesat**") relies on worst case outcomes and assumptions to argue for spectrum sharing during in-line events based on date priority. For example, Telesat assumes that many if not all NGSO licence applications are granted and are brought into operation. Further, Telesat's calculations include worst-case assumptions, such as fixed conjunction angles "triggers", and/or fixed interference level "triggers", potentially applied without regard to the specific characteristics of each system's planned operations. The analysis leads to the conclusion that regulations such as mandated spectrum sharing are equivalent to "band segmentation".[5] This is in fact the conclusion given that the regulations should be specifically designed to provide an incentive for operator coordination and represent a "last-chance" alternative to unsuccessful coordination agreements. Furthermore, the results presented for impacts due to in-line event spectrum sharing can be improved within coordination agreements by suitable alteration of the assumptions. The analysis Telesat has submitted to ISED utilizes a fixed 10-degree conjunction angle trigger and shows a variety of interference levels, many of which may be acceptable for system operation either "as-is" or with reduced capacity (not necessarily requiring band-splitting).[6] A similar analysis presented to the FCC by Telesat illustrates that these interference levels could also be translated into the equivalent of 5 degree conjunction angles for some systems, a factor of 4 reduction in the

[4] O3b comments, para. 10.
[5] Telesat Comments at para. 103; Comments of WorldVu Satellites Limited ("**OneWeb***")*, Attachment, pages 29-32.
[6] Telesat Comments at Attachment A, Table 1.

frequency of events for those particular cases.[7] These variations illustrate the flexibility available to, and inherent in, bi-lateral coordination agreements.

9. As indicated above, regulation should encourage operators to enter into coordination agreements, and any requirements regarding spectrum sharing in the absence of coordination agreements should discourage "monopolization" of spectrum by earlier entrants or incumbents, as well as be "agnostic" to the characteristics or implementation of particular systems.

10. In paragraphs 98 and 99 of its comments, Telesat argues that the coordination that would be necessary to permit multiple NGSO satellite systems to operate using an in-line avoidance approach would force operators to disclose the locations of their earth stations, which Telesat suggests is "highly sensitive commercially." However, the use of a date-priority approach would still require NGSO operators to disclose their earth station locations to each other. In the absence of such disclosure, it would not appear possible for subsequently launched NGSO systems to protect incumbent NGSO systems operating in the same frequencies.

11. Furthermore, the sharing of ephemeris data is an essential aspect of the efficient operation of GSO and global NGSO satellite systems. As Planet Labs notes in its comments, "the sharing of ephemeris data with other operators is … common … for facilitating cooperation between systems and mitigating interference concerns".[8] Boeing submits that ephemeris data relating to satellites and similar data relating to earth stations that is required for spectrum sharing could be shared in a manner that protects commercially sensitive matters.

12. Finally, Boeing notes that although there is strong support for removal of co-existence as a pre-requisite to approval of Canadian-licensed NGSOs, including by GHGSat, Kepler,

[7] Reply comments of Telesat Canada, Letter to the FCC regarding IB Docket No. 16-408, April 10, 2017, at Exhibit 1, Table 2-1
[8] Comments of Planet Labs, para. 8.

NorthStar and Planet Labs, these companies assert that foreign-licensed NGSOs should not be authorized for use in Canada prior to completion of domestic coordination. As in the case of approval of Canadian-licensed systems, the removal of domestic coordination as a prerequisite to ISED authorization of foreign NGSOs for use in Canada will not affect ISED's ability to oversee compliance by such foreign systems with ISED procedures for domestic coordination and dispute resolution. Accordingly, the criterion is unnecessary. An obligation that requires foreign NGSOs to coordinate with "Canadian networks" prior to being authorized for use in Canada, simply serves to bar or delay effective spectrum utilization and the provision of new services to Canadians.

Canadian Coverage and Capacity Reservation Requirements (SMSE-009-17, items C and D)

13. Telesat maintains that all Canadian and foreign-licensed systems authorized for use in Canada should be required to demonstrate the ability to provide service throughout Canada on a 24/7 basis. Other commentators, including the Coalition, SpaceX, GHGSat, Planet Labs, NorthStar and Kepler, note that this type of Canadian coverage obligation may not be technically and/or economically feasible for some systems and will limit the ability of Canadians to benefit from new and innovative services offered by global systems and the expected competition between different satellite system and service providers, with no corresponding benefit to Canadians. Similarly, most participants that address the issue oppose a Canadian capacity reservation requirement, noting that such a requirement is unnecessary, inefficient, and will not benefit Canadians.

14. Boeing recognizes that as a licensing jurisdiction, ISED may want to impose conditions on Canadian-licensed NGSOs that relate to Canadian direction and control of the system. However, Boeing is not aware of any basis for concluding that Canadians will not be well-served by existing and proposed NGSO systems absent Canadian coverage and capacity reservation requirements.

15. There are also a variety of system configurations (both existing and proposed) and a system may not be able to provide service everywhere in Canada on a 24/7 basis or at all. For example, Boeing understands that Globalstar Canada cannot provide service north of the 70th parallel because of the orbit design of its system. Accordingly, application of Telesat's coverage proposal to the Globalstar constellation would mean that no Canadians would have access to, and be able to benefit from, Globalstar services.

16. Application of a 24/7 pan-Canadian coverage requirement will block innovative, effective and efficient domestic and foreign NGSOs from offering services in Canada. As a result, Canadians will not have access to many if not most of the services supported by global NGSOs, and Canadian spectrum resources will not be used effectively or efficiently, contrary to the objectives of Canadian telecommunications policy. Similarly, a Canadian capacity reservation requirement will preclude efficient and dynamic capacity allocation, block foreign NGSOs from offering services in Canada and severely limit the ability of Canadians to reap the benefits of this new global infrastructure.

17. For these reasons, Boeing does not believe that Canadian coverage or capacity requirements are necessary or appropriate. Should, however, ISED remain of the view that some requirement is necessary to ensure Canadian coverage and capacity, ISED could (as proposed in Boeing's comments) require that NGSOs authorized for use in Canada make fair and reasonable efforts to provide FSS to all regions of Canada within the coverage contour and service availability of the NGSO system. Any more intrusive Canadian coverage or capacity obligations will not, in Boeing's submission, support Canadian economic or social interests.

Spectrum Licensing Approach

18. As noted at the outset, although there is broad-based recognition in the comments of the global nature of NGSO systems and the need for Canadian regulatory procedures to reflect this, only Boeing addressed the licensing framework for the provision of FSS in Canada using foreign-licensed NGSOs. A spectrum licensing approach for service providers seeking to use foreign NGSOs to provide FSS in Canada is an efficient method of spectrum management that significantly reduces the administrative and regulatory burden that would otherwise be imposed on the Department and these service providers, and will facilitate the roll-out of competitive services in Canada.

Conclusion

19. Canada will be best-served by adopting flexible and efficient processes for authorizing Canadian and foreign-licensed NGSOs for use in Canada that do not arbitrarily favour systems with regulatory priority or impose unnecessary barriers to the provision of competitive services to Canadians using this new global infrastructure.

20. Boeing reiterates its thanks to the Department for the opportunity to comment on these issues.