



September 13, 2024

Minister Francois-Philippe Champagne
Innovation, Science, and Economic Development Canada
Engineering, Planning, and Standards Branch
Senior Director, Space Services and International
6th Floor, East Tower
235 Queen Street
Ottawa ON K1A 0H5

Re: **Consultation on a Policy, Licensing, and Technical Framework for
Supplemental Mobile Coverage by Satellite, SMSE-006-24, June 2024**

Minister Philippe Champagne:

Lynk Global, Inc. (Lynk) respectfully responds to the Minister of Innovation, Science, and Industry to the Innovation, Science and Economic Development Canada (ISED) on the consultation on a policy, licensing, and technical framework for the use of certain bands allocated to flexible use and/or commercial mobile services to support the expansion of coverage via satellite, which is referred to hereafter as supplemental mobile coverage by satellite (SMCS).

I. Lynk's SMCS Solution

Lynk appreciates ISED's leadership in solving the challenges of SMCS mobile phone connectivity across Canada. Lynk shares ISED's policy objectives to: "expand mobile services, particularly in unserved and underserved areas, including rural, remote, and Indigenous communities, promote competition in the provision of wireless services so that consumers and businesses benefit from greater choice and competitive prices, support increased reliability and resiliency of telecommunications services, and foster investment and the evolution of wireless networks by enabling the development of innovative and emerging applications."

Lynk's mission is to connect all 7.7 billion people everywhere on Earth *via* its patented 3GPP-compliant fronthaul satellite communications system. Lynk utilizes terrestrial spectrum bands using space-based cell towers connected to a Mobile Network Operator's (MNO) terrestrial network as a roaming partner to expand coverage for mobile phones that terrestrial networks cannot economically or technically reach, which would include unserved and underserved areas, remote rural areas, and Indigenous communities. The Lynk system also provides instantaneous backup coverage and added resiliency for existing MNO infrastructure if there is disruption or damage to the primary terrestrial network.

In 2020, Lynk became the first company in the world to successfully demonstrate that non-geostationary orbit (NGSO) satellites in Low Earth Orbit can connect with unmodified,



commercial-off-the-shelf cellular phones in the Falkland Islands.¹ To date, Lynk has deployed eight satellites operating pursuant to experimental authorizations.² In addition, Lynk is the first commercial operator to receive a United States Federal Communications Commission (FCC) license for the provision of Supplemental Coverage from Space (SCS)³ services.⁴ Under this license, Lynk can build and operate ten satellites to provide SCS services outside the United States, subject to the approval of local regulatory authorities.

Lynk favors a regulatory licensing approach that fuels innovation, protects competition, and accelerates the use of SMCS. By building a flexible approach, ISED can leverage SMCS to meet policy initiatives that serve Canadian citizens where they live, work, and play. SMCS is an industry that can deliver life-saving communications as the category and technology mature. This presents regulatory challenges to create policies that facilitate this maturation journey.

II. The ISED's Proposed Regulatory Approach to Implementation of SMCS

Canada's Connectivity Strategy seeks to build or improve mobile network coverage in unserved and underserved areas in the country. Today, coverage gaps exist in Canada along some roads and highways and in remote regions, leaving 14,036 kms of major roads and highways without coverage. Lynk agrees that the lack of mobile coverage poses serious public safety risks and inhibits economic growth and social inclusion. Canadians must have access to essential mobile services and emergency services such as 9-1-1. Such efforts are significant considering that the physical infrastructure supporting mobile service networks is vulnerable to extreme weather, natural disasters, and human factors, which may result in the loss of reliable mobile coverage in Canada, as much of the country is rural. Lynk agrees that SMCS technology holds the promise of helping to close mobile wireless coverage gaps, including along roads and highways, unserved and underserved areas, and providing much-needed emergency services.

¹ See, e.g., Loren Grush, *Space startup Lynk uses satellite to send text messages to unmodified Android phone*, THE VERGE (Mar. 18, 2020), <https://www.theverge.com/2020/3/18/21184126/lynk-mega-constellation-text-message-android-smartphone-cell-towers-space>.

² See, e.g., Lynk Global, Inc., Federal Communication Commission's (FCC) ELS File No. 0113-EX-CN-2022 (granted May 25, 2022); Lynk Global, Inc., FCC ELS File No. 1117-EX-CN-2021 (granted May 25, 2022).

³ Supplemental Coverage from Space (SCS) is the United States FCC's regulatory term of art for classifying the service offering with the same meaning as the Canadian moniker supplemental mobile coverage by satellite (SMCS).

⁴ Lynk Global, Inc., FCC Order and Authorization, DA 22-969, File No. SAT-LOA-20210511-00064 (IB 2022).

A. ISED Consideration of SMCS Service Areas Size and/or The Presence of Mobile Service Providers⁵

Lynk's view, based on its considerable experience in the international SMCS marketplace, is that a flexible approach combined with experimental demonstrations of a system's architecture and business arrangements between SMCS providers and MNOs provides a path to expedient deployment. This approach enables all MNOs – including large spectrum licensees, regional and rural carriers, and carriers with fragmented spectrum holdings – to pursue SMCS as soon as possible. As other nations have proposed, implementing nationwide geographic licensing is well-intentioned in solving the most straightforward case, but it is potentially anti-competitive and may negatively impact rural carriers. Based on Lynk's global experience, multiple alternative paths toward service can adequately protect adjacent channel and area license holders through business arrangements.

Lynk agrees with ISED that mobile service providers and satellite operators can find approaches to mitigate co-channel interference to adjacent geographies. SMCS satellite architectures can differ both technologically and with respect to spectrum, so it is imperative that prospective providers first demonstrate their systems under experimental licenses in full view of co-channel and adjacent users. SMCS systems that meet these technical requirements and show no harmful interference should be commercially licensed in their demonstrated range of frequencies and geographies. Still, service should be conditioned on operations under a business arrangement with one or more existing terrestrial licensees.

B. SMCS Frequency Bands

Regarding ISED's SMCS terrestrial spectrum bands, Lynk provides global 2G, 4G, and 5G services using the 698-960 MHz bands, which encompasses a considerable portion of the current ISED spectrum bands. Lynk also provides the flexibility to include additional spectrum based on MNO partner requirements for SMCS service. Also, ISED should consider applying SMCS to the public safety broadband spectrum. The United States is currently supporting the use of supplemental coverage from space for the same policy reasons that ISED seeks for commercial service, e.g., the lack of service in underserved and unserved areas where emergency communications and services are lacking today.

Lynk looks forward to ISED's further consideration of SMCS in future public safety services consultations.

⁵ ISED has defined terrestrial license holders under geographic areas categorized under "service area tiers" based on Statistics Canada's Census Divisions and Subdivisions. Tier 1 license holders encompass a single national service area, while Tier 2 comprises "14 large service areas covering all of Canada, with eight service areas aligning with provincial/territorial boundaries and six sub-provincial areas within Ontario and Quebec." Tier 3 includes 59 smaller regional service areas, while Tier 4 encompasses 172 localized service areas. Tier 5 represents the most minor licensing areas, comprising 654 smaller localized service areas.



C. Emergency Communications 911 and Wireless Emergency Alerts

Lynk supports consideration of future implementation of 9-1-1 and Wireless Emergency Alert requirements for SMCS providers. Lynk encourages ISED to consider a holistic review of the technical constraints and other unique aspects of providing emergency alerting, 9-1-1 services, and public safety response services over satellite networks. Today, Lynk provides cell broadcast emergency alerts. The Lynk system creates a common communications platform that supports emergency response by connecting first responders, government agencies, international first responders⁶ and agencies, and affected communities across Canada and around the globe.

Specifically, Lynk's space-based cell towers function when disasters occur that damage or disable the terrestrial wireless network, which limits the ability for life-saving information to be provided to those who are in harm, *via* people's mobile devices. For instance, in the wildfires in Canada that disabled and destroyed numerous cell towers and occurred where no cellular network existed, the Lynk system could have provided connectivity. Lynk's architecture does not require ground infrastructure to deliver life-saving communications like SMS texting and Wireless Emergency Alerts.

Lynk has conducted satellite-based data, voice, and text demonstration activities, including Cellular Broadcast, in dozens of countries worldwide and on all seven continents. Lynk's beta service is fully operational in several countries, providing connectivity to previously unconnected people. Lynk and its global partners have demonstrated these and other capabilities that fully prove SMCS technology in real-world applications. For instance, in July 2023, Lynk tested with the United States Government in Hawai'i. One of the Helemano Reserve test participants shared that this technology would address the need to communicate with civilians during a natural disaster just weeks before the Maui fire tragedy. In December 2023, Rogers and Lynk demonstrated a satellite-to-mobile phone call with Newfoundland and Labrador Premier Andrew Furey and a Search and Rescue volunteer.⁷

Given that one of the primary benefits of SMCS is the ability to provide communications in currently unserved and underserved areas, the ability to provide emergency communications will help alleviate and address concerns that many satellite networks have historically been unable to comply with 9-1-1 requirements due to technical infeasibility in the past.

Lynk recommends that ISED adopt rules that enable MNOs to provision and utilize SMCS to satisfy their resiliency obligations and emergency response and preparedness requirements where appropriate for 9-1-1 service. Lynk believes it's critical that before any operator makes SMCS available for emergency communications to first responders or the public, both the satellite and terrestrial operators proposing to make the service available undertake sufficient and demonstrable real-world testing of the capability. Such real-world testing should be conducted in coordination with public safety licensees to evaluate the risk of interference and

⁶ See Bill Gabbert, *U.S. and Canada send firefighters to Australia*, WILDFIRE TODAY (Dec. 5, 2019).

⁷ See Juan Pedro Tomás, *Rogers and Lynk complete satellite-to-mobile phone call in Canada*, RCR WIRELESS NEWS (Dec. 18, 2023).



procedures to detect, identify, and eliminate interference should it occur. Also, this issue is more significant than between carriers and SMCS providers and should include public safety, the disability community, multilingual, and emergency communications professionals for the industry to get this essential service initially right by a take-your-time approach.

Presently, Lynk is in the process of supporting a U.S. interim requirement that 9-1-1 calls be routed to a Public Safety Answering Point (PSAP) using either location-based routing or an emergency call center.⁸ The provider also must transmit location information and the user's phone number to facilitate dispatch and callback capabilities at the receiving PSAP.

SMCS holds the promise of delivering emergency communications for Governments, the public, and private citizens when terrestrial networks are not available, and the technology and industry are on a journey of building this capability. Lynk believes the Canadian Government would be served by early and often dialog with potential SMCS providers to understand the timelines and technology—both its advantages and limitations—to deliver 9-1-1 services. The services and requirements will grow over time and a policy framework to maximise the technology over this growth curve will save lives.

D. SMCS Providers and MNO Agreements

Lynk respectfully disagrees with ISED's proposal that an SMCS agreement be in place before applications for foreign satellite approvals can be submitted to ISED for consideration. Lynk contends that a commercial license should not be conditioned upon an SMCS provider to provide service in Canada under a business arrangement with an existing terrestrial licensee in the frequencies and geographies for which both are authorized. A preexisting business arrangement should not be a requirement to submit a license application. This approach decouples the MNOs and SMCS providers, which enables multiple MNOs to partner with a single SMCS provider, creating robust competition for SMCS providers in the marketplace and ensuring network redundancy for an MNO partner,⁹ and enables multiple SMCS providers to partner with a single MNO.¹⁰

Lynk agrees with ISED's proposal to limit the operation of SMCS to only the frequency bands and areas contained in the SMCS Agreement, which would be referenced on the SMCS licenses. Also, Lynk agrees that in an SMCS Agreement that is modified with updated frequency bands and/or areas after authorization, the SMCS licensee can request an amendment to their licenses. MNOs, however, should have the flexibility to create leasing structures for SMCS that

⁸ *Single Network Future; Supplemental Coverage from Space; Space Innovation*, GN Docket No. 23-65, IB Docket No. 22-271, Report and Order and Further Notice of Proposed Rulemaking, 89 Fed Reg 34188 (April 30, 2024) (SCS Order).

⁹ See Spark Press Release, *Spark to launch satellite-to-mobile service*, <https://www.sparknz.co.nz/news/Spark-to-launch-satellite-to-mobile-service/>; See also, 2degrees website, *Lynk Global Satellite Connectivity*, <https://www.2degrees.nz/mobile-plans/satellite>.

¹⁰ See Rogers Press Release, *Rogers Partners With Lynk Global to Bring Satellite-to-Phone Coverage to Canadians*, <https://about.rogers.com/news-ideas/rogers-partners-with-lynk-global-to-bring-satellite-to-phone-coverage-to-canadians/> (April 26, 2023); Rogers Press Release, *Rogers Signs Agreement With SpaceX to Bring Satellite-to-Phone Coverage to Canada*, <https://about.rogers.com/news-ideas/rogers-signs-agreement-with-spacex-to-bring-satellite-to-phone-coverage-to-canada/> (April 26, 2023).



allow the parties to develop agreements and enter into leasing arrangements that best suit their commercial requirements. Allowing MNOs to contract with multiple SMCS providers allows for leasing arrangements that provide alternative frequency bands, a greater range of coverage across Canada, and primary and secondary network redundancy in cases where the network fails for one provider but not for the other contracted SMSC provider. It will enhance network coverage and resiliency in emergencies with primary and secondary failover, especially where network redundancy is essential in a disaster scenario. Allowing an MNO to partner with multiple SMCS providers ensures competitive pricing in the marketplace and the highest quality service to the consumer.

E. Licensing Agreements and SMCS Providers

Lynk believes ISSED's proposal for a license renewal on an annual basis is not appropriate. The proposal to issue annual spectrum licenses for SMCS earth stations that expire on March 31 each year until the flexible use spectrum license term ends or when the associated SMCS Agreement is terminated is unnecessary. The spectrum lease agreements between the MNO and the SMCS provider should be adequate until the MNO spectrum license agreement ends or the contract is terminated. ISSED already has control over the MNO spectrum license and can regulate any issues that may occur in the subsequent SMCS spectrum management lease agreement. There is no beneficial reason to require a potentially burdensome annual regulatory obligation in this case.

Also, ISSED should not allow SMCS licenses to be transferred, divided, or subordinated. In these instances, licenses should be terminated, and the new provider of SMCS services should meet the same regulatory thresholds that ISSED requires through a new license grant. Lynk also agrees that in the event of a change in ownership and control, eligibility requirements and all other conditions of license or authorizations for SMCS would continue to apply to the license.

Lynk's patented technology does not require a traditional satellite ground station; instead, it relies on traditional MNO terrestrial network nodes for routing traffic. As such, Lynk can provide off-shore service to international waters and the exclusive economic zone. Lynk has assisted in providing such service in a search and rescue mission over open waters in the Pacific Ocean.

III. Technical Considerations

A. Network Protections and Interference

Lynk has developed a comprehensive interference mitigation analysis (Interference Analysis) as part of the company's commercial application to the FCC.¹¹ The Interference Analysis includes a description of how beams can be deployed from satellites to provide cellular coverage on the Earth in a manner that is compatible with existing terrestrial frequencies.

¹¹ See Lynk UHF Interference Mitigation Analysis (Interference Analysis), FCC File ID: SAT-LOA-20210511-00064, https://licensing.fcc.gov/cgi-bin/ws.exe/prod/ib/forms/attachment_menu.htm?id_app_num=137811&acct=803602&id_form_num=12&filing_key=-461013.



Fundamentally, the deployment plan would follow a procedure similar to, or identical to, a typical terrestrial cellular build-out planning procedure. Since MNOs with license/authority to deploy the spectrum are directly partnering with SMCS providers, there is a high degree of accountability when mitigating internal interference to the terrestrial and space network since harmful interference would degrade the service. As a result, regulators should feel at ease that MNOs will continue to use their spectrum to deploy their services – either through terrestrial or space networks – in a way that minimizes or mitigates interference scenarios within their jurisdiction. Regulatory borders (internal or external to a given country) can be managed like they are today in the terrestrial regime by conforming to existing Power Flux Density (PFD) thresholds at or beyond the border (whatever it may be). These operational constraints can be codified into the space network and verified by MNO partners.

Specific sections of the Interference Analysis of relevance would be "Section III. A. PFD of Lync's Service Link" (Pages 11-12)¹² that highlights the proposal to conform the cell edge condition to not exceed the PFD limits already set by the FCC for terrestrial services with respect to adjacent service areas (40 dBuV/m as set forth in 47 CFR §22.983(a)).

"Section III. B., Interference Analysis, Cell Size Adjusted via Satellite Transmit Power" (Page 13-14) and "Section III. C. Example Spot Beam Simulation" (Page 14-21)¹³ show how the satellite spot beams from SMCS providers can be adjusted in transmit power to conform a beam to a circular cell on the earth and prevent excessive PFD overflow into adjacent areas.

"Section V. Co-Channel Interference Analysis" (Pages 23-50) of the Interference Analysis¹⁴ illustrates a detailed analysis of the probability of harmful interference from SMCS provider services on the existing terrestrial spectrum. Further, Pages 34-50 illustrate a specific case study for a real-world network in the Bahamas which deploys a heterogeneous network of multiple frequency bands.¹⁵ The concept of geospatial and spectral orthogonality wrt beam deployment to avoid harmful interference is described here and supported with a real-world example. In particular, the analysis shows the use of co-channel spectrum in the 850 band between the terrestrial network and the space network, which is highlighted in Figure 24 on Page 44.¹⁶ The use of this spectrum would be deployed from the spacecraft on beams in locations that are well planned out in practice, but Pages 44-49 also demonstrate that the Bahamas network is robust to harmful interference even in the event of co-channel overlap in the 850 band between the terrestrial and space network.¹⁷

B. Technical Requirements for Commercial Mobile User Equipment

Lynk agrees with ISSED that SMCS should leverage existing UE to ensure that mobile wireless connectivity can be offered rapidly in unserved or underserved areas. Hence, MNO

¹² *Id.* Section III. A. Power Flux Density of Lync's Service Link at 11-12.

¹³ *Id.* Section III. B., Interference Analysis, Cell Size Adjusted via Satellite Transmit Power, at 13-14; Section III. C. Example Spot Beam Simulation at 14-21.

¹⁴ *Id.* Section V. Co-Channel Interference Analysis at 23-50.

¹⁵ *Id.* at 34-50.

¹⁶ *Id.* at Figure 24 at 44.

¹⁷ *Id.* at 44-49.



customers would not need to purchase new devices or equipment or recertify UE devices for SMCS services. ISED plans to maintain existing terrestrial technical requirements for UE, which is operated under an SMCS earth station license. Lync agrees that the existing technical requirements in the relevant SRSP and RSS in each frequency band would be sufficient for UE for SMCS. Lync has in the past provided both analytical and empirical evidence of this through link budget analysis, license filings, and in-field test data/results for two-way text, voice, and data communications.

C. Technical Requirements to be Applied to SMCS Space Stations

ISED seeks comment on applying 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.

Lync believes ISED should adopt the same framework with respect to PFD limits established by the FCC in *Single Network Future; Supplemental Coverage from Space; Space Innovation* (SCS Order).¹⁸

D. Technical Requirements Coexistence Between SMCS Space Stations

Lync agrees with ISED that interference caused by SMCS satellite licensee to licensed operations in the same frequency band or block in adjacent areas, and in the adjacent frequency band or block, must take steps to eliminate it. The SMCS operators are responsible for coordinating their constellations and resolving any interference issues that may arise. Together with their MNO partner, SMCS operators will resolve spectrum deployment issues with licensed stakeholders to ensure their MNO partners network and other licensees' networks are not harmfully impacted. MNOs and their SMCS partners will manage coordination and interference issues similar to terrestrial networks coordination.

E. Coexistence With Radio Astronomy Service

ISED seeks comment on requiring SMCS satellites to meet the protection criteria under Recommendations ITU-R RA.769-2 and ITU-R RA.1513-2 for radioastronomy frequency bands. Lync believes the frequency bands that ISED has proposed for the SMCS framework do not include any allocations for radio astronomy. SMCS operators should avoid using allocated Radio Astronomy frequencies for their service bands and provide sufficient out-of-band-emission (OOBE) protection to ensure no interference from the SMCS service. In other bands, SMCS providers should be encouraged to coordinate with the astronomy community to minimize the impact of SMCS operations in radio astronomy efforts where and when possible. ISED should not require such coordination, but it should be encouraged.

¹⁸ See SCS Order *generally* at footnote 8.



In addition, SMCS operators should be encouraged to work with the astronomy community to investigate, test, demonstrate, and implement best practices for reducing or eliminating visual interference from satellites. SpaceX has done the most work in this field of all satellite operators. To that end, LYNK and SpaceX are working with the International Astronomical Union Centre for the Protection of the Dark and Quiet Sky from Satellite Constellation Interference (IAU-CPS).

F. Canada and United States Cross-Border Coexistence

LYNK believes that SMCS systems can and should be designed to operate in the same way terrestrial carriers already do today with respect to cross-border co-existence. LYNK agrees with the ISED proposal to apply existing terrestrial cross-border rules to SMCS operations and requires that the SMCS operator mitigate any interference caused by SMCS. By way of example, the attached “Arrangement S.pdf” provides details of the spectrum sharing arrangement between ISED and the FCC concerning the use of the frequency bands 824 to 849 MHz and 869 to 894 MHz by cellular radio systems serving adjacent sides of the Canada-United States border. This could be pointed to as an existing agreement that SMCS operators could adopt at the Canada-United States border in the 850 MHz cellular band (and possibly other bands as well). In this arrangement, both Agencies agree that the PFD at the ground level produced by a station located in the other country’s territory shall not exceed -102 dBW/m² in any 200kHz bandwidth unless the licensees in adjacent areas and the Agencies agree to a higher value. It also specifies that coordination of a station is required if it is located at a distance less than 72 km from the Canada-United States border. A similar idea could be adopted for SMCS where the center of a beam that is less than 72 km away from the border could be coordinated if the -102 dBW/m²/200kHz threshold cannot be met.

Conclusion

SMCS can provide near-instantaneous backup to terrestrial wireless networks that are exposed to natural and man-made disasters and can be utilized where network coverage is fragmented or does not exist in rural areas of Canada. LYNK looks forward to working with Canadian terrestrial operators to explore how this can be introduced to satisfy network resiliency obligations and emergency response and preparedness requirements. SMCS also delivers affordable ubiquitous rural connectivity while simultaneously providing redundancy for critical communications.

For the above reasons, LYNK encourages the ISED to proceed with an SMCS framework that allows for the rapid adoption of SMCS technology by recognizing that business



arrangements between satellite operators and MNOs can adequately and efficiently protect incumbent licensees.

Please direct any questions you may have to the undersigned.

Respectfully submitted,

/s/ Margo Deckard
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Co-founder
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