



September 13, 2024

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(Submitted by email - satelliteplanning-planificationsatellite@ised-isde.gc.ca)

Subject: SMSE-006-24 - Consultation on a Policy, Licensing and Technical Framework for Supplemental Mobile Coverage by Satellite

Please find attached the RABC response to the above noted consultation. This response was sent to RABC Sponsor Members for ballot. Of the Board's 19 Sponsor Members, 7 voted to approve (Canadian Association of Chiefs of Police, Canadian Association of Wireless Internet Service Providers, Canadian Electronics and Communications Association, Canadian Satellite and Space Industry Forum, Department of National Defence, Railway Association of Canada and TELUS, 2 voted to approve with comment (Bell and Rogers; and 3 voted to abstain (Canadian Association of Broadcast Consultants, CBC/Radio Canada and NAV CANADA).

The members that approved with comment provided the following for inclusion with the RABC submission.

Bell

Bell recommends to harmonize all technical limits with the US in order to avoid any cross border coexistence issues.

Rogers

Rogers generally supports the RABC Comments.

We note that SMCS is highly dynamic and in an early developmental phase, and current analysis may not have incorporated all advancements, such as phased antenna arrays. The Department should ensure technical regulations retain flexibility if any changes or guidelines are produced, and look to real-world measurements as these systems come online.

Rogers also recommends that the Department generally align with equivalent U.S. RSS/SRSP requirements. Any SRSP limitations specific for terrestrial systems should be dismissed for installations in space. Since many satellite stations could be operating over the U.S. prior to transiting into Canada, all Canadian hardware specifications should be fully aligned with U.S. standards.

For certainty, Rogers agrees with applying PFD limits from existing Canadian SRSPs, since the protection of UEs is common to both terrestrial and satellite cases. This may not necessarily align with U.S. values, which in some cases could be less stringent. With these PFD limits, the Department should maintain its practice of allowing operators to mutually agree upon alternate thresholds, thereby providing both cross-boundary protection when needed, as well as full flexibility to enable coordinated continuity of service.

We appreciate having had the opportunity to provide comments to this important consultation.

Sincerely,



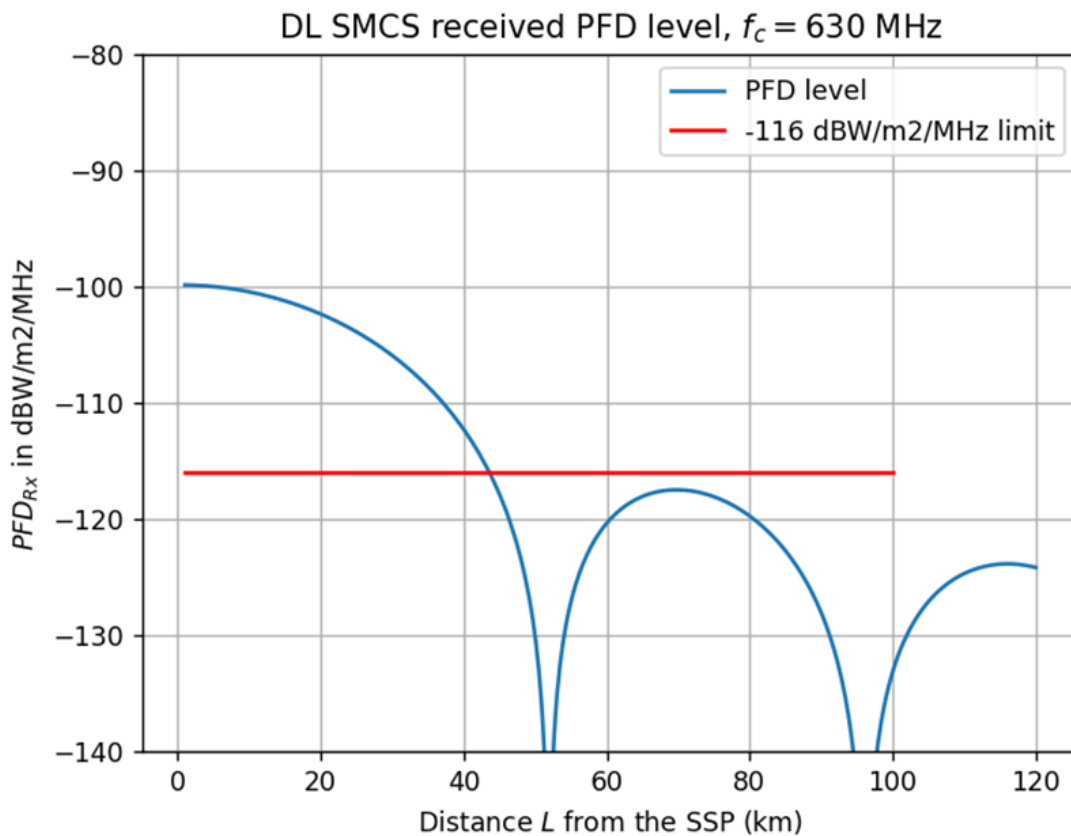
J. David Farnes
General Manager

Attachment

Response to Question 2

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.

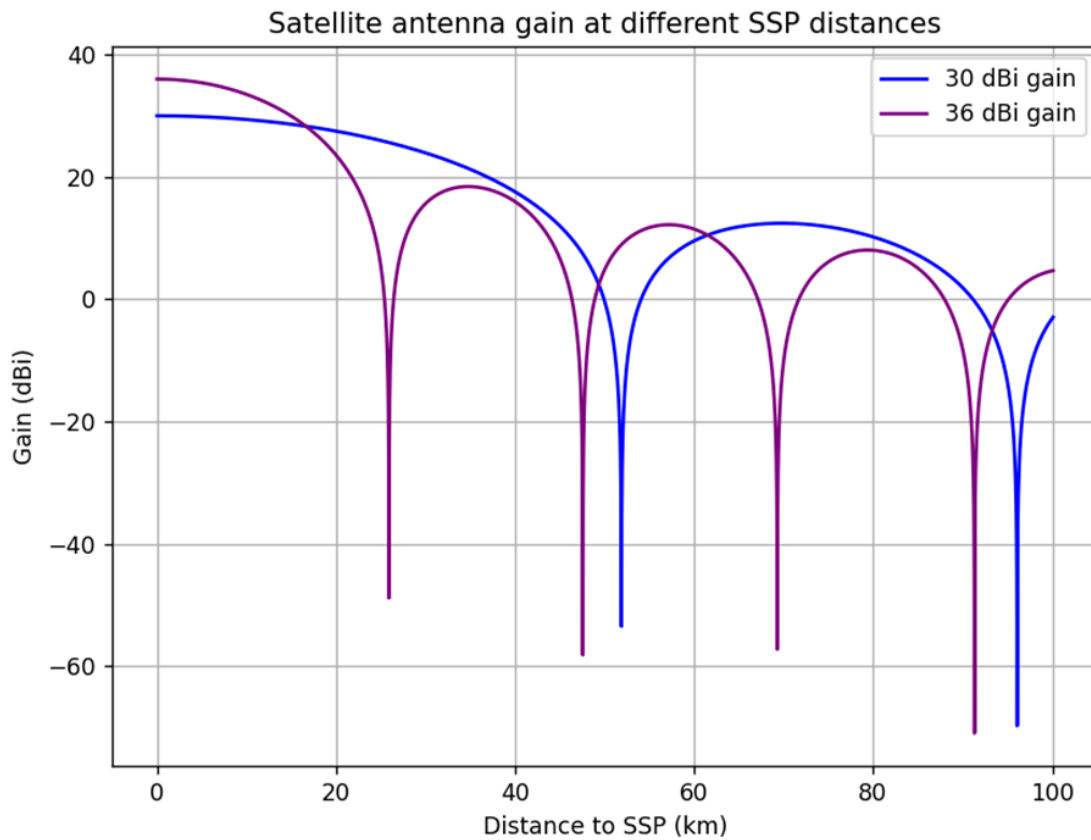
The RABC has considered the proximity of satellite spot-beams to the service area boundary. The analysis of a SMCS service demonstrates that the main lobe edge, defined by a power-flux density (“PFD”) limit on the ground (beyond the 3 dB point), could respect the mobile SRSP adjacent service boundary limit shared with another mobile licensee. Licensed service areas (or sub-divided areas for SMCS) larger than the distance corresponding to the single-sided SMCS main lobe, approximately equal to the satellite beam’s half-power beamwidth, provide sufficient distance in every direction for the downlink PFD signal level to be attenuated down to the adjacent service boundary limit (i.e., -116/-106 dBW/m²/MHz). An illustration of the downlink PFD level as a function of the distance from the sub-satellite point (SSP) is shown below, for a satellite beam with 30 dBi peak gain and 5.2° half-power beamwidth.



Response to Question 3

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.

Smaller beam sizes would provide higher capacity per user and offer some protection area reduction, depending on the satellite’s maximum EIRP. However, the protection area reduction would not be proportionate to the beam size as smaller spot beams tend to have higher gains, and antenna gain sidelobes would not be significantly lower than the main lobe of the larger spot beam, as illustrated below. Ultimately, the protection to an adjacent service area depends on the transmit power into the satellite antenna, and the resulting PFD, which will dictate the required separation distance. A smaller spot beam, with higher peak gain, would allow for shorter protection distance, provided the two antennas have the same EIRP.



Response to Question 5

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)

The RABC has considered the frequency bands ISED has proposed to be part of the initial SMCS framework and has not raised any technical reasons why they should not be included. We note that there are a limited number of non-cellular users (i.e. low power broadcast stations in 600 MHz), that can be protected with well-established mobile interference limits.

Response to Question 6

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

The RABC recommends ISED take a technology neutral approach and not exclude any commercial mobile bands, unless there is a specific technical reason for excluding a band (that can't be addressed within the technical standards). Also, the RABC recommends an SMCS designation be added to Public Safety Broadband spectrum (758-768 / 788-798 MHz) to align it with the FCC Supplemental Coverage from Space designation, even if ISED chooses not to immediately license the spectrum for SMCS services.

Response to Question 7

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.

The RABC generally supports ISED's proposal to allocate the commercial mobile bands that are to be designated for SMCS per the response to Question 6 above, on a secondary basis.

The RABC notes that the proposed footnote Cxx would allocate certain bands¹ to the mobile-satellite service on a secondary basis, while further indicating that "the use of these bands for SMCS shall be based upon not interfering with, or claiming protection from, **any radio**

¹ The RABC supports the list of bands listed in ISED's proposed footnote Cxx, but as indicated in response to Question 6, the list could be expanded to all commercial mobile bands, and Public Safety Broadband spectrum (758-768 / 788-798 MHz).

services.” (emphasis added). The proposed footnote would set a new precedent by going beyond the standard ITU allocation definition of a Secondary service in RR’s 5.28 to 5.31 and as described in Section 1.3 of the CTFA. The RABC recommends ISED remove “the use of these bands for SMCS shall be based upon not interfering with, or claiming protection from, any radio services” from the footnote and address the provision as described in the RABC response to Question 8.

To manage interference through international coordination with the US, the RABC recommends a similar approach to the FCC² with the following footnote proposal:

ADD Cxx: Additional allocation: The following frequency bands [...to be determined by ISED] are allocated to mobile-satellite service on a secondary basis, limited to the provision of supplemental mobile coverage by satellite (SMCS) only and are subject to the rules of the SMSE-006-24 Decision. If any unwanted emission from a transmitter operating in the SMCS service results in harmful interference to users of another radio service, ISED may require a greater attenuation of the SMCS emission than specified in the SMSE-006-24 Decision. SMCS shall not cause harmful interference to stations to which frequencies are already assigned in the same bands allocated on a secondary basis to a radio service.

To avoid undue delay in developing SRSPs and RSSs for these rules, the RABC recommends the Department’s Decision arising from the SMSE-006-24 consultation at minimum include SMCS rules that protect another radio service according to the response to Question 8 and protect terrestrial mobile service according to the responses to Question 22 and Question 27.

Response to Question 8

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

The RABC notes that a no-interference, no protection provision for SMCS against all radio services in all bands, not just those in which the SMCS will operate or in reasonable proximity to the bands in which the SMCS will operate, is overly broad and untenable to kick off a nascent service. There is a concern that this may open the door to unfounded claims of interference to services operating in far-removed bands on primary or secondary status. The RABC notes that the FCC limited its application of interference to “harmful” “§25.202(k)(2) Interference caused by out of band emissions. If any emission from a transmitter operating in the SCS service results in harmful interference to users of another radio service, the FCC may require a greater attenuation of the emission than specified in this section.”

² NG33A: The secondary MSS operations in the bands 614-652 MHz and 663-769 MHz, 775-799 MHz, and 805-806 MHz, 824-849 MHz and 869-894 MHz, and 1850-1920 MHz and 1930-2000 MHz are limited to Supplemental Coverage from Space (SCS) and are subject to the Commission’s SCS rules in part 25 of this chapter.

To address this concern in its response to Question 7, the RABC recommends a secondary allocation domestically and specific technical coexistence rules for protecting the other services. The RABC also notes that the FCC has limited SCS licenses to certain spectrum and locations based on geographic and co-channel assumptions in accordance with paragraph 21 of this consultation (SMSE-006-24).

In the case of SMCS, the frequency assignment is inconsistent with the allocations. Canadian Administrations under ITU RR 4.4 must assign a frequency to radio systems such that when operating ‘shall not cause harmful interference to, and shall not claim protection from harmful interference caused by’ another international radio service operating in accordance with ITU rules and not domestically.

The RABC also notes that under RR 5.317, the band 806-890 MHz is also allocated to the mobile-satellite service on a primary basis, subject to agreement under RR 9.21 in most Region 2 countries, including Canada. Whether ISED enables MSS service on a Secondary or Primary basis (using RR 5.317), the RABC recommends the MSS service should be limited to the provisions governing SMCS in its footnote Cxx proposal. This recommendation is specific to the band 806-890 MHz and should in no way be interpreted as calling into question the primary status of the mobile satellite service in any other bands.

Response to Question 9

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.

Based on the RABC technical working group studies, the range of SNR values for SMCS operations varies between 0 dB and 20 dB (based on free space path loss), thus enabling outdoor coverage anywhere within the line of sight (LOS) to the SMCS satellite(s). For roads and highways, where the in-car penetration loss is expected to be around 7 dB, in-car coverage would be limited only to the areas where the free-space loss SNR exceeds about 6 dB (without any margin).

Similar arguments can be made for indoor services to homes in rural areas, where the expected penetration loss should allow for limited services, at least in the areas where the free space SNR is around 12 dB to 16 dB or even higher.

Response to Question 13

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.

The RABC has considered the technical possibilities and limitations of accessing 9-1-1 via an SMCS service. Since SMCS is a nascent service today, it will not be equipped to address current 9-1-1 terrestrial requirements at launch. At this time, it is difficult to assess with any level of certainty whether or not future services will operate in a predictable enough way such that there is a reasonable expectation that 9-1-1 is just an SMCS phone call away.

Unlike the mature terrestrial systems, the capabilities of SMCS systems will vary greatly between the various satellite systems; consideration must be given to the available spectrum bandwidths, link budgets and power levels that will dictate a given service offering and QOS. While it is expected that best effort voice calls will be possible over SMCS in the near term, there are a number of capabilities that would need to be developed, implemented and vigorously tested before 9-1-1 services over SMCS will be comparable to current terrestrial 9-1-1 services. For instance, location conveyance and Real-Time Text (“RTT”) for future text to 9-1-1 while call routing to the appropriate Public Safety Answering Point (“PSAP”) may potentially require the use of an Intermediary 9-1-1 call centre.

Response to Question 14

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

Similarly to 9-1-1, as nascent SMCS services are being developed, satellite operators today may not have the necessary infrastructure to support Wireless Public Alerting System (“WPAS”). For example, it is unclear to what extent existing or planned satellite systems will have all the technical capabilities to support the broadcast of messages. The RABC also raises a consideration of the accuracy of geo-targeted emergency alerts to end users - a key requirement. The technical parameters of satellite beams will vary between systems and as such the target geographic alert accuracy would need to be consistent with the technical capabilities of a particular satellite system or alternatively broad enough such that it could be met by all systems.

The RABC considers that WPAS over SMCS should work once the necessary infrastructure is developed and integrated with alert originators, but the risk of a significant undershoot or overshoot of the geo-target must be considered as a technical limitation of providing WPAS over SMCS. Furthermore, the LEO satellite systems are not expected to offer continuous coverage over Canada initially and this would be another limitation in providing WPAS over SMCS.

Response to Question 15

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.

The RABC does not see any technical limitations that would preclude the use of existing mechanisms that support emergency attachment (regardless of whether a roaming arrangement is in place) if the user is capable of completing a voice call over SMCS once provisions for 9-1-1 over SMCS have been established by the CRTC at some point in the future as discussed in response to Question 13 above. Mobile communication standards (such as 3GPP) already exist to ensure that all standard mobile handsets, regardless of the existence of commercial roaming agreements, are able to access 9-1-1 services. This also applies to mobile handsets that have no active mobile subscription. While we do not foresee a need for a new obligation, the existing mechanisms would require thorough testing over SMCS systems.

Response to Question 17

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.

In providing comments to the above questions, respondents are asked to include supporting rationale and arguments.

The RABC believes that there would be some use for off-shore services, at least within Canadian territorial waters.

The RABC notes that the various tiers described in the “ISED service areas for competitive licensing” also include internal bodies of water³; however, it is not clear whether these and other tiers include portions of the oceans that extend up to the 12 nautical miles off-shore from the Canadian landmass. Since these territorial waters are part of Canada’s territory, the RABC believes there would be a business case for extending the licensing tier areas to cover such off-shore operations, which could serve vessels that are arriving or departing from ports, resource exploration sea platforms, and Canadian Government operations such as the Coast Guard.

The RABC is of the view that ISED’s authorization would not extend beyond territorial waters, since that becomes international waters, and the administration responsible for licensing the SMCS operations would be the jurisdiction that authorises the satellite network and has filed its operations with the ITU.

The RABC notes that no coordination can be made anywhere with ships because they are moving, and their movements cannot be constrained. In addition, the RABC also notes that the 890-902 MHz band has a C5A footnote allowing the Government of Canada operations using radiolocation service outside inland waters across Canada. As a result, since no coordination can

³ For example, Tier 4-077 (Toronto) includes the portion of lake Ontario up to the Canada-US border and so do other tiers around the Great Lakes; Tier 4-023 (Matane) covers most of the Gulf of St-Lawrence; several other tiers encompass the St-Lawrence river; several tier 4 areas in BC also extend into the inside passages and Tier 4-171 (Nunavut) covers Hudson’s Bay, James Bay, the Bay of Ungava as well as the Northwest passage.

be made, these Government of Canada operations need to be protected somehow if SMCS are allowed outside inland waters.

Response to Question 22

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.

SMCS uplink operations (handset to satellite)

Existing technical requirements applicable to mobile user equipment are sufficient to allow operation of SMCS, as the systems are designed to operate with existing devices.

SMCS downlinks impact on adjacent terrestrial mobile service areas

The RABC responses to Question 2 and 3 for co-channel coexistence with adjacent service areas use a PFD on the ground for determining the SMCS beam size and subsequent required protection areas. The responses reflect the Consultation band proposal, noting the technical studies support the PFD limits of $-116 \text{ dBW/m}^2/\text{MHz}$ for the sub-GHz bands and $-106 \text{ dBW/m}^2/\text{MHz}$ for the mid-bands SMCS service to coexist with mobile services without unduly increasing the interference risk.

The RABC supports the PFD limits in Table 1 at the boundary of a licensed SMCS service area domestically and internationally for cross-border coexistence (with further cross-border comments in response to Question 27 below).

Table 1- Proposed PFD limit for co-channel operations with adjacent service areas by band

Band	SRSP/RSS	PFD limit for co-channel (dBW/m ² /MHz)
600 MHz	SRSP-518/RSS-130	-116
700 MHz	SRSP-518/RSS-130	
Cellular 850	SRSP-503/RSS-132	
PCS	SRSP-510/RSS-133	-106
AWS	SRSP-513/RSS-139	

SMCS downlinks impact on adjacent terrestrial mobile frequency blocks or bands

Existing technical requirements related to unwanted emissions from TN/base stations⁴, if applied to SMCS satellite transmissions would be sufficient to protect terrestrial mobile stations in adjacent channels within overlapping geographical areas provided that satellite antenna gains are limited to about 33 dBi (at LEO heights of 520 km). Under the same scenario but with higher gain (above 33 dBi) antennas would result in interference that would exceed $I/N = -6$ dB, thus interfering with terrestrial mobile operations in adjacent channels.

An I/N of -6 dB is the typical protection criterion between terrestrial mobile services, which results in a known interference level resulting in ~15% to 18% degradation at the cell edge⁵. While this level is not negligible, it is considered adequate for the protection of terrestrial mobile user terminals from SMCS satellite transmissions.

Alternatively, if mobile services in the adjacent channels are not operating in overlapping geographic areas, SMCS service would not be interfering with mobile services when engineered with sufficient satellite gain reduction through distance separation. To avoid potentially complex policies that may limit design of SMCS services, it is recommended to define adjacent channel

⁴ Unwanted emission limit of -13 dBm/100 kHz in bands below 1 GHz and -13 dBm/MHz for bands above 1 GHz, per SRSP-[*list numbers*]

⁵ Assuming terrestrial mobile service at the cell edge operating in the SNR range between 0 and 3 dB.

PFD limits for sub-GHz bands and mid-bands. The proposed PFD limits are listed in Table 2 below.

Table 2 - Proposed PFD limit for adjacent channel operations by band

Band	Frequency (MHz)	PFD level for -6 dB I/N into adjacent channel (dBW/m ² /MHz)	Proposed PFD limit for adjacent channel (dBW/m ² /MHz)
600 MHz	630	-120.6	-120
700 MHz	740	-119.2	
Cellular 850	860	-117.9	
PCS	1990	-113.6	-113
AWS	2145	-112.9	

The two proposed limits simplify the PFD limits for adjacent channel operations in the bands and are calculated assuming an I/N of -6 dB, UE noise figure of 9 dB, UE gain of -3 dBi for bands below 1 GHz and 0 dBi for PCS and AWS, and with no polarization loss. Additional polarization loss, which typically varies from 1 to 3 dB could further relax the above values, depending on the type of polarization transmission from the satellites, whether circular or linear, and in the case of linear polarization, the relative direction of the satellite incoming wave relative to the victim user terminal local horizon.

Some satellite and terrestrial operators do not support defining two adjacent channel PFD limits for sub-GHz bands and mid-bands. These satellite and terrestrial operators recommend that the limits should be harmonized with the FCC's Part 25.202 (k)(1), since it is no more difficult for satellites to meet the more stringent limit.

Response to Question 23

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.

Please see the response to Question 22.

Response to Question 24

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.

As recommended in the RABC answers to Questions 7 and 8, the SMCS service should operate on a Secondary basis and within the appropriate technical limits as described in the response to Question 22. The RABC has not identified any additional challenges to coexistence with terrestrial operations.

Response to Question 25

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.

The RABC agrees that coexistence between SMCS systems can be achieved through inter-system coordination.

Response to Question 27

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.

The existing cross-border rules from the related Terrestrial Radiocom Agreements and Arrangements (TRAA) could be a framework for SMCS coexistence with the FCC SCS service and terrestrial mobile networks. Today, the TRAA's have some specific terrestrial mobile rules that either do not apply, apply with modification, and/or new rules needed to guide SMCS coexistence with international SMCS and mobile services. For instance, the existing TRAA technical rules consider co-channel coordination trigger distances from the border for terrestrial mobile stations cannot apply to SMCS service delivered by satellites but may need to consider rules for SMCS earth stations near the border. TRAA provisions to protect fixed point-to-point microwave stations in PCS and AWS-1 would need modification for SMCS, SMCS adjacent-channel coexistence may need new rules under the TRAA framework. The RABC recommends that ISED consult with the industry regarding TRAA rules for SMCS.

In the absence of a TRAA framework for SMCS with the US, the RABC recommends that cross-border coexistence rules adopt the two PFD limits of $-113 \text{ dBW/m}^2/\text{MHz}$ for sub-GHz and $-106 \text{ dBW/m}^2/\text{MHz}$ for mid-band SMCS service by way of incorporation in an appropriate SRSP.

The RABC notes the recommended PFD limits align with the FCC SCS rules under §25.208(w)(3) references the US domestic limits calculated with a 5 MHz carrier. “The aggregate field strength at the earth's surface produced by all visible beams and satellites within each satellite constellation providing SCS service as they move over any given point or area in bands authorized by NG33A in the United States Table of Frequency Allocations and [§ 25.125](#) must meet:

- (1) $40 \text{ dB}\mu\text{V/m}$ for the 600 MHz, 700 MHz, and 800 MHz bands; and
- (2) $47 \text{ d}\mu\text{V/m}$ for the AWS and PCS bands; and
- (3) Licensees must comply with all applicable provisions and requirements of treaties and other international agreements between the United States Government and the governments of other countries, including Canada and Mexico. Absent specific international agreements regarding SCS, licensees must comply with the limited provided in [paragraphs \(w\)\(1\)](#) and [\(2\)](#) of this section.”