



**VIA E-MAIL**

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Innovation, Science and Economic Development Canada  
c/o Senior Director, Spectrum Licensing and Auction Operations  
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**Re: Canada Gazette Notice SLPB-002-20  
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**

Inmarsat Solutions (Canada) Inc. ("Inmarsat") appreciates the opportunity to comment on the *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 Notice No. SLPB-002-20 (the "Consultation"). Inmarsat operates C-band feeder links and telemetry, tracking, and command ("TT&C") functions in the fixed-satellite service ("FSS") that are critical to support mobile-satellite service ("MSS") operations in Canada and across the Americas.

Inmarsat operates a global satellite communications system of 13 geostationary orbit ("GSO") space stations offering diverse services in the L-, S-, and Ka-bands. Inmarsat's global L-band satellites provide a plethora of services including mobile voice and data, Internet of Things applications, and vital safety of life services relied upon worldwide by governments, enterprises, and individuals. These L-band satellites require access to C-band spectrum for feeder links and TT&C operations. Inmarsat's C-band earth station located in Weir, Quebec, is one of two sites that provide feeder link and TT&C services to support Inmarsat's L-band MSS services in Canada and across the Americas via the Inmarsat-4 F3 space station at the 98°W orbital location. Two sites are required to provide the redundancy capabilities required for Inmarsat's services, and particularly safety of life services.<sup>1</sup>

In these comments, Inmarsat focuses on the questions raised by ISED in the Consultation, and addresses particular questions below. As a general point, Inmarsat reiterates its view in the Preliminary Consultation<sup>2</sup> that the spectrum authorized to terrestrial mobile services in the 3450-3650 MHz band should be fully utilized by the mobile terrestrial industry before further action in the 3800 MHz band is undertaken. Additionally, if ISED changes the allocation in the 3800 MHz band in the future, it should ensure that current and future satellite use is not precluded.

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<sup>1</sup> The other earth station providing feeder links for Inmarsat-4 F3 is located in Paumalu, Hawaii, in the United States. See FCC Radio Station Authorization, Call Sign E080059.

<sup>2</sup> Comments of Intelsat, Inmarsat, and SES, *Consultation on Revisions to the 3500 MHz Band to Accommodate Flexible Use and Preliminary Consultation on Changes to the 3800 MHz Band*, Canada **Gazette Notice SLPB-004-18**, July 12, 2018 (available at [https://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/SLPB-004-18-Intelsat\\_Inmarsat\\_and\\_SES.PDF/\\$file/SLPB-004-18-Intelsat\\_Inmarsat\\_and\\_SES.PDF](https://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/SLPB-004-18-Intelsat_Inmarsat_and_SES.PDF/$file/SLPB-004-18-Intelsat_Inmarsat_and_SES.PDF)).

As a further general point, Inmarsat also notes Paragraph 39 of the Consultation, in which ISED notes that there are no remaining grandfathered FSS earth stations in the 3650-3700 MHz band in the Spectrum Management System (“SMS”) database. Inmarsat believes this is in error. One of Inmarsat’s C-band earth station in Weir, Quebec, has been licensed since October 27, 2008,<sup>3</sup> with the license most recently revised on August 1, 2017.<sup>4</sup> The face of the 2008 license authorizes operation in the space-to-Earth throughout the 3599-4200 MHz range, and Inmarsat took no action in advance of the 2017 license modification to alter that range. Inmarsat has been and will continue to be in communication with ISED’s Montreal Regional Office to ensure that this station and its operation in C-band, including within the 3650-3700 MHz segment, are appropriately reflected in the SMS.

**Q4**

ISED is seeking comments on the proposal to add a primary mobile service, except aeronautical mobile, allocation in the 3700-4000 MHz band to the CTFA and the specific changes shown in annex B.

A: Inmarsat does not object to the addition of the addition of a primary mobile (except aeronautical mobile) allocation in the 3700-4000 MHz band to the Canadian Table of Frequency Allocations (CTFA), provided appropriate measures for continued access to the band by FSS, as discussed below, are implemented.

**Q5**

ISED is seeking comments on developing a flexible use licensing model for fixed and mobile services in the 3650-4000 MHz band.

A: Inmarsat does not object to a flexible use licensing model for fixed and mobile services in the 3650-4000 MHz band, provided appropriate measures for continued access to the band by the FSS, as discussed below, are implemented.

**Q6**

Given the proposal in section 7.2 on developing a flexible use licensing model for fixed and mobile services in the 3650-4000 MHz band, ISED is seeking comments on the proposal that no new FSS earth stations be authorized in the 3700-4000 MHz band in the future and that the authorization of new FSS earth station licences be limited to the 4000-4200 MHz band.

A: Inmarsat uses spectrum in the 3700-4000 MHz band for TT&C operations on its Inmarsat-3 and Inmarsat-4 family of satellites. In Canada, Inmarsat maintains a steerable antenna in Weir, Quebec,<sup>5</sup> to receive TT&C signals from the Inmarsat-3 F5 and Inmarsat-4 F3 space stations, as well as other space stations in the Inmarsat-3 and Immarsat-4 families that may be in transit between orbital locations. These operations occur in the 3945-3955 MHz frequency range. These are receive-only operations, with the transmitters located on the spacecraft already in orbit, and therefore no adjustments can be made to the frequency or signal. Inmarsat will continue to need to use these frequencies in this location for the rest of the operational life of the Inmarsat-3 and Inmarsat-4 satellites, which is likely to extend to 2030 or beyond.

<sup>3</sup> License No. 010001493-001, call sign XJ996.

<sup>4</sup> License No. 010001493-002, call sign VF842.

<sup>5</sup> License No. 010001491-002, call sign VF840.

Accordingly, Inmarsat opposes the proposal not to authorize new FSS earth stations in the 3700-4000 MHz band. A sweeping prohibition on new FSS earth stations in this band would preclude Inmarsat's ability to replace its current Canadian facility for TT&C operations with satellites in the Inmarsat-3 and Inmarsat-4 families if necessary.

ISED should provide accommodation to continue such FSS operations at designated facilities throughout Canada, including the facility in Weir, Quebec, housing Inmarsat's present operations. Inmarsat proposes Weir as a C-band gateway site in response to Question 30 below.

**Q8**

ISED is seeking comments on the proposal to maintain a primary allocation to FSS in the entire 3700-4200 MHz band and the proposal that existing FSS earth stations in satellite-dependent areas remain licensed in the entire 3700-4200 MHz band.

A: Inmarsat supports the proposal to maintain a primary allocation to the FSS in the entire 3700-4200 MHz band. Conditions of coexistence may be addressed, if necessary, in appropriate footnotes to the CTFA.

**Q9**

ISED is seeking comments on the future demand for C-band in rural and remote areas such as the North, including the following:

- a) the trend towards using higher frequencies by FSS operations to provide broadband connectivity
- b) the ability of using higher frequencies to replace current C-band capacity and the potential timelines
- c) the possibility of a trend towards using 4000-4200 MHz in combination with other connectivity options (e.g. higher frequencies satellites or wireline solutions) and when it would be expected to be available for satellite-dependent areas

A: Inmarsat's use of C-band for MSS feeder links and TT&C purposes is motivated by factors beyond those listed above, and the motivations will not change with the passage of time.

C-band is uniquely suited to these purposes due to the superior propagation it provides, being less susceptible to rain attenuation than higher frequencies. Other spectrum bands, such as the Ku- or Ka-bands, are not adequate substitutes for the reliability provided in C-band because their propagation conditions cannot ensure the same quality of service required for MSS, including safety of life applications provided by MSS.

The Ku- and Ka-bands are complementary to, but not replacements for the C-band, as their propagation conditions and larger contiguous bandwidths are more suitable for other services, including broadband connectivity.

The MSS services supported by feeder links in C-band are provided to a variety of platforms, including mobile platforms well removed from areas where complementary connectivity options would be feasible (terrestrial and wireline services to airplanes and ships, for example, are difficult). While Inmarsat's services to such platforms are on L-band instead of

C-band, the feeder links between the gateway and the space station are integral to the overall function of the network.

**Q11**

ISED is seeking comments on its proposal to remove the FSS allocation in the 3500-3650 MHz band and to suppress Canadian footnote C20 in the CTFA as detailed in annex B. In addition, ISED is seeking comments on the proposed grandfathering of the existing earth station operations listed in annex C, such that fixed or mobile stations in the 3500-3650 MHz band will be required to coordinate with these earth stations as specified in SRSP-520.

A: Inmarsat is the licensee of both earth stations listed in annex C, and is grateful to have been invited by ISED to participate in the discussions to finalize SRSP-520. The coordination protocol provided therein provides necessary protection for the operation of these stations, which provide MSS feeder links to the Inmarsat-4 F3 and Inmarsat-3 F5 space stations. The coordination protocol enables continued support of MSS services, including safety of life services, while enabling flexible use near the Weir site on a number of frequencies within the band. Inmarsat offers the procedure of SRSP-520 as an appropriate way of facilitating further FSS use of the 3650-4000 MHz band in situations where relocation is not feasible.

Inmarsat plans to place an Inmarsat-6 satellite at the current 54°W orbital location of Inmarsat-3 F5 within the next few years, utilizing its currently authorized frequencies for feeder link purposes. The coordination protocol of SRSP-520, coupled with the imminent availability of other mid-band spectrum for flexible use, should provide ample opportunity for enhanced terrestrial services in the area around Weir. Accordingly, Inmarsat seeks the ability to continue use of its authorization in the 3500-3650 MHz band (and above) at the currently served orbital locations (54°W and 98°W) with replacement satellites for Inmarsat-3 F5 and Inmarsat-4 F3, respectively.

Inmarsat supports maintaining the FSS allocation in the 3500-3650 MHz band in the CTFA, as well as footnote C20, to indicate Inmarsat's continued use. Any policy considerations relevant to the general priority of flexible use terrestrial services may be appropriately expressed in a revision to footnote C20 if necessary.

**Q12**

ISED is seeking comments on its proposal to remove the primary FSS allocation from 3650-3700 MHz and suppress Canadian footnote C33 in the CTFA as detailed in annex B.

A: Inmarsat opposes the deletion of the referenced allocation and footnote from the CTFA.

For the reasons noted in general comments above, Inmarsat believes this CFTA table entry and footnote are applicable to its C-band earth station providing feeder links to the Inmarsat-4 F3 satellite at the 98°W orbital location. This has been licensed since October 27, 2008,<sup>6</sup> with the license most recently revised on August 1, 2017.<sup>7</sup> The face of the 2008 license authorizes operation in the space-to-Earth throughout the 3599-4200 MHz range, and Inmarsat took no action in advance of the 2017 license modification to alter that range. Inmarsat has been and will continue to be in communication with ISED's Montreal Regional Office to ensure that this station and its operation in C-band, including within the 3650-3700 MHz segment, are appropriately reflected in the SMS.

<sup>6</sup> License No. 010001493-001, call sign XJ996.

<sup>7</sup> License No. 010001493-002, call sign VF842.

Inmarsat proposes that the coordination protocol established in SRSP-520 would reasonably accommodate flexible use services around this station while permitting the continuation of existing FSS use within the 3650-3700 MHz segment.

**Q21**

ISED is seeking comments on whether the Tier 4 service areas identified for exemption of certain provisions in GL-10 for mmWave bands as listed in annex E would be appropriate to apply for FSS operations in the 3700-4200 MHz band. ISED invites alternative proposals for areas that would be considered satellite-dependent (e.g. based on Tier 5 categories).

A: The provisions in GL-10 consider the accommodation of FSS in Ka band for broadband applications. While the areas identified in GL-10 may be appropriate for similar treatment for broadcasting services, the geographic distribution and use case for MSS feeder links and TT&C are different. The location decision is based on the availability of a centralized facility with sufficient connectivity and accessibility, not by the end consumer.

Inmarsat proposes that in addition to the Tier 4 service areas identified in GL-10, other areas should be identified as satellite-dependent because of the location of critical central facilities. A limited area around Weir, Quebec, in limited portions of the 3700-4200 MHz band, would permit Inmarsat to continue to conduct its TT&C operations with minimal impact on flexible use deployment. Alternately, Weir could be identified as a gateway site as discussed in response to Question 30 below.

**Q22**

ISED is seeking comments on whether certain remote industry operations, for example offshore oil drilling platforms, should be included in the definition of satellite-dependent areas.

A: Inmarsat supports the inclusion of remote industry operations in the definition of satellite dependent areas. Such remote operations are unlikely to be sufficiently proximate to flexible use infrastructure to either be served by it or experience interference from it.

**Q23**

ISED is seeking comments on its proposal to modify the existing FSS satellite authorizations to limit FSS operations in 3700-4000 MHz in non-satellite-dependent areas of Canada to a no-interference basis. ISED is also seeking comments on the proposal to adjust the conditions of licence for FSS operations to reflect the proposals as of the FSS transition deadline, including the possible removal of a high expectation of renewal for the 3700-4000 MHz portion of the band.

A: Inmarsat opposes this proposal for reasons stated in the answer to Question 6 above. The TT&C operations between 3945-3955 MHz at Inmarsat's Weir facility are critical for the safe operation of the spacecraft, not frequency agile, and will continue for the life of the Inmarsat-3 and Inmarsat-4 family of satellites.

**Q24**

ISED is seeking comments on its proposed date of December 2023 as the Canadian FSS transition deadline.

A: Inmarsat opposes the application of the proposed deadline, or any incompatible deadline, to the TT&C operations described in response to Question 6 above, as the frequencies are not agile and must be used for the life of Inmarsat-3 and Inmarsat-4 satellites. Inmarsat takes no position on the applicability of this transition deadline to other, more agile, FSS applications.

**Q27**

ISED is seeking comments on its proposed transition deadline of December 2023 for FSS earth stations, in which existing FSS earth station licences would be modified to 4000-4200 MHz in the relevant areas.

**Q28**

ISED is seeking comments on making amendments to the relevant conditions of licence and technical rules in the 3700-4200 MHz band as well as the 3450-3700 MHz band in order to implement the following proposals with respect to protection from interference:

a) prior to the transition deadline, existing licensed FSS earth stations may operate in the entire 3700-4200 MHz band in all areas and be protected from interference from flexible use operations both in-band (3700-3980 MHz) and the adjacent 3450-3700 MHz band

b) after the transition deadline, existing licensed FSS earth stations may continue to operate in the entire 3700-4200 MHz band in satellite-dependent areas and be protected from interference from in-band flexible use operations in 3700-3980 MHz, but would not be protected from flexible use operations in the adjacent 3450-3700 MHz band; however, ISED also proposes that flexible use licensees deploying stations in the 3450-3700 MHz band within 25 km of an existing licensed FSS earth station in the 3700-4200 MHz band be required to provide a notification to these operators, one year prior to the deployment of fixed or mobile stations

c) after the transition deadline, FSS earth stations would only be licensed to operate in the 4000-4200 MHz band in non-satellite-dependent areas and would be protected from flexible use operations in the adjacent 3700-3980 MHz band

d) after the transition deadline, FSS earth stations operating in 3700-4000 MHz, in all areas, which are not eligible for licensing could continue to operate as a licence-exempt station without protection from flexible use operations both in-band and adjacent band(s)

A: For the reasons discussed above in response to Question 6, Inmarsat does not find the proposed transition deadline, conditions of license, or technical rules suitable for TT&C operations on already-deployed satellites that are immobile in frequency and will continue through at least 2030. Inmarsat takes no position on the suitability of this transition deadline or license conditions for other, more agile, FSS applications.

**Q29**

ISED is seeking comments on the proposed change to the CTFA to add the new footnote CZZ proposed above and shown in annex B.

A: For the reasons discussed above in response to Question 6, Inmarsat does not find the proposed footnote text suitable for TT&C operations on already-deployed satellites that are immobile in frequency and will continue through at least 2030. Inmarsat takes no position

on the suitability of this transition deadline or license conditions for other, more agile, FSS applications.

**Q30**

ISED is seeking comments on how to ensure the continued operation of gateways that support the provision of services in satellite-dependent areas, specifically:

- a) how much spectrum would be required at these gateway sites
- b) if these stations could be consolidated into two sites, away from major population centres, and where the best locations for those sites would be

A: Inmarsat supports the accommodation of gateway sites at certain locations around Canada. The contemplated operation describes Inmarsat's operations at its Weir earth stations quite well.

As ISED notes, these sites must have access to necessary infrastructure such as fibre and major roads, in order to provide necessary services. Inmarsat suggests that the area around Weir is a suitable candidate for such a site. While in the southwestern portion of Quebec, the site is well shielded in most directions, including in the direction of the nearest population centres, by mountain ranges. In many directions, surrounding land is sparsely populated. Nevertheless, the site, located at the Tata Communications teleport, has access to adequate fibre, staff, and infrastructure that will be difficult to replicate in remote locations.

At a minimum, Inmarsat believes the spectrum for TT&C operations for its satellite and similarly situated satellites must be accommodated within the 3700-4200 MHz band. In addition to the TT&C operations discussed in response to Question 6 above, future generations of Inmarsat satellites, including the Inmarsat-6 family, will place TT&C and emergency beacon operations at the top end of the C-band, between 4198-4200 MHz. For MSS feeder links, 100 MHz of bandwidth would provide the necessary redundancy to ensure continuation of services. Inmarsat prefers to place these feeder links for replacement sites at its current orbital locations below 3700 MHz, where they are currently located.

**Q47**

After the transition deadline, in all areas for flexible use in the 3450-3650 MHz band: ISED is seeking comments on its proposal that the current SRSP-520 coexistence requirements for flexible use operations in the 3450-3650 MHz band to protect FSS operations in the adjacent band 3700-4200 MHz be removed.

A: Inmarsat does not object to the removal of such requirements to protect FSS operations in the *adjacent* 3700-4200 MHz band. Inmarsat reiterates its answer to Question 12 above with respect to the applicability of SRSP-520 for *in-band* FSS protection.

**Q49**

ISED is seeking comments on what technical requirements should be imposed to ensure co-channel protection of FSS earth stations from flexible use systems, in the relevant scenarios and timeline as stated in sections 9.5 and 9.6. For example, could the pfd limit of -124 dBW/m<sup>2</sup>/MHz measured at the earth station antenna proposed by FCC above be used to protect co-channel FSS earth station? Alternatively, should other measures be adopted, such as a separation distance as described in section 7.3? Or should a combination of measures be adopted? If applicable, what are the specific values that should be adopted?

A: Inmarsat believes that a pfd limit, as proposed by the FCC, may not provide an FSS operator with the situational awareness necessary to assess an interference situation. Inmarsat prefers a coordination protocol as described in SRSP-520, which could be narrowly tailored to limited geographic areas around a few earth stations and the limited portion of the band used at that earth station. The parameters in the SRSP-520 coordination protocol are offered for consideration.

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