



October 4, 2021

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235 Queen Street (6th Floor, East Tower)
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Re: *Consultation on Updates to the Licensing and Fee Framework for Earth Stations and Space Stations in Canada (SMSE-009-21)*

Dear Director Scott:

Space Exploration Technologies Corp. (“SpaceX”) hereby comments on the Consultation on Updates to the Licensing and Fee Framework for Earth Stations and Space Stations in Canada (“Consultation”) as published in the *Canada Gazette*, Part I, Vol. 155, No. 33 on August 14, 2021.

SpaceX is a private company founded in 2002 to revolutionize space technologies, with the ultimate goal of enabling humanity to become a multi-planetary species. SpaceX has achieved a series of historic milestones and is proud to have become the first private company in history to send astronauts to orbit, safely returning them to Earth. To date, SpaceX has successfully launched more than 100 missions to space.

SpaceX is leveraging its accumulated expertise in space system manufacturing, design, and operations, to develop Starlink, a constellation of satellites designed to provide high-speed, low-latency, competitively priced broadband service to locations in Canada and anywhere around the globe. SpaceX’s first-generation constellation consists of over 4,400 non-geostationary orbit (NGSO) satellites and extensive ground infrastructure employing advanced communications and space operations technology. SpaceX has invested billions of dollars in this system and is currently building 120 satellites per month, along with gateways and end-user terminals. Starlink has been designed to make efficient use of radio spectrum resources by prioritizing the ability to flexibly share spectrum with other licensed satellite and terrestrial users, including by using advanced beam-forming and digital processing technologies. SpaceX links to the customer user terminals in the Ku-band for both uplink and downlink frequencies, with gateway links in the Ka-band.

General comments

SpaceX welcomes the opportunity to provide input on Canada’s NGSO licensing and fee framework and assist ISED in developing a world-class satellite licensing regime. A well-designed regulatory framework can promote the rapid deployment of advanced next-generation satellite systems that provide quality broadband to all Canadians.

The past year and a half have demonstrated conclusively the importance of connecting every Canadian, no matter where they live. ISED's approach to licensing and fees for earth stations and space stations can be an important part of ensuring that Canadians have the most choices of the best broadband services as quickly as possible. To achieve this goal, ISED should encourage rapid resolution of operator-to-operator coordination, while ensuring regulations do not unintentionally delay critical deployments of innovative next-generation satellite systems that can immediately meet the connectivity needs of Canadians. Overall, the licensing system and fees should create both opportunities and strong incentives for deployment of advanced and capable systems that feature the operational flexibility and technical agility needed to operate in an environment with multiple systems in the same spectrum bands.

Earth stations play a crucial role in the network designs for all broadband satellite networks, including for SpaceX. SpaceX's user terminals consist of advanced phased-array antennas that use Ku-band spectrum to carry data from Canadian homes and businesses to its satellites. SpaceX's satellites then aggregate this data and use Ka-band spectrum to link with a vast network of gateway earth stations that connect to the rest of the Internet. On both ends, SpaceX invested in innovative technologies that efficiently use and better share scarce spectrum resources, thus creating opportunities for more competition for more Canadians.

Flexible, predictable, and cost-effective earth station licensing regimes are critical for facilitating necessary coordination between spectrum users and ensuring appropriate quality of service for the satellite communications services offered by licensed operators. Earth station authorization processes should be designed to promote efficient use of spectrum and enable timely deployment of advanced NGSO systems to expand connectivity and consumer choice across the country. If poorly designed, licensing and fee arrangements can impose a significant drag on innovation and deployment, undermining the core goals that the policies are intended to advance.

SpaceX encourages ISED to continue to provide a clear path to obtaining gateway earth station authorizations and ensuring access to spectrum while minimizing the burden on the regulator, as well as on satellite operators.

Q1. ISED is seeking comments on its proposals to:

- a. use spectrum licences to authorize fixed and transportable earth stations and ESIMs within Canadian territory, with multiple earth stations authorized under a single licence**
- b. issue the proposed spectrum licences for a Tier 1 service area, and have those licences authorize the radio service and frequency bands**
- c. apply the general conditions of licence that are listed in [annex A](#) to earth station spectrum licences**

SpaceX supports ISED's proposals to use spectrum licences to authorize fixed and transportable earth stations and ESIMs within Canadian territory, with multiple earth stations authorized under a single licence. This approach is a significant improvement over the existing apparatus-based licensing framework and would simplify the licensing process and reduce fees for satellite networks such as Starlink.

Tier 1 service area. While SpaceX agrees with ISED’s goal of ensuring the maximum possible coverage of Canada’s population, ISED should not mandate 100% geographic coverage, which may in fact limit services and options for all Canadians. A geographic coverage requirement will create high barriers to entry or deter innovation.

In particular, because the northernmost portion of Canada extends above 70° North Latitude, providing service on a continuous basis at such latitudes requires NGSO satellites to operate at highly inclined orbits, which could impose a significant cost to achieve coverage that may not fit the business plan of the system’s operator. For example, Space Norway has proposed an NGSO system specifically designed to provide pan-Arctic service to areas above 55° North Latitude, which would not be capable of providing continuous service to the rest of Canada.

In contrast, NGSO systems that operate near the plane of the equator may not be able to provide service in high-latitude regions, while systems that concentrate coverage in a particular region of the world may not be able to provide service to “all locations” in the required area. Thus, a rule that requires 100% geographic coverage may not accommodate an innovative NGSO design that would meet an identifiable market need. Domestic coverage requirements would impose undue constraints on NGSO system design, potentially requiring an operator to employ multiple NGSO constellations to meet the requirement.

This issue is not exclusive to Canada. Just last year, the U.S. Federal Communications Commission (“FCC”) eliminated its domestic coverage requirement, finding that “[w]ith advances in NGSO technology and spectrum sharing, the domestic coverage requirement can actually discourage or hinder the development of new innovative NGSO FSS systems.”¹

Licence conditions. SpaceX does not oppose the typical conditions of licence for all earth stations. At the same time, SpaceX urges ISED to continually revisit these conditions and identify opportunities to streamline requirements, either by removing unnecessary conditions or adopting technologies that ease the burden of compliance.

As for the additional conditions, SpaceX offers several recommendations. First, condition A12 (contact information) should clarify that contact information does not require the identification of a specific individual and that a general email address is sufficient to meet the requirement.

Second, with respect to A16 (research and development), SpaceX strongly urges ISED to abandon this requirement. As ISED itself notes, satellite operators are already engaging in intense R&D, driven by significant competition and consumer demand for better service. As such, well-designed rules that encourage competition will drive operators to invest in R&D appropriate for the market, consumer demand, and its own financial resources, without resorting to a more draconian one-size-fits-all minimum requirement.

¹ *Update to Parts 2 and 25 Concerning Non-Geostationary, Fixed-Satellite Service Systems and Related Matters*, IB Docket No. 16-408, Second Report and Order, FCC 20-119 (rel. Aug. 28, 2020).

Third, ISED should clarify that satellite operators may comply electronically with the subscriber notice provision within A17 (technical requirements). Moreover, ISED should waive the certification and type-approval requirements for subscriber radio equipment brought in by visitors in situations where the equipment is identical to equipment already subject to a generic licence. This is particularly relevant for companies such as SpaceX and other next-generation service providers that employ a common user terminal architecture around the world.

Q2. ISED is seeking comments on its proposals to:

- a. implement spectrum licences that require site approvals for all earth stations described above operating in any frequency band**
- b. collect and assess the technical information listed in [annex B](#) as part of the site approval process**
- c. require earth station licensees with site-approved spectrum licences to hold licences for entire spectrum blocks, as per relevant SRSPs**

ISED should take this opportunity to adopt a flexible and efficient model for gateway licensing that prioritizes rapid deployment of service to Canadians and encourages competition through operator-to-operator coordination.

Specifically, for earth stations requiring site-specific analysis, SpaceX urges ISED to adopt a presumption of timely approval for any application that meets the technical requirements for the frequency band being used. SpaceX particularly supports ISED's proposal to allow operators to apply for multiple locations at a time so that earth stations with identical technical information can be reviewed together. SpaceX does not object to ISED's proposal to collect technical information about each site.

At the same time, locations with access to fiber can be scarce and operators may be tempted to claim prime locations even if they do not intend to deploy in the near or even mid-term. To prevent this sort of warehousing of scarce earth station locations, ISED should require that gateways be deployed no later than one-year after being licensed.

If ISED requires site approvals for all earth stations, it could also consider other less-resource intensive approaches to reviewing applications; for example, a software-driven process that enables automated coexistence analysis leading to rapid reviews. Specifically, operators with a nationwide authorization could then register individual earth stations in a database that can automatically check each location against all previously registered earth stations and determine whether to permit the new earth station or require further coordination. In fact, the United States has adopted a similar light-licensing framework for fixed services in the 70/80 GHz bands in the United States, which has led to rapid successful deployment of fixed links for backhaul.

Q3. ISED is seeking comments on any additional technical information that should be required for site-approved earth stations. In providing comments, respondents are requested to include supporting arguments and a rationale.

If ISED decides to require submission of the technical information included in Annex B, the information already outlined by ISED should be sufficient to assess applications.

Q4. ISED is seeking comments on what other types of earth stations, in addition to those identified, could be subject to spectrum licences that require site approvals.

To encourage rapid deployment to otherwise unserved Canadians and to ensure efficient use of ISED resources, ISED should minimize the types of earth stations subject to individual site approvals. Manual site approval processes as envisioned in the consultation—which involve a number of agencies at various levels—are the least efficient approach to licensing, often with little need or benefit to Canadians.

Q5. ISED is seeking comments on its proposal to adopt generic spectrum licences in order to authorize systems of identical fixed earth stations and ESIMs.

SpaceX strongly supports ISED’s proposal to adopt generic spectrum licences for a wide array of satellite earth stations, including identical fixed earth stations and ESIMs. Such “blanket licences” streamline the site-per-site licensing requirements and accelerate widespread deployment of two-way satellite broadband terminals to support innovative next-generation satellite services in Canada.

For end-user equipment like user terminals and ESIMs, a site-per-site licensing regime is simply unworkable. ISED will be overwhelmed with hundreds of thousands of applications, while Canadians will be left waiting for their equipment to be individually authorized. In contrast, a generic earth station licence framework provides flexibility for the deployment of end-user terminals to meet fluctuating and evolving demand nationwide without the administrative burden of individual site-specific licensing, while still protecting other authorized users in the same frequency bands. Permitting such generic licensing for identical fixed earth stations and ESIMs matches the successful approach adopted elsewhere in the world and would expand the number of Canadian consumers that can be supported by next-generation satellite systems, such as Starlink and others.

SpaceX’s own Ku-band broadband user terminals connect customers directly to SpaceX’s satellites in the Ku-bands of 10.7-12.7 GHz for downlink and 14.0-14.5 GHz for uplink. SpaceX’s terminals are intended to be ubiquitously deployed, with one terminal per every end-user premises. In the United States, for example, the FCC granted SpaceX a blanket licence in March 2020 to deploy up to 1,000,000 end user terminals across the country, and SpaceX has subsequently applied for approval of yet another 5,000,000. The FCC rules for blanket licensing of user terminals are codified at 47 C.F.R. § 25.115(f)(2). Countries throughout Europe and around the world have also granted SpaceX blanket licenses that have enabled SpaceX to quickly provide high-quality broadband service to consumers. In Canada, ISED granted SpaceX an interim authorization in November 2020 to deploy up to 200,000 end user terminals.

Importantly, ISED should clarify that for situations where the same or electrically identical earth station is used for both user terminals and for ESIMs, a satellite operator should only have to obtain a single licence and pay a single spectrum fee, rather than seeking separate licences for what is, in essence, the same equipment.

Q6. ISED is seeking comments on its proposals to allow generic spectrum licensing systems of identical fixed earth stations and ESIMs in the frequency bands discussed above.

SpaceX strongly supports ISED's proposal to permit generic spectrum licences for identical earth stations and ESIMs in a wide variety of spectrum bands, and urges ISED to make generic spectrum licensing available for as many use cases and spectrum bands as possible. Below, SpaceX offers specific suggestions for Ku, Ka, and other identified bands.

Ku-band. SpaceX supports ISED's proposal to permit NGSOs to obtain generic spectrum licensing of identical earth stations and all three types of ESIMs (land, aeronautical, and maritime) in 10.95-11.2 GHz and 11.45-11.7 GHz (space-to-Earth); 11.7-12.2 GHz (space-to-Earth) and 14.0-14.5 GHz (Earth-to-space); and 12.2-12.7 GHz (space-to-Earth); and 13.75-14.0 GHz (Earth-to-space).

SpaceX urges ISED to consider going even further to support rapid deployment of new services for Canadians by adopting generic spectrum licensing in 10.7-10.95 GHz and 11.2-11.45 GHz for both identical earth stations and all three types of ESIMs. While these two bands are heavily used by terrestrial fixed point-to-point systems, next-generation satellite operators can protect these fixed services by complying with international limits designed specifically for this purpose. Nonetheless, if ISED believes these international standards are insufficient to prevent harmful interference to fixed services, then it could make available the 10.7-10.95 GHz and 11.2-11.45 GHz bands available for generic licensing on a non-interference, unprotected basis for all three types of ESIMs. For example, to avoid harmful interference with fixed service links on land, satellite operators could institute a software-defined mechanism for identifying and avoiding potential interference. In 17.7-18.83 GHz (space-to-Earth and Earth-to-space), rather than prohibit generic licensing for NGSOs, ISED should adopt a spectrum sharing regime that would permit identical earth stations and all three types of ESIMs for NGSOs to operate on a non-interference, unprotected basis.

Ka-band. While SpaceX does not operate user terminals or ESIMs in the Ka-band, it urges ISED to adopt a flexible approach to generic licensing of identical earth stations and ESIMs in the Ka-band as well. Specifically, ISED should make generic licensing available across the sub-bands identified in Section 6.3 for both GSO and NGSO satellite networks and for both user terminals and all three types of ESIMs (land/maritime/aeronautical). For example, in 27.5-28.35 GHz, rather than prohibit generic licensing for NGSOs, ISED should adopt a spectrum sharing regime that would permit identical earth stations and ESIMs for NGSOs to operate on a non-interference, unprotected basis.

Other bands. ISED should take the widest possible view of generic licensing to promote innovation, drive down costs, and enable rapid deployment of critical ground infrastructure to Canadians everywhere.

Q7. ISED is also seeking comments on any other bands that should be considered for generic spectrum licensing for fixed earth stations and ESIMs, including for systems of identical receive-only earth stations in the 4000-4200 MHz band. In providing comments, respondents are requested to include supporting arguments and a rationale.

SpaceX encourages ISED to make generic licensing available wherever feasible to promote innovation, economies of scale, and rapid deployment.

Q8. ISED is seeking comments on its proposals to:

- a. **issue generic spectrum licences for ESIMs on a no-interference, no-protection basis**
- b. **require ESIM licensees to provide a contact that would be available to respond to interference issues 24 hours a day, 7 days a week, as per the licence conditions in [annex A](#)**
- c. **require applicants to submit technical information needed to confirm compliance with SRSP-101 when they apply for generic spectrum licences for ESIMs and for fixed earth stations intended for self-installation by consumers**

As ISED recognizes, the international framework for ESIMs is still evolving. As such, SpaceX suggests ISED issue generic spectrum licences for ESIMs on a non-interference, unprotected basis at this time. But ISED should also clarify that—if the international framework changes—it will work to update and harmonize its rules to coincide with global best practices.

SpaceX supports ISED’s proposal to require ESIM licensees provide a contact that would be available to respond to interference issues. If ISED requires contact information, it should not necessarily be tied to a specific person who may be unreachable at a given moment, but rather a 24-hour operations center.

As for the proposal to require technical information needed to confirm compliance with SRSP-101, self-certification with the relevant standards should be permitted along with only whatever information is necessary to determine compliance. If ISED requires operators to submit information to confirm compliance, then ISED should leverage automated tools wherever possible to enable rapid review and approval.

Q9. ISED is seeking comments on whether an RSS should be developed for earth stations intended for self-installation by consumers.

The use of a Radio Standards Specification (RSS) or certification for earth stations before entering the Canadian market is not necessary for next-generation satellite systems. Instead, ISED should facilitate competition between operators to promote user-friendly and safe installations without regulatory intervention that could unintentionally impede development, with no coinciding benefit for Canadians.

For example, SpaceX has developed a user terminal that makes self-installation possible in only two steps: point at the sky and plug in, in either order. Each Starlink Kit arrives with everything a customer needs to get online, including a Starlink dish, Wi-Fi router, power supply, cables and mounting tripod. Customers then use the Starlink app to assess field of view in their desired install location before installing, and roof mounts are available for purchase in their account.

While RSS standards have the admirable goal of improving the consumer experience, they could have negative unintended consequences. For example, establishing RSS standards would require a whole new regulatory process to define and promulgate the standards. Moreover, RSS standards could delay deployment of critical technology and new versions by requiring operators to re-engineer or recall earth stations already in the market. It could also result in a patchwork of certification regimes around the world that significantly raise the costs of producing new terminals for operators and, in turn, costs for consumers.

ESIM terminals on vehicles and vessels can be installed by qualified installers who understand the antenna's radiation environment and the measures best suited to maximize protection of the general public and persons operating the vehicle and equipment.

Q10. ISED is seeking comments on its proposals to:

- a. introduce spectrum licensing for space stations in all satellite services, with licences authorizing the radio service, the frequency band(s), the orbital location and a coverage area**
- b. set the licence term on a case-by-case basis for satellites that are not FSS, BSS or MSS**
- c. apply the existing conditions of licence for space stations, published as N2 – Space station licences, to the new spectrum licences**

SpaceX has no comment on these proposals.

Q11. ISED is seeking comments on its proposal to introduce spectrum licensing to authorize FSS feeder link and/or TT&C spectrum used by space stations to support MSS, with licences issued immediately after a favourable licensing decision and fees applicable once satellites are in operation.

As ISED recognizes in this consultation, satellite technologies are undergoing dramatic innovation and convergence, including between MSS and FSS networks. As such, ISED should endeavor to streamline its licensing regime to avoid requiring duplicative licence applications and fees and minimize the ISED resources needed to review what promises to be a growing number of licence applications. This is particularly true for FSS feeder links and/or TT&C spectrum used by space stations. For example, ISED should clarify that a satellite system with FSS and MSS capabilities would only need to obtain a single FSS licence to cover both FSS and FSS feeder links.

Q12. ISED is seeking comments on whether to require MSS satellite operators to comply with the rules regarding minimum holdings for FSS feeder link spectrum, as defined in RP-008. In providing comments, respondents are requested to include supporting arguments and a rationale.

SpaceX has no comment on this proposal.

Q13. ISED is seeking comments on its proposals to:

- a. issue spectrum licences instead of approvals in principle for MSS satellites, with fees remaining payable only once satellites are launched and operational**
- b. issue spectrum licences for MSS satellites with a 20-year term**
- c. issue separate spectrum licences for MSS satellites and MSS earth stations, with each licence assigned a fee**

SpaceX has no comment on these proposals.

Q14. ISED is seeking comments on its proposals to:

- a. issue the three types of satellite-related spectrum licences separately and assign a separate fee for each [generic, site-approved, and space stations]**
- b. allow communication with multiple GSO satellites on a single earth station licence**
- c. require separate earth station licences for NGSO systems**

SpaceX does not oppose ISED's proposal to issue three types of satellite-related spectrum licences, provided that fees for those licences are related to the cost of processing the application, as explained in more detail in the answer to Question 15.

Q15. ISED is seeking comments on its proposal to assign a consumption-based fee to earth station spectrum licences, where site and station approvals are required, as follows:

- below or equal to 1 GHz: \$2000/MHz**
- above 1 GHz and below or equal to 3.4 GHz: \$100/MHz**
- above 3.4 GHz and below or equal to 7.075 GHz: \$20/MHz**
- above 7.075 GHz and below or equal to 17.3 GHz: \$10/MHz**
- above 17.3 GHz and below or equal to 51.4 GHz: \$5/MHz**
- above 51.4 GHz: \$1/MHz**

SpaceX appreciates ISED's proposal to revisit its current fee structures for earth stations. But a cost-recovery method would better meet ISED's goals than a consumption-based model. By reducing the costs of deploying and managing a satellite network in Canada, allowing operators to invest more in technology and lower prices for Canadians.

A consumption-based model will ossify inefficiencies in the licensing system that will result in market distortions that would inhibit innovation, raise barriers for new entrants, and require continual assessment and readjustment. As explained by the OECD, the economic valuation of any particular use of spectrum is difficult because:

Firstly, it necessarily requires a multiyear evaluation – ten or more years – in a sector characterized by technological breakthroughs and discontinuities. Few envisaged, for example, the high rate of smartphone uptake around the world. Secondly, country-specific and market conditions influence any valuation. Thirdly, even among similar players and uses, the value for each player could be significantly different depending on specific circumstances. Assigning the spectrum to a player that values it the most does not necessarily maximize the value to the economy. This is part of the rationale behind spectrum caps, which try to protect competition by preempting possible spectrum hoarding, which increases barriers to entry. Fourthly, the valuation might require a comparison of distinctly different things, as was the case for broadcasting and broadband. In such scenarios, certain aspects are very hard – if not impossible – to measure. In countries where most households predominantly access free-to-air (FTA) television broadcasting, either because of income restrictions or because pay television infrastructure is not ubiquitous, the social value of the service is high and challenging to quantify.²

A regulatory method based on uncertain economic valuations will lead to unintended and potentially harmful consequences for consumers. Worse, a consumption-based model would create the perverse incentive to decrease the capacity of a system, rather than optimizing service to meet consumer demands. Operators should not be punished for better meeting the needs of Canadians.

Instead of using the blunt tool of regulatory fees, ISED should instead seek to drive spectral efficiency through well-designed spectrum policies. Properly designed spectrum policies can encourage operators to continue to invest in high-performing technologies, rather than attempting to avoid exorbitant fees by reducing services to Canadians. For example, ISED could reward operators that exceed certain efficiency thresholds and can provide the most throughput to the most consumers.

In contrast to a complex and unreliable consumption-based model, ISED's spectrum efficiency goals would be better served with a cost-recovery method. A cost recovery model conceptualizes spectrum licence fees more simply as a way of recovering the administrative costs of processing the licence itself. As one example, the United States employs a fixed application fee for spectrum use, where the licensing fees for a fixed satellite earth station would range in the hundreds of dollars, instead of hundreds of thousands of dollars. Excessive fees could slow innovation and lead to higher costs for Canadians.

If ISED nonetheless decides to proceed with the consumption-based fee, then SpaceX recommends three targeted changes to ISED's proposals with the overarching goal of aligning and streamlining FSS and MSS fees in recognition of growing convergence:

- Reduce fees for frequencies at or below 1 GHz to \$500/MHz or lower, and make a corresponding change to the MSS fees at or below 1 GHz;
- Assess a \$5/MHz fee for stations above 3.4 GHz and at or below 51.4 GHz, also to align with MSS fees; and

² OECD/IDB (2016), *Broadband Policies for Latin America and the Caribbean: A Digital Economy Toolkit*, OECD Publishing, Paris, <https://doi.org/10.1787/9789264251823-en>, 71.

- Adopt a low, flat fee for earth station sites in the 71-76 GHz/81-86 GHz consistent with a light-licensing model, given the high-gain, directional “pencil beam” nature of such links and ease of coordinating and coexisting with co-primary users in the band such as fixed links.

Q16. ISED is seeking comments on its proposal to assign a consumption-based fee to generic earth station spectrum licences for fixed earth stations and ESIMs at the rate of \$5/MHz.

SpaceX appreciates ISED’s decision to adopt a harmonized fee framework for generic earth station spectrum licences for fixed earth stations and ESIMs. But SpaceX urges ISED to maintain its current fee structure for identical fixed earth stations, under which no fee is required, and to extend that framework to ESIMs. Moreover, ISED should permit operators to apply for a single generic earth station spectrum licence, with a single fee, where the identical fixed earth stations and ESIMs have the same or substantially similar technical parameters and use the same spectrum. In that case, it would be more efficient for applicants and ISED to review a single application than to review two separate applications, particularly where, as here, ISED proposes to grant the licences on a non-interference, unprotected basis.

If ISED proceeds with its proposed consumption-based model, then SpaceX requests that ISED assess a fee of \$1/MHz or lower for generic spectrum licences in frequencies at or above 10.7 GHz. Excessive fees will deter deployment and raise costs for Canadians.

Q17. ISED is seeking comments on its proposal to modify the existing consumption-based fee for spectrum licences for MSS earth stations operating in bands allocated to MSS as follows:

- at or below 3 GHz: \$1500/MHz
- above 3 GHz: \$5/MHz

As above, SpaceX recommends that ISED take a cost-recovery approach to spectrum licence fees, which will enable innovation and is better tailored to the administrative costs of managing the licensing system than fee structures that attempt to represent the value of specific spectrum bands.

An ill-fitted consumption-based model could be particularly detrimental for rapidly evolving areas of the satellite ecosystem, such as MSS, that are increasingly being integrated into the modern mobile ecosystem. Rather than impose artificial barriers to deployment of innovative mobile technologies that can be used to connect Canadians everywhere, ISED should take all possible steps to further streamline the licensing and fee structure for MSS.

If ISED proceeds with a consumption-based fee, then ISED should make the following changes to align fees for MSS earth stations with the fixed earth station fees:

- Set fees for frequencies below or equal to 1 GHz at or below \$500/MHz;
- Set fees for frequencies above 1 GHz and at or below 3 GHz at or below \$100/MHz; and
- Set fees for frequencies above 51.4 GHz at or below \$1/MHz.

Q18. ISED is seeking comments on its proposal to assign the spectrum licence fee for MSS earth stations based on the maximum amount of spectrum a system is capable of using, within a range of possible operation. This amount would be the assigned spectrum used in the fee calculation.

As above, fees should be assessed on a cost-recovery basis tailored to the administrative costs of processing and managing the licences. Should ISED proceed with a consumption-based fee, SpaceX agrees that MSS earth stations should not be assessed based on the total authorized spectrum, but even the maximum amount a system is capable of using may still overstate true usage. For instance, SpaceX's next-generation satellite system is capable of dynamically allocating throughput to meet changing user demand. The theoretical maximum amount of spectrum a system can use would be a false construct that does not represent how spectrum is actually deployed to serve Canadians.

Q19. ISED is seeking comments on its proposals to:

- a. modify the MSS satellite spectrum licence fee to \$124.84/MHz**
- b. assign a consumption-based fee for new spectrum licences for all other satellites (that are not FSS, BSS or MSS) at \$124.84/MHz**

Consistent with responses above, SpaceX urges ISED to abandon consumption-based fees in favor of a cost-recovery model that seeks solely to cover administrative costs of processing applications and managing the licences. These cost-recovery models should be paired with spectrum policies that reward efficiency.

If ISED declines to adopt a cost-recovery model, then it should set MSS satellite spectrum licence fees at a level that would not result in a total fee increase across all new licences.

Q20. ISED is seeking comments on its proposals to:

- a. introduce a two-step fee for space station spectrum licences for constellations of NGSO satellites in any satellite service that are subject to phased deployment milestones**
- b. apply the first fee step currently at \$62.42/MHz from the launch of the first satellite up until the deadline for the first deployment milestone (typically year 6). The second fee step, currently at \$124.84/MHz, would apply thereafter and would continue until the end of the licence term, recognizing that all annual fees will increase over time, according to the CPI**

SpaceX reiterates its view that a cost-recovery model for spectrum fees is the best way to achieve ISED's goal of "increasing spectrum efficiency, use and flexibility." The consumption-based model outlined in the consultation would discourage operators from maximizing the service they provide for Canadians. But if ISED nonetheless adopts a consumption-based fee for spectrum licences, then a two-step phased approach is reasonable for non-geostationary satellite networks.

If ISED adopts a two-step approach, then SpaceX recommends setting the second step at or below \$62.42/MHz and setting the first step at one-third of that amount, representing the one-third of the total satellites that would be in operation.

Q21. ISED is seeking comments on its proposals to introduce a minimum annual spectrum licence fee of \$160 for earth stations and \$300 for space stations, and to apply these fees whenever the application of the consumption-based fee model would result in a fee lower than those amounts.

SpaceX does not oppose minimum annual spectrum licence fees. But the actual “value of a licence” that ISED is attempting to capture actually varies depending on the spectrum band, and indeed, by operator. As such, the set fees proposed by ISED more closely resemble an administrative cost-based model. As such, ISED should consider adopting these minimum fees as flat fees for all generic earth station and space station licences and tying them to spectrum policies that encourage efficiency.

Q22. ISED is seeking comments on its proposal to apply a minimum annual spectrum licence earth station fee of \$160 to radioastronomy sites.

Radioastronomy is critically important for Canada and mankind. While SpaceX has no comment on ISED’s specific proposal, SpaceX encourages ISED to ensure its fee structure helps facilitate the important exploration conducted by radioastronomers.

Q23. ISED is seeking comments on its proposals to introduce developmental spectrum licence fees for earth stations and space stations at a flat rate of \$160 and \$300, respectively.

SpaceX has no comment on this proposal.

Q24. ISED is also seeking comments on limits to eligibility requirements for developmental spectrum licences, limits on frequency bands where developmental licences could be issued, and conditions of licence that could be applied. In providing comments, respondents are requested to include supporting arguments and a rationale.

ISED should remain as flexible as possible when issuing developmental licences to support innovation and experimentation while at the same time protecting incumbent and co-primary users.

Q25. ISED is seeking comments on its proposal to apply a prorated fee, of 1/12th of the relevant annual fee for each month until March 31 of the fiscal year, for licences issued part-way through a licensing year.

If ISED requires annual spectrum fees, SpaceX agrees that any licences obtained part-way through the year should be prorated.

Q26. ISED is seeking comments on its proposals to:

- a. issue short-duration licences for periods of less than one year**
- b. assign a prorated fee of 1/12th of the total annual fee per month, with the lowest fee possible being \$160 for earth stations and \$300 for space stations**

SpaceX has no comment on this proposal.

Q27. ISED is seeking comments on its proposals to set service standards for the issuance of licensing decisions for satellite-related spectrum licences as follows:

- space stations: 126 days**
- generic earth stations: 126 days**
- site-approved earth stations: 126 days**
- additional sites under an existing site-approved earth station licence: 49 days**

The satellite industry is undergoing a rapid transformation, with operators around the world leveraging new technologies and business models to serve consumers everywhere with high-speed, low-latency broadband connectivity. To keep pace and not serve as a drag on innovation, spectrum regulators have started streamlining outdated, decades-old processes designed for yesterday's satellite ecosystem. ISED should adopt bold goals to promote its own administrative efficiency alongside rapid deployment of satellite technology and connectivity across Canada.

To that end, SpaceX requests that ISED set service standards at 49 days or fewer for all earth stations, including generic earth stations, site-approved earth stations, and additional sites under an existing licence. With technology advances in spectrum management and frequency coordination, along with the detailed information that ISED proposes to require from applicants (see Annex A and B), 49 days should provide ISED with sufficient time to review licence applications.

Conclusion

SpaceX commends ISED for undertaking this consultation on the licensing and fee framework for earth stations and space stations. ISED raises important questions and has the opportunity to develop a forward-looking and flexible framework that will drive rapid deployment of much-needed connectivity to Canadians across the country.

Respectfully submitted,

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