

Consultation on Releasing Millimetre Wave Spectrum to Support 5G

Comments of Intelsat Corporation

Intelsat Corporation (“Intelsat”) submits the following comments to the Department of Innovation, Science & Economic Development Canada (the “Department” or “ISED”) in the proceeding initiated by Consultation on Releasing Millimetre Wave Spectrum to Support 5G, Canada Gazette, July 15, 2017, Notice No. SLPB-001-17 (“Consultation”).

Intelsat is the leading provider of fixed satellite services (“FSS”) worldwide, serving the media, network services, and government customer sectors. Intelsat owns and operates a global satellite network providing space and terrestrial capacity, which offers a wide array of communications services, including voice, video, data, and Internet connectivity. Intelsat’s fleet of satellites covers more than 99 percent of the world’s populated regions, serving customers that range from large telecommunications carriers and broadcasters to corporate networks and Internet service providers. Intelsat’s customers include distributors that resell capacity, as well as, customers that purchase capacity for their own use. Currently, some 30 satellites operated by Intelsat are included on the Department’s *List of Satellites Approved to Provide Fixed-satellite Services (FSS) in Canada*.

Background and Context

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

Innovation is by its very nature disruptive, often creating new business models and network applications, and 5G is no different. Satellite technology will be an integral part of the 5G ecosystem, and Intelsat understands the projected demand for additional spectrum to facilitate new applications and business models in the 5G ecosystem, but encourages ISED to consider innovation outside of just terrestrial technology when encouraging innovation in 5G and related telecommunication technologies.

The satellite industry continues to innovate in areas that will enrich and compliment terrestrial technology in the 5G ecosystem, and in some cases satellite will be the technology of choice for a variety of applications. For example, the unique characteristics of geosynchronous orbit (“GSO”) and non-geostationary satellite orbit (“NGSO”) satellite networks, in particular their wide-area coverage, can be leveraged to ensure consumers enjoy broadband communication seamlessly across the whole country—even in most remote areas in Canada. In addition to broadband services to end-customers, there is a whole list of other applications that satellites that will play a critical role in the future such as: backhaul capacity for terrestrial 5G technology; public safety and mission critical services; Internet of Things (“IoT”) and Machine to Machine communications (“M2M”); connected cars; and sensitive applications that require security not available on wireless terrestrial communications.

Intelsat sees satellite technology as an important part of the 5G ecosystem to provide ubiquitous, resilient, and seamless services in Canada. In order to ensure a robust, competitive 5G ecosystem, FSS

operators will require continued access to spectrum bands currently allocated to FSS, e.g. C-Band, Ku-Band and Ka-band, and will also need access to additional spectrum, such as the 37-40 GHz frequency band.

Canadian Approach and Timing

Question 5-1: ISED is seeking comments on developing a flexible use licensing model for fixed and mobile services in the 28 GHz and 37-40 GHz frequency bands, and allowing license-exempt use of the 64-71 GHz frequency band ahead of WRC-19 and before 5G technology standards are finalized.

There are currently important developments under way within the International Telecommunication Union (“ITU”) for these bands, most of which are subject to Agenda Item 1.13 in the upcoming World Radio Conference in 2019 (“WRC-19”). It would be in Canada’s best interest if ISED waits for the outcome of the WRC-19 Agenda Item 1.13 and avoids any decisions that may turn out to be internationally incompatible. This is particularly important given the breadth and number of bands being evaluated. At this point it is not clear which frequency bands will be identified for International Mobile Telecommunications (“IMT”).

The technology used for the mmWave bands is still under development and standardization is yet to be produced. It will take some time until 3GPP has finalized its standard for 5G. Furthermore, ITU-R WP5D will not complete the definition of the IMT-2020 interfaces until end of 2020. Therefore, it would be more strategic and beneficial for the Department to wait until the ITU has taken action related to WRC-19 Agenda Item 1.13 and, perhaps, until the IMT-2020 process is completed. This intentional delay would allow ISED to take full advantage of the work undertaken in the ITU process to enrich its policy-making decisions as well as align Canada with the rest of the world—thereby likely allowing Canadian citizens to take advantage of economies of scales in 5G technology.

Intelsat wants to call to the Department’s attention that the 27.5-28.35 GHz band *is not included* in WRC-19 Agenda Item 1.13. So far no other country, besides the United States and South Korea, has indicated any intention to open this band for IMT. As such, and given the current use of this band by FSS, Intelsat does not believe this band should be considered for terrestrial 5G use.

28 GHz Band

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*.

Intelsat would like to encourage ISED not to include the 27.5-28.35 GHz for terrestrial 5G, as it does not have international support as an IMT candidate band. If ISED includes this band, Intelsat supports ISED’s proposal to keep the co-primary allocation for FSS. This co-primary allocation is critical for the future deployment of FSS antennas for feeder links. Similarly, European regulators and CEPT took the position to protect the 27.5-29.5 GHz for FSS services.

Question 6-2: ISED is seeking comments on the moratorium for new site-specific fixed service licenses as described above.

No Comment.

Question 6-3: ISED is seeking comments on its proposal to adopt the band plan (as shown in figure 3 above) in the 28 GHz band.

If ISED includes this band, Intelsat has no concerns with the proposal of the new band plan, provided there is an FSS co-primary allocation across the whole 850 MHz band.

Question 6-4:

A. ISED seeks comments on its proposal to require site-by-site coordination between proposed flexible use terrestrial stations and FSS earth stations in the 28 GHz band when a pre-determined trigger threshold is exceeded.

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

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

If the 28 GHz band is included in the Department's changes, Intelsat supports ISED's proposal to keep the licensing rules as flexible as possible and not restrict or limit the deployment of new FSS earth stations, as this will not only ensure continued viable access to spectrum but also enable regulatory certainty which is key for future investments. A coordination trigger value in terms of a power flux density ("PFD") value could be established to determine if coordination is required. To implement such a mechanism the location of the flexible use terrestrial stations need to be made publicly available to allow the earth station operator to take those terrestrial locations into account for the site selection.

Further, as the Department mentioned, the earth station operator should have the flexibility to meet that PFD limit by employing mitigation techniques, e.g. shielding or natural blocking. Intelsat suggest that ISED consider a minimum PFD limit of -77.6 dBm/m²/MHz as a starting point (this is the level adopted by the Federal Communication Commission ("FCC"), *see* 47 CFR 25.136). Intelsat is not in favor of any additional technical rules to limit or restrict further the deployment of FSS earth stations.

Question 6-5:

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 28 GHz band.

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.

Intelsat agrees with ISED that the FCC's approach is not appropriate in the Canadian context. The unnecessary limitations as ordered in the FCC's Report & Order are very restrictive for the deployment FSS earth stations. The satellite industry has filed a petition with the FCC asking the agency to reconsider the adopted earth station deployment rules and have proposed alternatives,¹ in part because it will be almost impossible to deploy new antennas with the current earth station deployment rules in the United States. As currently adopted, the FCC rules hinder the growth of the satellite industry.

Taking into account the limited number of currently deployed earth stations in Canada, Intelsat is of the view that no additional restrictions or technical rules need to be implemented. Any additional restrictions would introduce uncertainties and burden for the deployment of earth stations.

Question 6-6: ISED is seeking comments on whether it should impose any limits on the aggregate emissions of the terrestrial services. If limits are proposed, ISED is inviting detailed proposals on why they should be implemented, and what the limits should be.

At this point it cannot be predicted how many terrestrial base stations and mobile stations will be deployed in any of the candidate bands. There could be the situation that the number of terrestrial operations reaches a level that would create harmful interference to satellite receivers in the aggregate. Therefore, Intelsat urges the Department to take aggregated interference into account in any new rules. There needs to be a mechanism to limit or manage the interference towards satellite receivers if harmful interference occurs. One possible mechanism that has been proposed by Ka-band satellite operators to the FCC is an aggregated limit towards the sky.² Another option could be to institute a single-entry limit per terrestrial base station and per terrestrial mobile station.

Question 6-7: ISED proposes that all existing FSS earth stations and those in applications pending approval for operation would be permitted to continue to operate under the current conditions of license as described above. Comments are sought on this proposal.

If ISED includes this band, Intelsat agrees with ISED's proposal. All granted and pending applications until the date the new rules come into effect should be provided grandfathered status.

37-40 GHz Band

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 CTF A footnote C51, while continuing to allow for fixed-satellite service (space-to-Earth) in the band.

Intelsat appreciates that ISED values the importance of the FSS and plans to keep the co-primary allocation for FSS. The 37.5-40 GHz band will be an important future satellite downlink band as Ku-band

¹ See, *Petition for Reconsideration of The Satellite Industry Association, Inc.*, GN Docket No. 14-177, IB Docket No. 15-256, RM-11664, WT Docket No. 10-112, IB Docket No. 97-95 (filed Dec. 14, 2016).

² See EchoStar, Inmarsat, Intelsat, O3b Limited, OneWeb, SES Americom, Inc., and ViaSat Inc. "Notice of Ex Parte – Use of Spectrum Bands Above 24 GHz For Mobile Radio Services Notice of Proposed Rulemaking, GN Docket No. 14-177, IB Docket Nos. 15-256 & 97-95; RM-11664; WT Docket No. 10-112", May 12, 2016.

and Ka-band get more and more congested. Future satellite networks will support this frequency band and therefore it is important to allow the deployment of FSS gateways in this band.

Question 7-2: ISED is seeking comments on whether a moratorium on the issuance of new licenses under the *New Licensing Framework for the 24, 28 and 38 GHz Bands and Decision on a License Renewal Process for the 24 and 38 GHz Bands* is required at this time.

No comment.

Question 7-3: ISED is seeking comments on the proposal to adopt the band plan as shown in figure 7 for the frequency band 37-40 GHz.

Intelsat has no concerns with the proposal of the new band plan, providing that there is an FSS co-primary allocation across the whole 37.5-40 GHz frequency band.

Question 7-4:

A. ISED seeks comments on the proposal to require site-by-site coordination between proposed flexible use terrestrial stations and FSS earth stations in the frequency band 37.5-40 GHz when a pre-determined trigger threshold is exceeded.

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

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

As mentioned in response to Question 6-4, Intelsat supports flexible licensing rules and the possibility to allow FSS earth stations to be deployed without a rigorous coordination procedure. However, as 37.5-40 GHz is an FSS downlink band, satellite earth stations need to be protected from terrestrial interference. Intelsat recommends that ISED adopt a first-come first-serve regime, where a terrestrial station would need to coordinate with already operating FSS earth stations and vice-versa.

In adopting such a regime, a certain PFD value or a defined distance would need to be defined as a trigger value. The terrestrial operators would need to coordinate their new terrestrial base station prior to deployment to ensure that the FSS earth station does not experience interference. Similarly, a second-in-time earth station provider would also need to coordinate its earth station site prior to deployment if the coordination trigger value is met. If the planned earth station site would fall within such a trigger value, the earth station would only be protected after successful coordination with the already deployed terrestrial base stations.

In the 37.5-40 GHz band, ISED would need to implement a mechanism to make the location of the earth station and terrestrial base stations available to the public for coordination purposes. The adopted trigger value should be sensitive enough to ensure protection of the FSS earth stations.

Intelsat also supports the use of shielding as a mitigation technique in this band. However, any shielding in the 37.5-40 GHz band, satellite downlink, should be at the location of the terrestrial base station as the terrestrial operator would be interfering into the earth stations.

Question 7-5:

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 37.5-40 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?

Intelsat agrees with ISED that the FCC's approach is not appropriate in the Canadian context for the 39 GHz band. Therefore, Intelsat is not in favor of geographical restrictions on the earth station deployment.

Question 7-6: It is proposed that, should SRS and/or MSS systems be deployed, flexible use licensees in the band 37.6-40 GHz may be subject to technical provisions to facilitate co-existence. Comments are sought. ISED notes that any such technical provisions would be established through a future consultation process.

No comment.

Question 7-7: ISED is seeking comments on:

A. the options and implications for the treatment of incumbent licensees currently holding Tier 3 licenses, the percentage that would apply to option 1 and supporting rationale.

B. the options and implications for the treatment of incumbent licensees currently holding FCFS licenses and supporting rationale.

No comment.

64-71 GHz Band

Question 8-1: ISED is seeking comments on its proposal to designate the band 64-71 GHz for license-exempt operations on a no-protection, no-interference basis.

No comment.

General Spectrum Access Considerations

Question 9-1: ISED is seeking comments on:

- A. Whether flexible use access in these bands should be exclusively licensed or license-exempt.
- B. If a licensing approach is proposed, which types of licenses (radio licenses, spectrum licenses with user-defined license areas, spectrum licenses 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?
- C. Whether a license-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.

Intelsat supports a flexible license regime for earth stations with the establishment of a well-defined coordination approach between the terrestrial and the satellite service. For this reason it is important that the locations of the terrestrial base stations are publically available regardless of regime is adopted.

Question 9-2: If an exclusive licensing approach is implemented, preliminary comments are sought on the benefits and risks related to longer license terms for these frequency bands.

No comment.

Question 9-3: If an exclusive licensing approach is proposed, ISED is seeking preliminary comments on possible measures that could support competition in light of the current conditions in the Canadian wireless service market and anticipated development and deployment of 5G services if flexible use licensing is developed through a spectrum licensing model.

No comment.

Intelsat thanks the Department for this opportunity to submit comments in response to the Consultation, and looks forward to participating further in this proceeding.