

13 September 2024

Innovation, Science and Economic Development Canada
Engineering, Planning and Standards Branch
Senior Director, Space Services and International
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Dear Sirs / Mesdames,

1. Terrestar Solutions Inc. (“Terrestar”) is pleased to provide the following comments to Innovation, Science and Economic Development Canada (“ISED” or the “Department”) on publication SMSE-006-24, *Consultation on a Policy, Licensing and Technical Framework for Supplemental Mobile Coverage by Satellite* (Canada Gazette, Part I, 29 June 2024) (the “Consultation Document”).
2. As the sole Mobile Satellite Service (“MSS”) network operator headquartered in Canada, Terrestar is uniquely positioned to deliver on the Department’s promise of universal connectivity for all Canadians, wherever they live, work or play. We look forward to working with the Department and all interested parties to establish an equitable competitive environment for non-terrestrial network (“NTN”) direct-to-device (“D2D”) services, one which is founded on innovation, which respects and protects the rights of existing spectrum licensees, and which brings the sweeping communications and security benefits of NTN D2D to as many Canadians as quickly as possible.

A) About Terrestar

3. Terrestar, founded in 2008, is a licensed Canadian MSS operator which actively markets and delivers retail wireless connectivity services throughout Canada under the “Strigo” brand name. Terrestar’s exclusive 40 MHz MSS licence (at 2000-2020 and 2180-2200 MHz) covers all of Canada (ISED Tier 1) and is aligned with the globally recognized MSS S-band, ensuring access to a robust standards-driven ecosystem of chipset developers, equipment manufacturers and other supporting network service providers.

4. Terrestar also holds a Canada-wide (Tier 1) Ancillary Terrestrial Component (“ATC”) licence covering the same 40 MHz as its MSS licence. In the terrestrial context, this spectrum band is referred to as the Advanced Wireless Services 4 (“AWS-4”) band. Terrestar has subleased much of its AWS-4 spectrum to terrestrial wireless partners across Canada, allowing them to enhance the range and quality of terrestrial services provided to Canadians.
5. Terrestar’s existing MSS services are provided by way of its exclusive ownership of the Canadian capacity of the Echostar T1 geostationary satellite orbit (“GSO”) satellite, situated above the Equator at longitude 111.1° W. The core Strigo offering is a mobile satellite internet service that supports texts, emails, photos and over-the-top voice calling, among other activities. At present, these services are provided using a proprietary mobile device that is able to connect to other mobile devices via Wi-Fi.
6. As mentioned in the Consultation Document, in 2022, the Third Generation Partnership Project (“3GPP”) published its Release 17 standard, which includes specifications for the integration of NTN into the fifth-generation new radio (“5G NR”) environment, most notably for NTNs operating in the global S-band. This is a monumental development for MSS providers like Terrestar, as it effectively opens the door to the provision of MSS services directly to the mass market mobile devices most Canadians already carry in their pocket.
7. Terrestar is moving aggressively to seize this new NTN D2D market opportunity. Major investments are underway to deploy 4G and 5G NR network cores and to integrate them with Echostar T1 to enable the rapid introduction of mass market NTN D2D services, beginning with text services as early as this calendar year. Consistent with Terrestar’s open network philosophy, we are in active discussions with several terrestrial mobile service providers aimed at concluding commercial arrangements whereby they would treat Terrestar’s new NTN D2D infrastructure as an extension of their own terrestrial wireless network coverage. In parallel, Terrestar is an active participant at 3GPP working to deepen the integration of NTNs into 5G NR through upcoming standard Releases 18 and 19. Terrestar is also a founding member of the Mobile Satellite Services Association (“MSSA”, www.mss-association.org), a global organisation dedicated to the promotion and expansion of MSS services, notably NTN D2D services.
8. Looking to the medium term, Terrestar has begun planning for the construction and launch of a non-geostationary satellite orbit (“NGSO”) satellite constellation, possibly in cooperation with international partners. This constellation would be tailored to provide exceptional coverage of the entire Canadian landmass at higher speeds and lower latencies than can be attained with the existing Echostar T1 GEO satellite. This project stands as the ultimate proof of Terrestar’s confidence in the size and strength of the NTN D2D market and

of Terrestrial's commitment to drive widespread deployment of these services to the benefit of all Canadians.

B) Terrestrial's Interest in this Consultation

9. As described above, Terrestrial already holds an exclusive 40 MHz Canada-wide MSS licence and is already in active discussions with several terrestrial mobile wireless service providers aimed at concluding commercial arrangements whereby they would treat Terrestrial's new NTN D2D infrastructure as an extension of their own terrestrial wireless network coverage. Importantly, none of these terrestrial service providers are being called upon to contribute their own scarce terrestrial mobile wireless spectrum resources to these commercial arrangements.
10. In other words, Terrestrial does not depend on the outcome of the current consultation to move forward with its business plans. This point is confirmed at paragraph 16 of the Consultation Document, where the Department states that "ISED's existing regulatory framework for MSS already supports such D2D operations in spectrum allocated to MSS and is therefore not included in this consultation".
11. Terrestrial nevertheless has a substantial interest in the decisions that will emerge from the current consultation, for several reasons.
12. First, the new Supplemental Mobile Coverage by Satellite ("SMCS") service providers that ultimately gain authorization pursuant to the rules established by ISED will be direct competitors of Terrestrial. As stated at paragraph 17 of the Consultation Document, they will effectively form a new category of MSS providers. Terrestrial has an obvious interest in ensuring a level playing field between the existing and new categories of MSS providers, for example in relation to conditions of licence.¹
13. Second, it is extremely important for the Department and all interested parties to recognize that the spectrum allocation decisions taken as a result of this consultation will not be taken in a vacuum. Adding a secondary MSS allocation to frequency bands currently allocated for terrestrial flexible use services is a novel concept that has not yet been approved by the International Telecommunications Union ("ITU"). Experience in the United States, where implementation of SMCS-like services² is most advanced, has revealed serious co-channel and adjacent channel interference concerns, for terrestrial as well as space-based systems.

¹ Note that for the remainder of these comments, we will refer to the existing category of providers that hold exclusive MSS spectrum (including Terrestrial) as "exclusive MSS providers" and to the new category of providers that will rely on the SMCS framework as "SMCS-based MSS providers".

² Note that the United States Federal Communications Commission ("FCC") has assigned these services the label "Supplemental Coverage from Space" or "SCS".

Great care must be taken to ensure that these existing systems are fully protected from any interference, both by policies and in practice.

14. Third, Terrestar has a broad interest in ensuring a positive reputation for the MSS sector in Canada, regardless of whether the services are being delivered by the exclusive sub-sector or the SMCS-based sub-sector. As is the case with many nascent technologies, widespread adoption of NTN D2D services will only occur if the general population has confidence in the quality and reliability of the services provided. The Consultation Document addresses several issues which stand to impact reputational values and on which Terrestar seeks to register its views, including matters related to service coverage, emergency roaming and 9-1-1 call handling.

C) Support for the Department's Policy Objectives

15. At paragraph 11 of the Consultation Document, ISED identifies the policy objectives that will guide the establishment of an SMCS framework in Canada. These are:
- to expand mobile services particularly in unserved and underserved areas, including rural, remote, and Indigenous communities,
 - to promote competition in the provision of wireless services so that consumers and businesses benefit from greater choice and competitive prices,
 - to support increased reliability and resiliency of telecommunications services, and
 - to foster investment and the evolution of wireless networks by enabling the development of innovative and emerging applications.
16. Terrestar draws immense encouragement from the Department's recognition of the role to be played by MSS satellite services in achieving each of these policy objectives. Universal coverage, enhanced competition, improved resiliency and constant innovation are all core elements of Terrestar's vision for a connected Canada.
17. We strongly support the Department's policy objectives and submit that they should guide all the Department's policies in the broader MSS sector, not just the SMCS-based sub-sector. As described above, Terrestar has already made substantial investments toward achieving these objectives through the deployment of our exclusive S-band MSS spectrum, and we intend to continue building upon our leadership position as the sole MSS network operator headquartered in Canada.

D) Protecting the Operations of Existing Service Providers

18. Before responding to the individual questions posed in the Consultation Document, Terrestrial believes it is important to draw specific attention to one issue that cuts across several of the questions: the need to protect the operations of existing service providers. Simply put, greater competition through the introduction of SMCS services cannot be allowed to come at the expense of weakening or interfering with the operations of other telecommunications service providers, whether they be space-based or terrestrial, domestic or international.
19. The Department recognizes this non-interference imperative at several locations in the Consultation Document, most notably when outlining the considerations for identifying SMCS eligible frequency bands (section 5.1), when proposing changes to the Canadian Table of Frequency Allocations (the “CTFA”) (section 5.4), when discussing terrestrial network priority and the continuity of commercial mobile services (section 5.5), and when discussing the technical requirements for SMCS space stations (section 7.2) and the coexistence between SMCS space stations (section 7.4).
20. Terrestrial greatly appreciates the Department’s attention to this matter. In particular, we strongly support the Department’s proposed text for a new footnote to the CTFA which declares that “the use of [the proposed candidate bands] for SMCS shall be based upon not interfering with, or claiming protection from, any radio services”. We also strongly support the Department’s unambiguous statement at section 7.1 of the Consultation Document that “[in] case of any interference from SMCS to any service, both the satellite operator and mobile service provider would be jointly responsible for eliminating such interference, regardless of compliance with all technical requirements”.
21. This being said, Terrestrial is concerned that the Department has not yet defined in sufficient detail the process by which affected parties will be able to identify and resolve interference concerns related to individual SMCS applications. Contrary to the situation that prevails in the internationally recognized MSS L- and S-bands, for example, no co-existence and sharing mechanisms have yet been established for space-based operations in the candidate SMCS bands. As a result, potential interference issues arising from in-band and out-of-band emissions need to be carefully studied to protect incumbent services, whether space-based or terrestrial.
22. Given the absence of established coexistence and sharing mechanisms, Terrestrial submits that the Department must put in place a robust process by which SMCS applicants are required to file with their applications detailed analyses demonstrating that they have evaluated all anticipated in-band and out-of-band interference scenarios, including space-to-space and border scenarios, for their fully deployed constellations operating at maximum

loading and power. Sufficient detail of these analyses must be filed on the public record to permit potentially affected parties to perform their own evaluations and to comment on the validity of the applicants' analyses.

E) Understanding the NTN D2D Business Model

23. One final issue Terrestar would like to address before responding to the individual questions posed in the Consultation Document is the nature of the business model for NTN D2D services. By describing the business model up front, we hope to facilitate a rational discussion of service provider responsibilities in areas such as emergency roaming and 9-1-1 call handling.
24. To date, MSS providers such as Terrestar have generally marketed their services directly to end-users, whether commercial or residential. This made sense as these services were provided on a stand-alone basis using proprietary end-user devices. There were limited gains to be had in attempting to bundle these services with mass market communication services, for example, primarily because of the absence of a viable dual-mode device ecosystem.
25. Today, this model is being turned on its head. The integration of NTN networks into 3GPP standards, embraced by chipset makers and handset manufacturers, is creating a world where a single mass market consumer device (the ubiquitous everyday smartphone) can be used to communicate directly with both space-based and terrestrial networks. Equally importantly, the economics of space-based versus terrestrial networks are such that the former are best seen as an extension of the latter. This reality finds direct expression in the name ISED has proposed for the new category of MSS offerings: Supplemental Mobile Coverage from Space.
26. Concretely, what we observe in the market, both from exclusive MSS providers (like Terrestar) and aspiring SMCS-based MSS providers, is a business model under which terrestrial wireless providers retain control of their end-users yet enter into partnerships with MSS providers to extend to these end-users the benefits of incremental space-based coverage.
27. This is the new NTN D2D business model. The fact that it leaves control of end-users in the hands of terrestrial wireless providers, even when end-users are temporarily active on MSS networks, has important implications for the attribution of responsibilities between service providers in areas such as emergency roaming and 9-1-1 call handling. We will have more to say on these matters in response to the relevant questions below.

F) Responses to Specific Questions Posed in the Consultation Document

***Q1** ISED is seeking comments on the proposed considerations to identify frequency bands where the proposed SMCS framework will be applied.*

***Q2** ISED is seeking comments on whether it should consider the service area size and/or the presence of mobile service providers holding the same frequency block as part of the general considerations for identifying frequency bands where the proposed SMCS framework will be applied.*

***Q3** ISED is seeking comments on the potential for the SMCS satellites to have smaller beam sizes such that they could serve smaller service areas and potentially reduce protection areas around existing mobile networks.*

***Q4** ISED is seeking comments on other considerations it should take into account when identifying frequency bands where the proposed SMCS framework will be applied.*

28. Terrestar considers that the five factors identified at paragraph 37 of the Consultation Document represent a useful yet incomplete list of the considerations that should guide the Department's selection of the frequency bands in which the SMCS framework will be applied.
29. One consideration that should figure more prominently in the Department's selection criteria, we submit, is the geographic continuity of the applicant's spectrum holdings in its chosen frequency band across Canada.
30. An estimated 75% of the Canadian landmass is not currently covered by terrestrial mobile networks.³ As noted at paragraph 8 of the Consultation Document, this includes over 14,000 km of major roadways. Clearly, the ability to offer continuous coverage of these remote areas and of fringe areas on the edge of terrestrial mobile networks will be a major selling point (if not the dominant selling point) in convincing end-users to adopt NTN D2D services.
31. As a holder of an exclusive Tier 1 MSS spectrum licence, Terrestar is explicit in marketing its continuous geographic coverage to potential customers. We are concerned, however,

³ Estimation based on a geomatic software analysis of terrestrial coverage maps published by the Canadian Radio-television and Telecommunications Commission ("CRTC") as part of its periodic Communications Market Report (see <https://crtc.gc.ca/eng/publications/reports/policymonitoring/>).

about the possible appearance in the market of new SMCS-based MSS providers whose network coverage is incomplete, excluding for example a number of ISED Tier 2, 3 or 4 service areas where they have not arranged for access to their chosen frequency band. End-users who access these SMCS networks will be confronted with seemingly arbitrary coverage holes aligned with ISED tier boundaries that are unknown to the general public. In addition, in-band signal limitations will need to be applied at tier boundaries to protect the terrestrial operators who do hold in-band licences within these coverage holes, creating further protection bands of potentially significant length and width where SMCS services cannot be provided.⁴ The result could be serious end-user frustration with SMCS services (especially as these services will often be accessed in emergency situations) and potential reputational damage to the entire NTN D2D sector.

32. To mitigate against this problem, Terrestar submits that the Department should give serious consideration to the adoption of a rule similar to that adopted by the FCC in its March 2024 SCS Ruling⁵. In that ruling, the FCC chose to limit the provision of SCS to instances where one or more terrestrial licensees hold all co-channel licences in the relevant band throughout one of six geographically independent areas (“GIAs”): (1) the contiguous United States, (2) Alaska, (3) Hawaii, (4) American Samoa, (5) Puerto Rico/U.S. Virgin Islands, and (6) Guam/Northern Mariana Islands.
33. In Canada, there are no geographically detached territories comparable to Alaska, Hawaii or the other island regions just mentioned. Application of the American concept of GIAs to Canada therefore results in a single GIA, that which is already designated by ISED Tier 1.
34. As noted by the FCC, “a GIA restriction is necessary in the initial SCS framework because it minimizes the risk of potential interference to geographically-adjacent, co-channel license areas”⁶. As such, it eliminates an important source of potential frustration for SMCS end-users and stands to enhance the reputation of NTN D2D services more broadly.
35. The same factors will be at play in Canada. Terrestar therefore recommends that the Department consider applications for SMCS licences only from applicants who are able to demonstrate that they have secured access to all geographic service areas in their chosen frequency band across ISED’s entire Tier 1 licence area.

⁴ See paragraphs 197-201 of the FCC SCS Ruling for a discussion of this in-band boundary protection requirement.

⁵ See US FCC 24-28, GN Docket No. 23-56 at <https://www.fcc.gov/document/fcc-advances-supplemental-coverage-space-framework-0> (the “FCC SCS Ruling”).

⁶ FCC SCS Ruling, paragraph 55.

Q5 ISED is seeking comments on its proposal to apply the SMCS framework to the following initial bands:

600 MHz (617-652 MHz/663-698 MHz)

700 MHz (698-756 MHz and 777-787 MHz)

800 MHz Cellular (824-849 MHz/869-894 MHz)

PCS (1850-1915 MHz/1930-1995 MHz)

AWS-1 (1710-1755 MHz/2110-2155 MHz)

AWS-3 (1755-1780 MHz/2155-2180 MHz)

Q6 ISED is seeking comments on any other bands that are used for commercial mobile services for which the SMCS framework should be applied.

36. Terrestar has no specific comment at this time on the list of SMCS candidate bands proposed by the Department.
37. That being said, we reiterate our concern expressed at section D) of these comments that the Department has not yet defined in sufficient detail the process by which affected parties will be able to identify and resolve interference concerns related to individual SMCS applications. Contrary to the situation that prevails in the internationally recognized MSS L- and S- bands, for example, no co-existence and sharing mechanisms have yet been established for space-based operations in the candidate SMCS bands. As a result, potential interference issues arising from in-band and out-of-band emissions need to be carefully studied to protect incumbent services, whether space-based or terrestrial.
38. Given the absence of established coexistence and sharing mechanisms, Terrestar submits that the Department must put in place a robust process by which SMCS applicants are required to file with their applications detailed analyses demonstrating that they have evaluated all anticipated in-band and out-of-band interference scenarios, including space-to-space and border scenarios, for their fully deployed constellations operating at maximum loading and power. Sufficient detail of these analyses must be filed on the public record to permit potentially affected parties to perform their own evaluations and to comment on

the validity of the applicants' analyses, even if the application relates to a band that appears on the Department's initial list of candidate bands.

39. We note that the procedural clarification just requested already forms part of the SCS framework in the United States. As stated by the FCC:

Finally, we emphasize that just because a band is available for SCS operations pursuant to our framework, it does not guarantee that the Commission will automatically authorize an SCS collaboration in the requested band. Upon submission of the SCS application, the Commission will conduct a rigorous analysis of the technical materials submitted to ensure compliance with our entry criteria and any applicable rules and requirements. (emphasis added, footnote omitted)⁷

40. As described in greater detail in subsequent sections of these comments, SMCS is a novel concept which has not yet been approved by the ITU and for which the various in-band and out-of-band interference impacts are not yet fully understood. Only through a detailed and transparent application-specific analysis can the Department ensure that SMCS will be provided in a manner that protects the operations of existing service providers.

***Q7** ISED is seeking comments on its proposal to modify the CTFA to add new secondary mobile-satellite service allocations, through a footnote, for the provision of SMCS only.*

***Q8** ISED is seeking comments on its proposal to enable SMCS on a no-interference, no-protection basis with respect to all radiocommunication services.*

41. While noting that we have refrained from making any specific comment at this time on the list of SMCS candidate bands proposed by the Department (see our response to questions 5 and 6), Terrestar fully supports the Department's proposed modifications to the CTFA, including the text of the proposed footnote. We agree that a secondary status designation for SMCS is consistent with the supplemental nature of the service relative to the flexible use terrestrial services that already have primary status in the candidate frequency bands. We further note that a co-primary status designation for SMCS in these bands would be inconsistent with the fact that SMCS has not been approved by the ITU for these bands.
42. Terrestar also fully supports the Department's proposal to enable SMCS on a no-interference, no-protection ("NINP") basis with respect to all radiocommunication services. As discussed at section D) of these comments, greater competition through the introduction

⁷ FCC SCS Ruling, paragraph 31.

of SMCS services cannot be allowed to come at the expense of weakening or interfering with the operations of other telecommunications service providers, whether they be space-based or terrestrial, domestic or international. The Department's proposed NINP text serves to codify this baseline requirement.

***Q9** ISED is seeking comments on the roles that SMCS and terrestrial mobile service expansion may play, as well as any potential limitations, in providing greater mobile service coverage to Canadians, including along roads and highways.*

43. Terrestar shares the Department's enthusiasm regarding the potential for MSS services to substantially enhance Canadians' connectedness and security wherever terrestrial mobile coverage is lacking, including along the nation's roads and highways.
44. Feedback from Terrestar's existing MSS customers shows that ubiquitous connectivity is a highly valued feature of the service. As we shift toward the provision of NTN D2D services over mass market devices, we fully expect this to be a core driver of end-user service adoption. Canadians deserve to feel secure wherever they might travel, whether for business or for pleasure. MSS will deliver this security.

***Q10** ISED is seeking comments on its proposal that SMCS would not contribute to meeting deployment conditions associated with flexible use licences.*

45. Terrestar agrees with the Department's proposal that SMCS would not contribute to meeting deployment conditions associated with flexible use licences.
46. This proposal accurately reflects the fact that SMCS services, as their name suggests, are intended to *supplement* rather than *replace* terrestrial wireless services. For the foreseeable future, SMCS services will be more limited in their technical characteristics than terrestrial wireless services, particularly with regard to transmission bandwidth and capacity. To permit SMCS deployments to replace terrestrial wireless deployments would have the effect of discouraging terrestrial deployments in borderline regions, which would not be in the interest of end-users.
47. The Department's proposal is also consistent with the prevailing rules regarding Terrestar's exclusive MSS spectrum. Specifically, Terrestar's space-based deployments do not assist the company in meeting its terrestrial deployment obligations under its AWS-4 ATC licence.

Q11 ISED is seeking comments on any considerations and/or limitations in providing network reliability and resilience using SMCS, based on the requirements in the MOU on Telecommunications Reliability.

Q12 ISED is seeking views on any considerations and/or limitations to providing emergency roaming using SMCS based on the requirements in the MOU on Telecommunications Reliability.

48. Terrestar agrees with the Department that MSS has an important role to play in enhancing the overall reliability and resilience of telecommunications networks in Canada. As a result, we have no objection in principle to the inclusion of MSS in arrangements such as those established in the *Memorandum of Understanding on Telecommunications Reliability* (the “MOU”).
49. It is nevertheless extremely important that the inclusion of MSS in such arrangements be done in a manner that is consistent and coherent with the emerging NTN D2D business model.
50. As discussed at section E) of these comments, the emerging NTN D2D business model is one in which terrestrial wireless providers retain control of their end-users yet enter into partnerships with MSS providers to extend to these end-users the benefits of incremental space-based coverage. Stated another way, emerging NTN D2D service providers will not have an end-user subscriber base of their own, but rather will provide a network extension service to terrestrial service providers who do.
51. Given this context, Terrestar submits that the only rational way to integrate NTN D2D providers into emergency roaming arrangements such those established under the MOU is to do so indirectly (as suppliers who serve to extend the coverage of their terrestrial network partners) rather than directly (as full network participants in their own right).
52. To understand how this would work in practice, consider two MOU participants, Terrestrial Provider A and Terrestrial Provider B. Assume for the sake of argument that Terrestrial Provider A has a network extension agreement with NTN D2D Provider C and Terrestrial Provider B has a network extension agreement with NTN D2D Provider D. Further assume that each of these network extension agreements is structured such that end-users devices always attempt to connect to the home terrestrial network before seeking out the partner MSS network.

53. In the event of an eligible network outage⁸ at Terrestrial Provider A, the affected end-users in the outage area would gain emergency access to the network of Terrestrial Provider B, including access to the network of NTN D2D Provider D. Importantly, however, access to the network of NTN D2D Provider D would only be provided if the end-user device had first attempted to connect to the network of Terrestrial Provider B.
54. The emergency access routing sequence just described is built upon the notion that the terrestrial service provider owns and controls the end-user. In the event of a network outage at one terrestrial signatory to the MOU, its end-users would temporarily become, in effect, the end-users of another terrestrial signatory, with access to any NTN D2D network extensions the latter signatory may have already secured for its end-users.
55. Contrast this situation with that which would prevail if NTN D2D providers were direct signatories to the MOU. In this case, in the event of an eligible network outage at Terrestrial Provider A, it is conceivable that the affected end-users in the entire outage area would immediately seek access to the network of NTN D2D Provider D. There would be no intermediate control process whereby these end-users would first be directed to attempt to connect to the network of Terrestrial Provider B. NTN D2D Provider D's network would be quickly overwhelmed, particularly if the network outage area included significant population centres. Such a scenario would in no way serve the interests of the affected population.
56. To summarize, Terrestar reiterates that it has no opposition in principle to the inclusion of NTN D2D providers in arrangements such as those established under the MOU. However, under no circumstances should these arrangements be constructed in a way that exposes NTN D2D providers to the risk of being overwhelmed by traffic that could otherwise be directed to terrestrial providers. The best way to protect against such an occurrence is to (i) limit direct participation in the MOU to terrestrial providers, (ii) specify that terrestrial providers may include in their emergency MOU arrangements access to their extended MSS coverage, and (iii) direct that under no circumstances should end-users seek out emergency access to MSS networks unless and until access to available terrestrial networks has failed.

⁸ The types of network outages that trigger emergency roaming are defined in the MOU.

Q13 ISED is seeking comment on the technical possibilities and limitations of SMCS for the provision of 9-1-1 access to all handsets from all service providers where there is SMCS satellite coverage.

Q14 ISED is seeking comments on how SMCS deployments would support the distribution of emergency alerts to mobile devices.

Q15 ISED is seeking comments on whether existing mechanisms will support emergency communications in the absence of a roaming agreement between providers, or whether a new obligation would be appropriate regarding this issue for SMCS.

57. Terrestar notes that 9-1-1 call routing in an NTN D2D context raises a long list of complex issues including: who bears the responsibility for call routing (the NTN D2D provider or its terrestrial partner), the availability and granularity of location-based data, the viability of automatic location-based routing, the utility of call triage through an intermediate call centre, and the impacts of various call handling scenarios on call response times.
58. We further note that the CRTC has traditionally borne responsibility for the development of regulatory frameworks related to 9-1-1 service and has considerable expertise in this area.
59. In light of the above, we submit that it would be both premature and inappropriate for the Department to attempt to impose prescriptive rules for one isolated aspect of 9-1-1 call handling, namely the treatment of calls from handsets that are not registered with a given SMCS service provider. Consideration of this issue would best be left to the CRTC as part of a comprehensive consultation on the treatment of satellite-enabled 9-1-1 calls.
60. Should the Department nevertheless proceed with its proposal to mandate the provision of 9-1-1 access to all handsets from all service providers where there is SMCS satellite coverage, Terrestar submits that two service delivery elements should be explicitly approved as part of this mandate. First, consistent with the fact that the terrestrial wireless provider will retain control of the end-user in an NTN D2D context, it is the terrestrial wireless provider, not the MSS provider, that should be responsible for routing 9-1-1 calls to the appropriate emergency response centre.⁹ Second, given the prevailing uncertainty regarding the viability of automatic 9-1-1 call routing from MSS networks, call triage

⁹ We note the US FCC's support for this perspective at paragraph 183 of its SCS Ruling where it states that "the approach we adopt ensures that terrestrial wireless carriers have responsibility for the SCS 911 voice call and 911 text message experience" (underlining added).

through an intermediate call centre should be the default method for 9-1-1 call routing, at least on an interim basis.¹⁰

61. As for the distribution of emergency alerts to mobile devices served by NTN D2D networks, we submit that satellite beam sizes are not yet sufficiently small to make a useful contribution to the distribution of such alerts. We recommend that the Department refrain from extending this obligation to NTN D2D networks until such time as technological evolution has produced the necessary degree of granularity.

Q16 *ISED is seeking comments on its licensing proposals:*

- a. to issue space station spectrum licences to Canadian satellite operators seeking to provide SMCS*
- b. to issue FSAs to foreign satellite operators seeking to provide SMCS in Canada*
- c. to issue generic earth station spectrum licences to flexible use licensees seeking to offer SMCS*
- d. to limit the eligibility for SMCS earth station licences to flexible use licensees that are considered mobile service providers and that are in good standing with their existing flexible use licences, to authorize the subscriber devices that would be communicating with the SMCS satellites*
- e. to issue all SMCS licences on a Tier 1 basis and to limit their scope to only those the service areas and frequency blocks held by the flexible use licensee where they plan to offer SMCS, as supported by the SMCS Agreement*
- f. for FSAs and earth station licences, to require that an SMCS Agreement be in place and that specific provisions of that agreement be submitted to ISED as part of the application process*
- g. for Canadian space station spectrum licences, to require that an SMCS Agreement be in place and that specific provisions be submitted to ISED for review prior to offering SMCS within Canadian territory*
- h. to require that the following provisions of the SMCS Agreement be submitted to ISED for review as described in f) and g) above: the associated flexible use spectrum licences; the specific frequency blocks and areas (which must be part of the mobile service provider's spectrum holdings) where SMCS will be offered; a provision stating that the agreement is not exclusive; and any provisions dealing with interference management, coordination, compliance with technical rules; measures required to facilitate compliance with the SMCS earth station licence conditions; or any other aspects dealing with spectrum management;*

¹⁰ We note that, as stated at paragraph 179 of the FCC SCS Ruling, call triage through an intermediate call centre (referred to as an “emergency call centre”) is one of two options currently available for the routing of SCS 911 calls in the United States, the other being location-based routing at the discretion of the terrestrial provider.

the signature page; and provisions related to the term of the agreement

i. that separate licences be required for different pairings of mobile service provider and satellite operator

62. With the three exceptions that follow, Terrestar supports the Department's licensing proposals.
63. First, regarding the proposal to issue all SMCS licences on a Tier 1 basis yet limit their scope to only those service areas and frequency blocks held by the flexible use licensee where they plan to offer SMCS, we reiterate our position expressed in response to question 2 that the Department should consider applications for SMCS licences only from applicants who are able to demonstrate that they have secured access to all geographic service areas in their chosen frequency band across ISED's entire Tier 1 licence area.
64. Second, regarding the proposal that an SMCS agreement be in place and that specific provisions of that agreement (including those dealing with interference management, coordination and compliance with technical rules) be submitted to ISED as part of the application process, we reiterate our position expressed at section D) of these comments that the Department must also put in place a robust process by which SMCS applicants are required to file with their applications detailed analyses demonstrating that they have evaluated all anticipated in-band and out-of-band interference scenarios, including space-to-space and border scenarios, for their fully deployed constellations operating at maximum loading and power. Sufficient detail of these analyses must be filed on the public record to permit potentially affected parties to perform their own evaluations and to comment on the validity of the applicants' analyses.
65. Third, regarding the proposal that an SMCS agreement must include a provision stating that the agreement is not exclusive, we submit that such a provision is unnecessary. All indications suggest that there will likely be multiple facilities-based entrants into the NTN D2D market in Canada. In such a context, market forces should be allowed to drive the business models of the various players. To be clear, Terrestar has opted for an open network model through which we are entertaining partnerships with multiple terrestrial operators. We do not believe, however, that this model needs to be imposed on our competitors.

Q17 ISED is seeking comments on any potential use cases for SMCS in waters that are outside of flexible use service areas (e.g. off-shore), and how such use could be coordinated.

66. Terrestar has no comment on this matter at this time.

Q18 ISED is seeking comments on its proposals on licence term:

a. For Canadian space station spectrum licences and foreign satellite approvals: a term that either aligns with the associated flexible use spectrum licence term or with the termination date of the agreement between the flexible use licensee and its partner satellite operator, whichever is earlier.

b. For generic earth station licences: annual spectrum licences for SMCS earth stations that will expire on March 31 of each year, with a high expectation of renewal. Licences would be renewed annually until the flexible use spectrum licence term ends, or when the associated SMCS Agreement is terminated, whichever is earlier.

67. Terrestar agrees with the Department's proposals regarding licence terms.

Q19 ISED is seeking comments on its proposals to:

- a.** impose conditions of licence for Canadian satellite spectrum licences to providing SMCS in Canada as set out in annex A
- b.** impose conditions on approvals issued to foreign-licensed satellites providing SMCS in Canada as set out in annex B
- c.** impose conditions of licence for SMCS generic earth station spectrum licences, as set out in annex C
- d.** not to allow the division, transfer or subordination of SMCS licences

68. Terrestar agrees with the Department's proposed conditions of licence as set out in Annexes A through C, with one exception: We do not support the proposed prohibition on the transfer or subordination of SMCS licences. As was the case with the proposed prohibition on exclusive SMCS agreements at question 16, we believe that such a measure would unnecessarily constrain the range of business models and partnership arrangements

that could emerge in the NTN D2D sector. Terrestar prefers the approach taken by the US FCC on this matter, which is to permit SCS subleasing, provided the licensee is aware of the sublease and provided all spectrum coordination and interference protection rules are rigorously respected.¹¹

***Q20** ISED seeks comments on whether Option 1 (implement a mandatory roaming requirement for SMCS licences that would take effect 5 years following the publication of a decision) or Option 2 (not impose a mandatory roaming requirement) would be most appropriate. Alternate options supported with a strong rationale may also be considered.*

69. On the matter of mandatory roaming, Terrestar supports Option 2 – no imposition of a mandatory roaming requirement. Simply put, a mandatory roaming requirement is incompatible with the NTN D2D business model.
70. To understand why, we must first look at how mandatory roaming functions in the terrestrial wireless environment. In that environment, the provision of roaming services by one carrier to the end-users of another carrier is at all times ancillary (or peripheral) to the first carrier's core business of providing connectivity to its own end-users. Bell Mobility, for example, may be mandated to provide roaming services to Videotron's end-users when they are in Nova Scotia, but Bell Mobility already has a substantial end-user base in that province. Provision of the mandatory roaming service is peripheral to Bell Mobility's core business.
71. The situation in the NTN D2D environment is fundamentally different. Here, as described at section E) of these comments, the NTN D2D provider will not have its own end-user base. The entirety of its NTN D2D revenues will come from the commercial deals it concludes with terrestrial wireless carriers. But if these same terrestrial wireless carriers have a mandated right to roam on the networks of NTN D2D providers, what is their incentive to conclude commercial deals? Seen from this perspective, it is clear that mandatory roaming would not be peripheral to the NTN D2D provider's core business, it would supplant the NTN D2D provider's core business.
72. NTN D2D providers are poised to provide Canadians with the final piece of the universal connectivity puzzle. They must be allowed to conclude commercial arrangements that afford them the means to accomplish this goal. This will not happen if their business model is supplanted by a regulated roaming mandate.

¹¹ FCC SCS Ruling, paragraph 122.

Q21 *ISED is seeking comments on the above proposed licence fees and service standards.*

73. Terrestar supports the Department’s proposal to apply existing satellite fee orders and service standards to SMCS licences, as described in the Consultation Document.

Q22 *Technical requirements to be applied to commercial mobile user equipment for SMCS: ISED is seeking comments on its proposal that existing technical requirements in the relevant SRSP and RSS in each frequency band would be sufficient for UE for SMCS.*

74. Terrestar agrees with the Department’s assessment that “SMCS as defined in this consultation will leverage existing UE to ensure that mobile wireless connectivity can be offered rapidly in unserved or underserved areas. Consumers would not need to invest in new devices, and equipment would not require recertification as no changes would be required for the UE to communicate with the satellites.”¹² We further note that the same assessment applies to NTN D2D services provided by way of exclusive MSS spectrum held by service providers such as Terrestar.
75. In light of the above, we support the Department’s proposal that existing technical requirements in the relevant Standard Radio System Plans (“SRSPs”) and Radio Standards Specifications (“RSSs”) in each frequency band would be sufficient for user equipment (“UE”) for SMCS. Furthermore, in the interest of competitive equity, we respectfully request that the Department extend the same measure to all NTN D2D providers.

¹² Consultation Document, paragraph 109.

Q23 Technical requirements to be applied to SMCS space stations: *ISED is seeking comments on its proposal to apply the same technical requirements and coexistence measures, such as maximum field strength or power flux density, and unwanted limits, stipulated in the existing applicable SRSPs and RSS for terrestrial commercial mobile services in the respective band of interest, to space stations for SMCS. ISED is also seeking comments on whether the specified general provisions in existing technical standards are sufficient to enable SMCS and to facilitate coexistence with terrestrial operations. ISED is also seeking comments on any additional technical requirements that may be needed for space stations for SMCS.*

76. Terrestar supports the Department's proposal to apply the same technical requirements and coexistence measures, such as maximum field strength or power flux density, and unwanted limits, stipulated in the existing applicable SRSPs and RSS for terrestrial commercial mobile services in the respective band of interest, to space stations for SMCS. We have no comments at this time on possible additional technical requirements that may be needed for space stations for SMCS.

Q24 Interference resolution: *Given that SMCS is proposed to operate on a NINP basis, ISED is seeking comments on its proposal to require operators of SMCS (both earth stations and satellite licensees) to assume the onus of mitigating any interference that occurs to licensed in-band and/or adjacent band/block terrestrial operations. ISED is seeking comments on any potential challenges in complying with the existing coexistence measures prescribed in the applicable technical standards.*

77. Terrestar strongly supports the Department's proposal to require operators of SMCS (both earth stations and satellite licensees) to assume the onus of mitigating any interference that occurs to licensed in-band and/or adjacent band/block terrestrial operations. Failure to impose an unambiguous interference mitigation requirement on both earth station and satellite licensees would run directly contrary to the NINP status of SMCS and would risk degrading the network capacities and underlying spectrum valuations of the affected terrestrial operators.
78. We note, however, that the Department's proposal at question 24 above has been drafted more narrowly than the Department's statement at paragraph 111 of the Consultation Document, wherein it was affirmed that "[in] case of any interference from SMCS to any service, both the satellite operator and mobile service provider would be jointly responsible

for eliminating such interference, regardless of compliance with all technical requirements” (underlining added). The statement at paragraph 111 rightly protects both satellite and terrestrial services from SMCS interference.

79. As noted at paragraph 193 of the FCC SCS Ruling, protection for non-SMCS satellite services is not a hypothetical requirement. MSS operator Omnispace LLC (“Omnispace”) has raised serious concerns regarding the potential for satellite-to-satellite interference from SCS to existing MSS operations in certain frequency bands, particularly in bands where there is a conflict between the direction of the proposed SCS operations, space-to-Earth (downlink) and the International Table of Frequency Allocations, Earth-to-space (uplink). These concerns remain unresolved.
80. For absolute clarity, and consistent with the scope of the SMCS NINP provision found in ISED’s proposed new footnote to the CTFA, we therefore call upon the Department to specify that SMCS operators (both earth stations and satellite licensees) will have the onus of mitigating any interference that occurs to licensed in-band and/or adjacent band/block terrestrial or satellite operations.

Q25 Coexistence between SMCS space stations: ISED is seeking comments on its expectation that operators of SMCS space stations coordinate their constellations and resolve any case of interference between them that may arise.

81. In light of the absence of an international framework for SMCS, Terrestrial agrees that operators of SMCS space stations should coordinate their constellations and resolve any case of interference between them that may arise. We reiterate, however, that any case of interference with internationally recognized non-SMCS space stations must be resolved in favour of the non-SMCS space stations, consistent with the secondary NINP status of the SMCS constellations.

Q26 Protection of radio astronomy services: ISED is seeking comments on its proposal to require SMCS satellites to meet the protection criteria as set out in Recommendations ITU-R RA.769-2 and ITU-R RA.1513-2, for the applicable radioastronomy frequency bands.

82. Terrestrial has no comments on this matter at this time.

Q27 Cross-border coexistence: *ISED is seeking comments on its proposal to apply existing cross-border rules, as defined in the applicable TRAA, and on whether other technical considerations must be taken into account to ensure protection of cross-border terrestrial operations.*

83. Terrestar agrees that existing technical requirements for cross-border coexistence between terrestrial commercial mobile services, as defined in the applicable Terrestrial Radiocom Agreements and Arrangements (“TRAA”), should apply to SMCS operations near the Canadian border on an interim basis until relevant cross border agreements and protections in each direction are established.

Q28 *ISED is seeking comments on the extent to which technical factors such as ensuring coexistence, managing interference, etc. could impact SMCS coverage.*

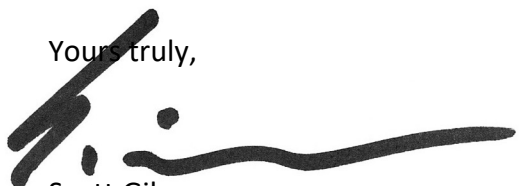
84. We reiterate our concern, expressed in response to questions 1 through 4 of this consultation, about the possible appearance in the market of new SMCS-based MSS service providers whose network coverage is partial or incomplete, excluding for example a number of ISED Tier 2, 3 or 4 service areas where they have not arranged for access to their chosen frequency band. End-users who access these SMCS networks will be confronted with seemingly arbitrary coverage holes aligned with ISED tier boundaries that are unknown to the general public. In addition, in-band signal limitations will need to be applied at tier boundaries to protect the terrestrial operators who do hold in-band licences within these coverage holes, creating further protection bands of potentially significant length and width where SMCS services cannot be provided. The result could be serious end-user frustration with SMCS services (especially as these services will often be accessed in emergency situations) and potential reputational damage to the entire NTN D2D sector.
85. To mitigate against this problem, Terrestar recommends that the Department consider applications for SMCS licences only from applicants who are able to demonstrate that they have secured access to all geographic service areas in their chosen frequency band across ISED’s entire Tier 1 licence area.

Q29 ISED is seeking comments on any other considerations related to the introduction of SMCS in Canada which may not have been specifically addressed in this consultation.

86. Terrestar has no further comments at this time.

87. We thank the Department for the opportunity to participate in this consultation and look forward to reviewing the comments of other interested parties.

Yours truly,

A handwritten signature in black ink, appearing to read 'S. Gibson', with a long horizontal flourish extending to the right.

Scott Gibson
General Counsel & Corporate Secretary
Terrestar Solutions Inc.