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Spectrum Management and Telecommunications

Consultation on the Technical and Policy Framework for the 3650-4200 MHz Band and Changes to the Frequency Allocation of the 3500-3650 MHz Band

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1. Intent

1. Through the release of this document, Innovation, Science and Economic Development Canada (ISED), on behalf of the Minister of Innovation, Science and Industry (the Minister), is initiating a consultation on the technical and policy framework for the 3650-4200 MHz band (referred to as the 3800 MHz band) to accommodate flexible use for fixed and mobile services. Proposed changes to the 3500-3650 MHz frequency allocation related to the status of fixed satellite service in the [Canadian Table of Frequency Allocations](#) (CTFA) are also included in this consultation. This document also announces moratoria on certain licensing processes.

2. Legislative mandate

2. The Minister, through the *Department of Industry Act*, the *Radiocommunication Act* and the *Radiocommunication Regulations*, with due regard to the objectives of the *Telecommunications Act*, is responsible for spectrum management in Canada. As such, the Minister is responsible for developing national policies for spectrum utilization and ensuring effective management of the radio frequency spectrum resource.

3. Policy objectives

3. Wireless services are an important part of Canadians' lives, whether they are accessing multi-media applications, conducting business while on the move, connecting with family and friends, or managing their finances. As wireless services become increasingly integrated into their lives, Canadians expect these services to be high quality, available in every region of the country, and competitively priced. Furthermore, connectivity becomes even more critical during times of crisis, such as the COVID-19 pandemic, a time when Canadians have relied even more on their wireless services to stay connected.

4. ISED is committed to the objective that all Canadian consumers, businesses, and public institutions have access to the latest wireless telecommunications services, at competitive prices. A robust wireless telecommunications industry drives the adoption and use of digital technologies and enhances the productivity of the Canadian economy.

5. Spectrum is a critical resource for wireless carriers. Additional spectrum for flexible use will enable providers to increase network capacity to meet the traffic demands of higher usage rates and support the provision of next-generation wireless technologies. The fifth generation of technology, known as 5G, is expected to dramatically change the telecommunications landscape. 5G technology will facilitate the delivery of high-quality and innovative services to Canadian consumers and businesses. The development and deployment of 5G technologies is essential to Canada becoming a global centre for innovation and will bring Canada to the forefront of digital development and adoption through the creation and strengthening of a world-class wireless

infrastructure. Further, it presents a key opportunity to support competition and the provision of high quality, innovative, and competitively priced wireless services to Canadians.

6. Beyond improvements to the mobile and fixed wireless networks, 5G is also expected to support the expansion of new wireless applications in vertical industries such as agriculture, manufacturing, healthcare, public safety and transportation. With more spectrum available, Canadians will be able to embrace new applications and services in these vertical industries as they are developed. Testing and demonstrations of different use cases are already taking place domestically and internationally. Initial 5G deployments appear to be focussed on capacity expansions for current 4G and fixed wireless access networks in the mid-band spectrum and backhaul applications; however, it is unclear at this time which business cases will drive ongoing investment in 5G networks, and which services and applications will deliver the greatest benefit to Canadians.

7. Around the world, spectrum regulators have released or are planning to release the 3800 MHz band, or portions thereof, for broadband wireless services. Repurposing this band to flexible use will not only support mobile services, such as smartphones and connected devices, but will also continue to support fixed wireless services. Promoting access to additional flexible use spectrum for mobile and fixed wireless services will enable telecommunication service providers (TSPs) and wireless Internet service providers (WISPs) to increase their network capacity to meet the traffic demands of increased data usage that is expected with 5G applications and services in both urban and rural areas of Canada.

8. In addition to the roles of mobile and fixed wireless services in the overall delivery of connectivity to Canadians, satellites continue to play a vital role in Canada's telecommunication and broadcasting infrastructure. They are currently the only means of reaching some communities in rural and remote areas, such as the North. ISED has observed an overall trend of satellite operations moving to higher frequencies to better accommodate the demands for data-intensive applications that require larger bandwidths (i.e. higher capacity Internet services and high-resolution images and video). Next-generation satellite technologies, such as high throughput satellites and low Earth orbit (LEO) satellite constellations, are expected to play an important role in supporting connectivity and bridging the digital divide between rural and urban areas, with satellites offering coverage in the far North of Canada. While the satellite trend is to move to higher frequencies, due to existing infrastructure and the propagation characteristics of the 3800 MHz band, it continues to be used to distribute media and provide Internet connectivity. Consequently, the repurposing and release of the 3800 MHz spectrum will take into account the role of fixed satellite services (FSS) operations, especially in rural and remote areas that depend on satellite communications.

9. Canadian consumers benefit from the economies of scale that come when manufacturers produce equipment for many markets resulting in access to the latest devices at competitive prices for Canadians. By ensuring that the spectrum being made available reflects global trends, emerging 5G standards and the equipment ecosystem that is expected to materialize in the coming years, Canada will continue to position itself to benefit from the next generation of smartphones and other advanced wireless devices.

10. In developing this consultation, ISED was guided by the [Spectrum Policy Framework for Canada](#) (SPFC), which states that the objective of the spectrum program is to maximize the economic and social benefits that Canadians derive from the use of the radio frequency spectrum resource. This objective and the enabling guidelines listed in the SPFC remain relevant for guiding ISED in delivering its spectrum management mandate.

11. In May 2019, the Government of Canada released [Canada's Digital Charter: Trust in a digital world](#). The Digital Charter lists universal access as the first of ten principles that will lay the foundation for a made-in-Canada digital approach, and guide policy thinking and actions towards establishing an innovative, people-centred and inclusive digital and data economy built on trust. Universal access is the principle that all Canadians will have an equal opportunity to participate in the digital world and have the necessary tools to do so, including access, connectivity, literacy and skills.

12. The Government of Canada is also committed to promoting the delivery of broadband services to rural and remote areas across the country. In 2019, [High-Speed Access for All: Canada's Connectivity Strategy](#) was launched, and a national connectivity target was announced that aims to make speeds of at least 50 megabits per second (Mbps) download and 10 Mbps upload available to all Canadian homes and businesses. As part of this commitment, ISED is considering the need to support and encourage connectivity for rural and remote communities as it develops new policies and licensing processes for this band.

13. The proposals set out in this consultation support the objectives of the *Telecommunications Act*, the SPFC, the Digital Charter and Canada's Connectivity Strategy by positioning Canada at the leading edge of the digital economy through the release of the 3800 MHz band to support 5G technologies. Consequently, ISED's policy objectives for the 3800 MHz band are to:

- foster investment and the evolution of wireless networks by enabling the development of high quality 5G networks and technology
- support sustained competition in the provision of wireless services so that all consumers and businesses benefit from greater choice and competitive prices
- facilitate the deployment and timely availability of services across the country, including in rural, remote, and Northern regions

4. Background and context

14. In the [Spectrum Outlook 2018 to 2022](#) (the Spectrum Outlook), ISED indicated that it would review the frequency ranges from 3400-4200 MHz to consider releasing them, or portions thereof, for commercial mobile and fixed use. ISED defined the 3800 MHz band as the frequency range of 3650-4200 MHz. The 3650-4200 MHz band is currently used for fixed point-to-point, wireless broadband service (WBS) and the FSS systems.

15. Comments from the Spectrum Outlook indicated support for a review of the 3800 MHz band. Responses also indicated that the 3800 MHz band is viewed as key spectrum to support 5G technologies, and many countries have begun work to make this spectrum available for this purpose. Concerns regarding continued access to the band and protection of existing services were expressed by FSS providers, WISPs and other existing licensees.

16. Different frequencies possess unique propagation characteristics and can be developed to offer applications and services that make use of these different characteristics and benefits. ISED considers that planning the release of spectrum in low-, mid- and high-frequency bands will be beneficial to the deployment of 5G technologies offering higher speeds, low-latency and improved capacity and coverage.

17. ISED has undertaken the following processes to address the requirements for low-, mid- and high-band spectrum.

- **Low-band spectrum:** Low-band spectrum is ideal for covering large geographic areas and for in-building penetration, making it important for both urban and rural deployments. In March 2018, ISED published the SLPB-002-18, [*Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band*](#), to support increased network capacity and coverage, and the deployment of next-generation technologies. The auction for the 600 MHz band was completed in April 2019.
- **Mid-band spectrum:** The characteristics of mid-band spectrum allow for a mixture of providing coverage and capacity. Taking into account the need for mid-band spectrum to complement existing low and high bands ISED published the SLPB-001-19, [*Decision on Revisions to the 3500 MHz Band to Accommodate Flexible Use and Preliminary Decisions on Changes to the 3800 MHz Band*](#) (3500 MHz Repurposing Decision), in 2019. The 3500 MHz Repurposing Decision was a first step to making portions of the larger 3400-4200 MHz band available for flexible use. In the 3500 MHz Repurposing Decision, ISED released the 3450-3650 MHz band (the 3500 MHz band) for flexible use. Through the release of the SLPB-001-20, [*Policy and Licensing Framework for Spectrum in the 3500 MHz Band*](#) (3500 MHz Framework), in March 2020, ISED outlined the rules for the auction currently scheduled for June 2021. As part of the 3500 MHz Repurposing Decision, ISED also committed to review the Wireless Broadband Service band (3650-3700 MHz) and the 3700-4200 MHz band through a future formal consultation, to release portions of the 3800 MHz band for flexible use through a future auction process.
- **High-band spectrum:** Releasing spectrum in high bands will allow service providers to obtain large blocks of spectrum to increase the capacity and quality of their networks and will promote innovation by supporting new technologies and business models. In June 2019, ISED published SLPB-003-19, [*Decision on Releasing Millimetre Wave Spectrum to Support 5G*](#) (mmWave Decision), taking a key step in optimizing this high-band spectrum for low-latency and high-bandwidth use. The mmWave Decision also resulted in interim guidelines GL-10,

[Interim Guideline for Licensing of Earth Stations in the Fixed-Satellite, Earth Exploration-Satellite and Space Research Services in the Frequency Bands 26.5-28.35 GHz and 37.5-40.0 GHz](#), which set out service areas that would be exempt from certain provisions for licensing of satellite services.

18. This consultation takes into consideration the support expressed in the Spectrum Outlook consultation for a review of the 3800 MHz band, the current incumbent situation in the band, the comments and reply comments provided by respondents to the SLPB-004-18, [Consultation on Revisions to the 3500 MHz Band to Accommodate Flexible Use and Preliminary Consultation on Changes to the 3800 MHz Band](#) (the Preliminary Consultation), and the policy objectives outlined above.

5. International context

19. The following sections discuss the use of 3800 MHz in other countries and the various ecosystems that are being or have already been developed for the different markets globally.

5.1 Use of 3800 MHz in other countries

20. Spectrum regulators around the world have released or are planning to release portions of the 3800 MHz band for flexible use. Internationally, the 3800 MHz band has traditionally been used as a downlink (space-to-Earth) band for FSS and fixed service with varying amounts of spectrum being made available for other uses in different countries.

21. Up until 2015, the 3650-3700 MHz band was aligned in Canada and the United-States (U.S.) for wireless broadband service (WBS) use. In 2015 the Federal Communications Commission (FCC) in the U.S. released a [Report and Order \(FCC 15-47\)](#), which made the larger 3550-3700 MHz band available for flexible use on a shared basis through a database-supported authorization system, known as the Citizen Broadband Radio Service (CBRS). The FCC has set up a three-tiered sharing framework enabled by a Spectrum Access System (SAS). As part of this decision, the FCC grandfathered existing WBS deployments for five years, allowing time for these licensees to update equipment to transition and align with the new rules. At the end of the transition period, the grandfathered WBS providers have the option to apply for priority access licences (PALs) through the upcoming auction or continue to operate as general authorized access (GAA) users. In addition, the FCC aligned the technical GAA rules such that WBS providers could continue to provide the same coverage when they migrate to the new band plan and licensing rules.

22. In March 2020, the FCC released [Report and Order and Order of Proposed Modification \(FCC 20-22\)](#), which made changes to the 3700-4000 MHz band to make it available for flexible use. The FCC decided to auction 280 MHz of spectrum from 3700-3980 MHz for flexible use in the contiguous U.S., with the auction expected to take place on December 8, 2020. In addition, it decided that the 3980-4000 MHz range will serve as a 20 MHz guard band (GB) to protect existing adjacent band FSS operations and decided to repack FSS operations in the contiguous

U.S. into the 4000-4200 MHz range. The FCC's order provided a deadline of December 5, 2025, to clear the band but also set a goal for accelerated relocation of December 5, 2023. All earth station and space station operators must clear the band by 2025, but those space station operators that elect to transition early will be eligible to apply for accelerated relocation payments, in addition to the reimbursement of their relocation costs. The funds to provide payments to eligible incumbent operators will come from payments made by new flexible use licensees in the band. In June 2020, the FCC released a [Public Notice](#) to announce that the incumbent satellite operators in the 3700-3980 MHz band elected to clear the spectrum according to an accelerated timeline. The FCC has also adopted service and technical rules for the flexible use licensees as part of the Report and Order. It also included rules that require incumbent fixed licensees in the contiguous U.S. to relocate their point-to-point links to other bands by December 5, 2023.

23. European countries have focused their mid-band spectrum releases on the 3400-3800 MHz range. Through the [European Electronic Communications Code](#), which was agreed by the European Union (EU) Member States in 2018, the European Commission adopted Article 54, to "allow the use of sufficiently large blocks" to facilitate the roll-out of 5G by the end of 2020. Specifically, the EU indicated that all EU Member States must make the 3400-3800 MHz band available in at least one city, an objective which was first introduced as part of the European action plan, [5G for Europe: An Action Plan](#). Europe's technical authority, the European Conference of Postal and Telecommunications Administrations (CEPT), harmonized technical conditions for 5G in the band through [CEPT Report 67](#). Several European countries including Italy, Spain, Austria, Germany and France, have already auctioned, released or announced a plan to release portions of the 3400-3800 MHz band.

24. Ofcom, the communications regulator of the United Kingdom (UK), auctioned spectrum in the 3400-3600 MHz range in April 2018 and will [auction](#) an additional 120 MHz of spectrum in the 3600-3800 MHz frequency range in 2020. According to a [statement](#) published in March 2020, Ofcom is "clearing fixed links from the band, and have given notice that satellite use will no longer be taken to account for spectrum management purposes." As a result, the 3600-3800 MHz band is expected to become available for mobile use as early as June 2020, but not necessarily across the UK until 2022.

25. Ofcom is also making modifications in the 3800-4200 MHz band. In July 2019, it published [Enabling wireless innovation through local licensing](#), in which it was announced that the 3800-4200 MHz band would be one of three spectrum bands made available for spectrum sharing. The band is currently used in the UK by satellite earth stations, point-to-point fixed links and fixed wireless access (FWA), but coordinated on a first-come, first-served basis.

26. In July 2020, the Australian Communications and Media Authority (ACMA) published [Planning options for the 3700-4200 MHz band](#), a consultation paper seeking comment on changes to the 3700-4200 MHz framework that would support the introduction of new broadband services, including 5G. The desired outcomes in this band are to introduce 5G services, the continued support of current services and coexistence with adjacent bands. ACMA identifies three potential options including exclusive access to a portion of the band for new

services, designating a portion for sharing between existing and new services, or a combination of both.

27. Administrations in the Middle East and North Africa that constitute the Arab Spectrum Management Group have decided that the 3300-3800 MHz range is key for the introduction of 5G. Commercial networks that have already been launched in the 3400-3800 MHz range, and some of these administrations are also looking at the opportunities in the 3800-4200 MHz range. In Asia, South Korea and China have focused their mid-band spectrum releases in the 3400-3700 MHz range and have launched commercial services in April 2019 and November 2019, respectively. In July 2020, South Korea announced that it will be reallocating additional spectrum in 3400-3420 MHz, currently used as a guard band, and in 3700-4000 MHz, currently used for satellite services, to use for 5G services, totalling 320 MHz. In Japan the entire 3400-4100 MHz range has been assigned to mobile operators.

28. Some countries have identified mid-band spectrum where they will allow sharing and introduce use by vertical industries. Ofcom is opening the 3800-4200 MHz range to new wireless broadband users through a shared local licensing arrangement. Users will apply to Ofcom for coordinated access to prevent harmful interference and will be issued either low-power small area licences or medium-power rural area licences for fixed wireless access and other uses on a first-come, first-served basis. Similarly, the Federal Network Agency (BNetzA) in Germany opened applications for local licences in the 3700-3800 MHz range for “innovative 5G solutions” and Sweden has allocated portions of mid-band spectrum for private local 5G or shared use.

5.2 Development of the 5G equipment ecosystem

29. The 3rd Generation Partnership Project (3GPP) includes various organizations that work together to develop industry specifications for equipment used for commercial mobile services. In the 3400-3800 MHz range, 3GPP specifications for three 4G Long-Term Evolution (LTE) bands have been defined: LTE bands B42 (3400-3600 MHz), B43 (3600-3800 MHz) and B48 (3550-3770 MHz). LTE band B48 covers the U.S. CBRS band. Equipment for fixed and mobile services has been available for a significant period for LTE bands B42 and B43, and are now available for band B48. The equipment in these bands is mainly using LTE time division duplex (TDD) technologies.

30. In late 2017, 3GPP identified the 3300-4200 MHz band for its 5G New Radio (NR) standards. Specifications were developed for two TDD NR bands; NR bands n77 (3300-4200 MHz) and n78 (3300-3800 MHz). Equipment for 5G NR operations based on the 3GPP specifications requiring an LTE anchor network has been available since 2019. Equipment for standalone 5G NR operations, not requiring an LTE anchor network, is expected in 2020. The initial focus for 5G NR networks has been on achieving much higher data rates, improved connectivity and higher system capacity compared to existing 4G LTE networks.

31. In July 2020, 3GPP finalized specifications for additional advanced 5G features, such as ultra-reliable low latency communication, massive machine-to-machine communication and

network slicing. These advanced 5G features will be used by vertical industries such as manufacturing, healthcare, public safety and transport. Availability of 5G equipment for these vertical industries is demand driven and will be determined in part by business cases and investment plans that are still maturing. Consequently, the timelines for the availability of equipment using these advanced 5G features are currently unknown.

32. 5G NR network equipment, smartphones, customer premises equipment and other types of end-user equipment are now available in various markets, all of which operate in various portions of the 3300-4200 MHz range, if not the entire range.

Q1

ISED is seeking comments on the timelines for the development of an equipment ecosystem using 5G technologies in the 3800 MHz band. In particular:

- a) the ecosystem maturity level and readiness of equipment under band classes n77 or n78 for the Canadian market
- b) the ability of existing or future base station radios to handle multiple technologies and band classes at the same time (i.e. whether all four band classes (B42, B43, n77 and n78) or a subset of these band classes are able to operate on the same base station radio) and how it may affect the adoption of 5G technologies in the 3800 MHz band

Q2

ISED is seeking comments on the potential linkages between the equipment ecosystems using 5G technologies in the 3500 MHz and 3800 MHz bands. In particular:

- a) whether contiguity between the 3500 MHz band and 3800 MHz band is preferred given that 3GPP specifications allows for non-contiguous carrier aggregation
- b) whether there are any technical or operational impediments (e.g. equipment limitations/challenges to support aggregated use of spectrum, or requirements for additional base station radios) that would be incurred if operators have a large frequency separation between frequency blocks in one or both bands, and at what point (i.e. how wide the frequency separation) such impediments would become significant
- c) whether the equipment ecosystem deployed for the 3500 MHz band will be able to operate in the 3800 MHz band, and whether this equipment could easily be extended to 3800 MHz after being deployed

In providing comments, respondents are requested to include supporting arguments and rationale.

33. Globally harmonized spectrum allocations will result in a larger equipment ecosystem, leading to economies of scale, lower costs for deployment, and more rapid roll-out of new services. However, the reality is that not all countries will have fully aligned spectrum allocations at the same time, if ever.

34. As indicated in section 5.1, part or all of the 3300-4200 MHz range will be available in some countries in the foreseeable future. The needs of current incumbent services such as FSS and fixed service will be given careful consideration. Regulators will decide which portions of

spectrum will be made available at a national level, based on incumbent use as well as national priorities and strategies. It is also expected that a given regulator may make different portions of the 3300-4200 MHz range available at different times, incrementally building large contiguous blocks.

35. ISED notes that the U.S. and the EU have published technical rules for the 3700-4000 MHz and 3400-3800 MHz bands, respectively. These rules do not align at band edges, or with technical rules such as out-of-band-emission (OOBE) power limits.

Q3

ISED is seeking comments on how the difference in technical rules between the U.S. and EU could impact Canada's ability to leverage the economies of scale from the global 3800 MHz ecosystem. In particular:

- a) would the difference in technical rules (such as out-of-band-emission (OOBE) power limits) result in two distinct region-specific equipment ecosystems
- b) which equipment ecosystem would be more suitable in the Canadian environment (noting that Canada has, for the most part, aligned with the U.S. on low- and high-band spectrum for 5G but in the mid-band, Canada is more aligned with the EU in the 3500 MHz band (3450-3650 MHz)) and specifically, whether Canada should generally align its technical rules with the U.S. or the EU in the 3800 MHz band

In providing comments, respondents are requested to include supporting arguments and rationale.

6. Current use of the 3800 MHz band

36. In the Spectrum Outlook, the 3800 MHz band was defined as the frequency range 3650-4200 MHz. Today, the 3650-3700 MHz band is available for WBS, which is licensed on a shared basis and can be used for both fixed and mobile applications. The 3700-4200 MHz band is mainly used by the FSS for the delivery of broadband services as well as for feeder links for television broadcasts. In addition, licence-exempt broadcast receivers receive TV programming that it distributes over cable infrastructure or in broadcast studios as multimedia to create programming. As for fixed service use, there are currently limited fixed point-to-point links in operation in the 3700-4200 MHz portions of the band. There are also two licences permitting the use of ultra-wide band devices for positive train control operations within the 3700-4200 MHz band. These licences operate on a no-protection, no-interference basis, as such are not discussed further in this consultation. Figure 1 shows the current main uses of the 3800 MHz band.

Figure 1: Current main uses of the 3800 MHz band



6.1 Use of the 3650-3700 MHz band

37. The 3650-3700 MHz portion of the 3800 MHz band is currently allocated to fixed, mobile and fixed satellite services on a co-primary basis. However, in accordance with Canadian footnote C33 in the CTFA, FSS earth stations licensed after June 2009 are only authorized to operate on a secondary basis so as not to constrain the implementation of wireless broadband services. As such, the 3650-3700 MHz band is currently mainly used for WBS operations.

38. **Wireless broadband service:** In June 2009, ISED published the SP 3650 MHz, [*Spectrum Utilization Policy, Technical and Licensing Requirements for Wireless Broadband Services \(WBS\) in the Band 3650-3700 MHz*](#). This policy allowed WBS operators to deploy a full range of fixed and mobile applications (i.e. point-to-multipoint, point-to-point and point-to-area) in the band. As described in SP 3650 MHz and Client Procedures Circular CPC-2-1-26, [*Licensing Procedure for Wireless Broadband Services \(WBS\) in the Frequency Band 3650-3700 MHz*](#), the 3650-3700 MHz band is licensed on a shared all-come, all-served basis. These licences are issued on a [Tier 4](#) basis for a one-year term and can be renewed annually. As of August 2020, there were 1128 licences issued to 338 licensees. ISED's current data shows that most licensees are using the spectrum to provide broadband Internet services, many to rural and remote communities.

39. **Fixed satellite service:** In SP 3650 MHz, ISED grandfathered the existing FSS earth stations operating in the 3650-3700 MHz band. WBS operators are required to coordinate with the grandfathered FSS earth station operators. New FSS earth stations in the 3650-3700 MHz band operate on a secondary basis so as not to constrain the implementation of wireless broadband services. In SP 3650 MHz, ISED also limited the authorization of new FSS earth stations to large antenna applications, such as gateways located in remote areas outside of urban centres. As of August 2020, there are no remaining grandfathered earth stations in ISED's Spectrum Management System (SMS) database.

6.2 Use of the 3700-4200 MHz band

40. The 3700-4200 MHz portion of the 3800 MHz band is allocated to fixed and fixed satellite services on a co-primary basis. In 2004, ISED published the Spectrum Utilization Policy SP 3-30 GHz, [*Revisions to Spectrum Utilization Policies in the 3-30 GHz Frequency Range and Further Consultation*](#). This policy maintained the designation of the 3700-4200 MHz band for FSS and fixed services, with coordination being carried out on a first-come, first-served basis. Receive-only earth stations may operate on a licence-exempt basis, but without protection from licensed fixed service systems.

6.2.1 Fixed satellite service

41. The 3700-4200 MHz band (space-to-Earth) is paired with the 5925-6425 MHz band (Earth-to-space) and together are called the "C-band." Earth station operations may be two-way, with the transmit portion in the paired upper band, or receive-only in the 3700-4200 MHz band.

42. There are two main uses of the FSS in this band. The first is the distribution of broadcast programming, including television and radio. Content is distributed through satellites to and from content creators, broadcasting undertakings, and cable companies. Foreign television programming is also transmitted, via satellite, directly to consumers and organizations. Although a significant portion of the satellite video and radio distribution networks in Canada has migrated to higher frequency bands, the 3700-4200 MHz band continues to be used for the distribution of video signals due to its continental coverage and propagation characteristics. A single satellite feed can be distributed cost effectively to multiple locations as required.

43. The FSS in this band also provides connectivity in remote areas, where fibre or terrestrial wireless connections are not practical or economically feasible. As such, multiple communities, many of them located in the North, are dependent on satellite services for broadband connectivity, Internet access and telephony. Enterprises also use satellite services for various applications such as virtual private networks (VPN), banking terminals, and communications with oil platforms.

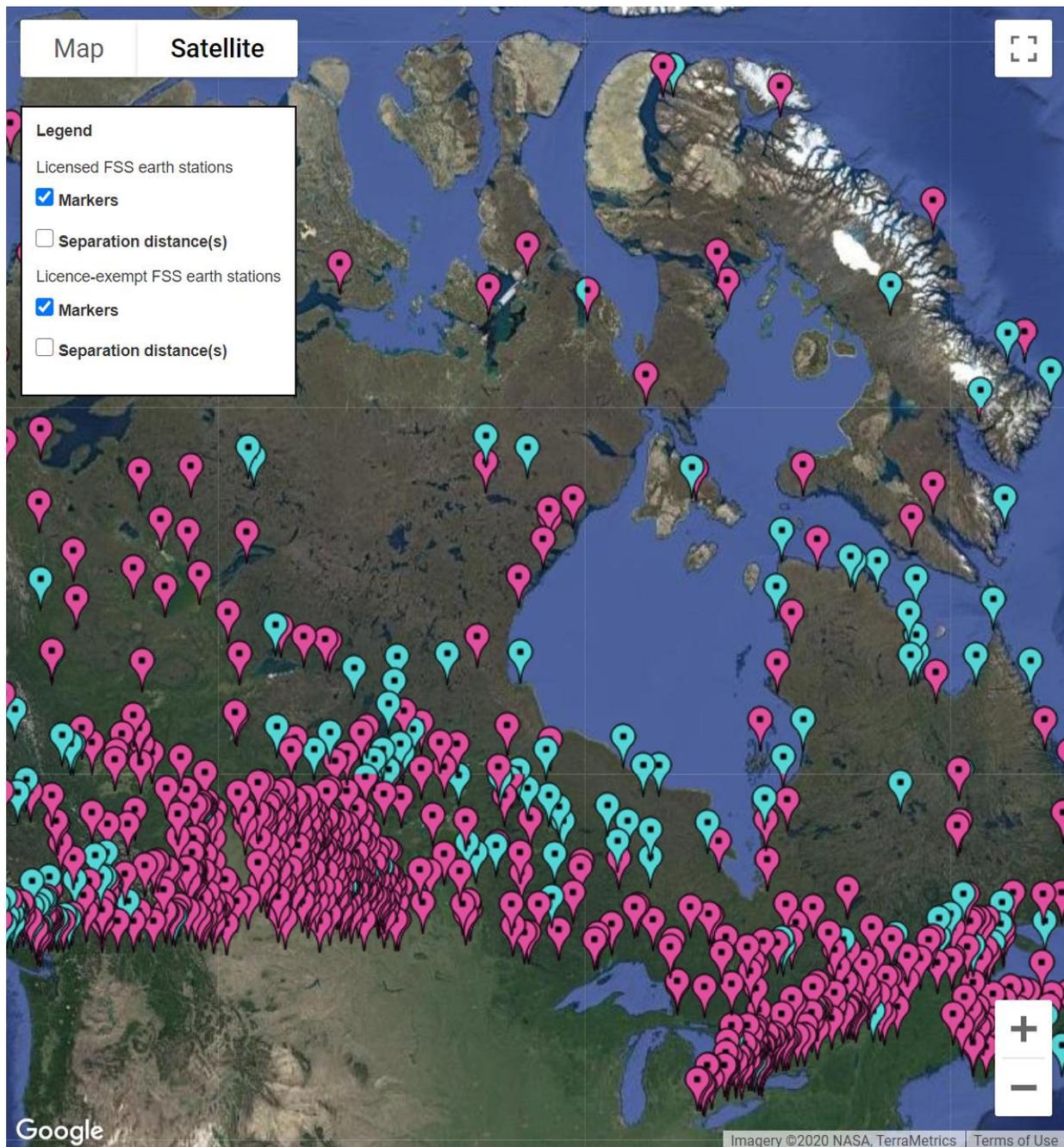
44. Satellites operating in the 3700-4200 MHz band communicate with both licensed and licence-exempt earth stations, which are located throughout the country covering urban, rural and remote areas. As of August 2020, there were 534 licensed earth stations in ISED's SMS database. The majority of these licensed earth stations communicate with three satellites operated by Telesat; the remaining licensed earth stations communicate with 16 foreign satellites. The expected end-of-life of each of Telesat's satellites varies with: Anik F2 ending in 2023, Anik F3 ending in 2024, and Anik G1 ending in 2032, however, the end dates may be extended.

45. In June 2019, ISED published a Spectrum Advisory Bulletin SAB-001-19, [Request for Information on Fixed Satellite Service \(FSS\) Earth Stations Operating in the 3700-4200 MHz Band](#), requesting that operators of FSS earth stations (both licensed and licence-exempt) in the 3700-4200 MHz band provide information on their stations. This request for information included television receive-only (TVRO) earth stations for the reception of satellite television direct to users from FSS satellites. Through this process, ISED was able to identify many licence-exempt receive-only earth stations, noting that all licence-exempt earth stations may not have been captured in this process.

46. Over 2500 licence-exempt receive-only earth stations were identified by operators and individual users in response to SAB-001-19. Most stations were identified by media companies, including Bell Media, CBC/Radio-Canada, Bell ExpressVu, Rogers Communications Canada Inc., Corus Entertainment and Shaw Communications Inc. for the reception of television and radio content. Other earth stations were identified by regional cable networks, other media networks and religious institutions. These earth stations receive transmissions from 45 foreign satellites operated by five companies (ABS Telecom, SES S.A, ARSAT, Eutelsat Communications and Intelsat).

47. Figure 2 shows the distribution of these earth stations across Canada. Licensed earth stations are represented in turquoise and licence-exempt earth stations are represented in pink. In some cases, earth stations are co-located and are only represented by one marker.

Figure 2: Licensed and licence-exempt FSS earth stations



48. ISED is seeking further information on constructed and operational licence-exempt receive-only earth stations in the 3700-4200 MHz band that were not submitted through SAB-001-19, by extending the timeframe of this SAB. Operators are requested to submit information by **November 30, 2020**. ISED may make the submitted information available on its website.

6.2.2 Fixed service

49. The 3700-4200 MHz band was used extensively in the 1970s and 1980s for fixed services, for high-capacity, point-to-point microwave systems. However, fixed use of this band is currently minimal with only two systems in operation as listed in annex A. These site-licensed systems include one point-to-point operation licensed for four links, and one point-to-multipoint operation. These systems operate in remote areas within Tier 4-104 (Kenora/Sioux Lookout, Ontario) and Tier 4-131 (Medicine Hat/Brooks, Alberta).

7. Changes to the spectrum utilization for the 3800 MHz band

50. Mid-band spectrum is important for next generation wireless services due to its favourable propagation and capacity characteristics. As noted earlier, ISED recently implemented a flexible use licensing model for the 3500 MHz band allowing for the deployment of both fixed and mobile services. The capacity of flexible use networks in the 3500 MHz band could be further increased by making portions of spectrum within the 3650-4200 MHz band available for similar use. ISED is of the view that repurposing portions of the 3650-4200 MHz band that would allow for a similar flexible use licensing model would foster more efficient and intensive use of mid-band spectrum to facilitate and incentivize investment in next generation wireless services.

51. ISED recognizes that sufficient and appropriate spectrum resources should be available to ensure that Canadians continue to benefit from advancements in wireless technology. Internationally, it is recognized that access to additional spectrum is needed to meet the exponentially increasing demand for wireless services. As discussed in section 5, several countries have been considering portions of 3650-4000 MHz for commercial mobile services and most recently, the U.S. decided to introduce fixed and mobile services in the 3700-4000 MHz band. Given the demand for mid-band spectrum and the expected availability of a 5G equipment ecosystem, ISED is proposing changes to the spectrum utilization of the 3800 MHz band.

7.1 Introduction of mobile service in the 3700-4000 MHz band

52. Traditionally, Canada has worked closely with the international community to harmonize frequency allocations and has sought to harmonize the use of spectrum through the adoption of common industry equipment standards. This approach allows for economies of scale in equipment manufacturing and, when aligned with the U.S., facilitates cross-border coordination of spectrum use.

53. Frequency allocations are an important first step in developing spectrum utilization policies that foster the implementation of new radiocommunication services. Modifications to the CTFA are implemented as required to enable the introduction of new wireless services that benefit Canadians and respond to marketplace demands.

54. The 3700-4000 MHz band is currently allocated to FSS and fixed service on a primary basis. In order to enable the release of additional flexible use spectrum in response to the growing demand for commercial mobile services, ISED is proposing to add a primary mobile service allocation to the 3700-4000 MHz band in the CTFA with the proposed changes detailed in annex B. ISED further proposes to align this primary mobile allocation with the International Telecommunications Union Radiocommunications Regulations (i.e. “MOBILE except aeronautical mobile”).

55. Allowing mobile use in the 3700-4000 MHz band would also allow Canada to consider aligning with the policy and licensing decisions in the U.S. It would also enable the harmonization of the use of spectrum through the adoption of common industry equipment standards allowing for economies of scale in equipment manufacturing. The addition of mobile service to the CTFA would be considered a fundamental reallocation.

Q4

ISED is seeking comments on the proposal to add a primary mobile service, except aeronautical mobile, allocation in the 3700-4000 MHz band to the CTFA and the specific changes shown in annex B.

In providing comments, respondents are requested to include supporting arguments and rationale.

7.2 Flexible use in the 3650-4000 MHz band

56. As discussed above, for the 3500 MHz band, ISED adopted a flexible use licensing model. Under a flexible use licensing model, licensees are permitted to deploy mobile and/or fixed services using the same spectrum licence.

57. The 3650-4000 MHz band provides opportunities to promote innovation and early adoption of 5G technologies under a flexible use licensing model. Flexible use licensing would enable licensees to better align their services to the needs of their customers. This approach is intended to enable new technology and innovations to evolve, while supporting a variety of different needs and use cases, such as broadband for high-speed Internet, and support the growing demand for new 5G services. As such, subsequent to the mobile service allocation discussed in section 7.1, ISED is proposing to also allow flexible use in the 3650-4000 MHz band.

Q5

ISED is seeking comments on developing a flexible use licensing model for fixed and mobile services in the 3650-4000 MHz band.

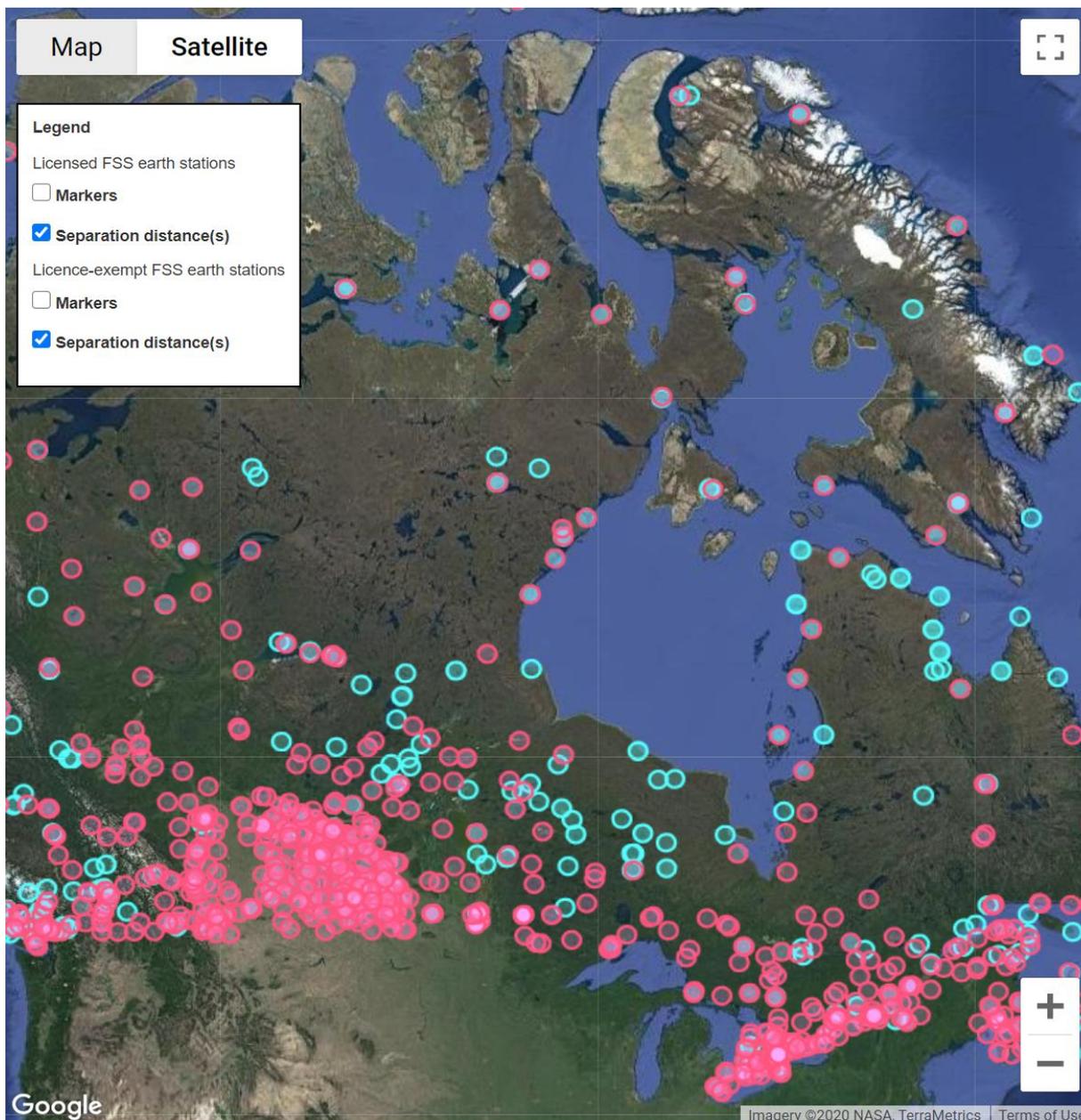
In providing comments, respondents are requested to include supporting arguments and rationale.

7.3 Changes to the FSS use in the 3700-4200 MHz band

58. FSS earth stations in the 3700-4200 MHz band receive relatively weak signals from satellites. Transmissions from flexible use operations in the same frequency band or in adjacent bands could create harmful interference to FSS receivers if protection measures are not implemented.

59. Studies undertaken by ISED have demonstrated that, without other mitigation measures, to protect FSS earth stations from co-frequency flexible use operations, a separation distance of about 60 km around the FSS earth station may be required in Southern latitudes. Larger separation distances may be required to protect FSS earth stations located at latitudes of about 60°N and increasing separation distances with higher latitudes. The separation distances in Northern regions are larger to account for the lower pointing elevation angle, which increases the receive antenna gains towards the horizon in the beam's pointing direction, thus increasing the level of interference received. Based on ISED's available station information, a separation distance of 60 km around each earth station is depicted for illustrative purposes only, as shown in figure 3.

Figure 3: Illustrative separation distances of licensed and licence-exempt FSS earth stations



60. Both licensed and licence-exempt earth stations are deployed ubiquitously throughout Canada. The separation distances that would be required to protect FSS earth stations, especially in and around population centres, would preclude flexible use in many areas of the country. Although with coordination and mitigation measures, co-frequency sharing could still be achieved in some areas, co-frequency sharing across Canada would not be efficient in general.

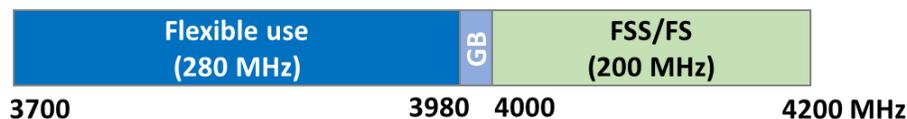
61. **Harmonization of FSS use in Canada and the United States:** As noted in section 5, the FCC is allocating the 3700-4000 MHz band for flexible use, of which 280 MHz between

3700-3980 MHz will be auctioned in the contiguous U.S. Another 20 MHz from 3980-4000 MHz will serve as a guard band. Existing satellite operations will be repacked into 200 MHz from 4000-4200 MHz band. The 280 MHz of spectrum is expected to be transitioned to flexible use no later than December 5, 2023. Further details of the U.S. transition timelines are provided in section 9.4. FSS operations in the full band will continue in areas that are not part of the contiguous U.S. such as Alaska, Hawaii and Puerto Rico, reflecting the importance of satellites in those areas.

62. In its Report and Order, the FCC noted that all incumbent space station operators who responded to the FCC space-station data collection agreed that the upper 200 MHz portion of the band provides a sufficient amount of spectrum to support their services. However, they also indicated that five additional satellites would be required in order to transition by the deadline.

63. Subsequent to significant technical study and input from industry, the FCC implemented a 20 MHz guard band to protect earth stations from harmful interference. Figure 4 represents the final band plan for 3700-4200 MHz in the contiguous U.S. after FSS transition.

Figure 4: New U.S. band plan for 3700-4200 MHz after FSS/FS transition



64. ISED has observed that there is a trend in the global satellite industry of shifting towards higher frequencies, such as the Ku and Ka bands in 12-18 GHz and 26-40 GHz respectively, and that the demand for the use of satellites operating in the 3700-4200 MHz band is decreasing. ISED expects this trend to continue as options for connectivity using alternate technologies such as high throughput satellites and LEO satellite systems in other bands, also continue to develop. Based on this and the experience in the U.S., ISED expects that 200 MHz of spectrum for FSS (4000-4200 MHz) would be sufficient for the current operators to continue to provide services to most areas in Canada.

65. Thus, in order to maximize the benefits of allowing flexible use in the 3700-4200 MHz band, ISED is proposing to segment the 3700-4200 MHz band between flexible use and FSS as shown in figure 5. Specifically, ISED proposes to segment this band so flexible use systems can be deployed in the 3700-3980 MHz portion of the band, as detailed in the following sections of this consultation. Based on this proposal and the decline of demand for FSS operations in the C-band, ISED is of the view that the authorization of new FSS earth stations in all areas of Canada should also be limited to the 4000-4200 MHz band. Consequentially, ISED is proposing that no new FSS earth stations be authorized in the 3700-4000 MHz band in the future. The relative obligations and/or rights to protection for authorized FSS earth stations in the 3700-4200 MHz band are detailed in sections 9 and 10. Licence-exempt receive-only FSS earth stations could continue operating across Canada on a no-protection basis.

66. **Guard band between flexible use and FSS in the adjacent 4000-4200 MHz band:** The FCC established a 20 MHz guard band (3980-4000 MHz) to protect FSS from future

flexible use after extensive consultation and study. In addition to imposing a 20 MHz guard band, the FCC also imposed additional technical restrictions on flexible use stations to address adjacent band coexistence with FSS. These technical restrictions and possible approaches that may be taken in Canada to address the protection of FSS earth stations are described in section 10.

67. Having reviewed the U.S. consultation and studies, and given that the existing FSS use and the planned future flexible use is similar in Canada, ISED is of the view that a 20 MHz guard band should also be implemented to protect FSS earth station operations in the 4000-4200 MHz band from harmful interference from the proposed future flexible use operations in the 3700-3980 MHz band.

68. Based on the proposals described above, ISED is seeking comments on the new proposed 20 MHz guard band (as shown in figure 5) in order to protect licensed FSS operations in the 4000-4200 MHz band.

Figure 5: Proposed new spectrum utilization plan for new FSS/FS and flexible use



69. **Maintaining FSS services in satellite-dependent areas:** Many rural and remote communities depend on satellite services for telephony and broadband connectivity. Although there is a trend towards using higher frequencies as they provide a larger capacity, ISED notes that the propagation characteristics and existing infrastructure for FSS in 3700-4200 MHz have made the band important for providing telecommunications, media and Internet to these communities.

70. In the U.S., the FCC acknowledged the ongoing importance of using satellite services operating in specific areas and identified areas with a greater need for satellite services in 3700-4200 MHz band, particularly services necessary for the protection of life and property, telehealth and education. In the identified areas, FSS in 3700-4200 MHz remains the most effective option available to provide reliable basic telephone and broadband services. As a result, the FCC made the decision to maintain FSS operations in the 3700-4200 MHz band in these areas, to ensure sufficient capacity for services in more remote areas outside of the contiguous U.S., such as Hawaii, Alaska and Puerto Rico.

71. Similarly, Canada also has a number of rural, remote and northern communities, where there is a strong reliance on satellites to deliver essential communication services. As such, ISED proposes to maintain the allocation to FSS in 3700-4200 MHz in the CTFA such that existing fixed satellite services can continue to be provided in satellite-dependent areas. The definition of which areas should be considered satellite-dependent is discussed in section 9.3. This means that existing authorized FSS earth stations would continue to be licensed for the entire 3700-4200 MHz band in satellite-dependent areas. However, as proposed above, the authorization of

new FSS earth stations in satellite-dependent areas would be limited to the 4000-4200 MHz band.

Harmonization of FSS use

Q6

Given the proposal in section 7.2 on developing a flexible use licensing model for fixed and mobile services in the 3650-4000 MHz band, ISED is seeking comments on the proposal that no new FSS earth stations be authorized in the 3700-4000 MHz band in the future and that the authorization of new FSS earth station licences be limited to the 4000-4200 MHz band.

Guard band between flexible use and FSS

Q7

ISED is seeking comments on the proposal to implement a 20 MHz guard band between 3980-4000 MHz to protect FSS operations in 4000-4200 MHz band from proposed flexible use operations in the 3700-3980 MHz band.

Maintaining FSS services in satellite-dependent areas

Q8

ISED is seeking comments on the proposal to maintain a primary allocation to FSS in the entire 3700-4200 MHz band and the proposal that existing FSS earth stations in satellite-dependent areas remain licensed in the entire 3700-4200 MHz band.

Q9

ISED is seeking comments on the future demand for C-band in rural and remote areas such as the North, including the following:

- a) the trend towards using higher frequencies by FSS operations to provide broadband connectivity
- b) the ability of using higher frequencies to replace current C-band capacity and the potential timelines
- c) the possibility of a trend towards using 4000-4200 MHz in combination with other connectivity options (e.g. higher frequencies satellites or wireline solutions) and when it would be expected to be available for satellite-dependent areas

Q10

In addition to capacity requirements, ISED is seeking comments on other issues that should be considered in maintaining broadband connectivity in satellite-dependent areas.

In providing comments, respondents are requested to include supporting arguments and rationale.

7.4 Change in status of FSS in 3500-3700 MHz

72. The following paragraphs detail the change in status of FSS in two band segments, 3500-3650 MHz and 3650-3700 MHz.

7.4.1 Change in status of FSS in 3500-3650 MHz

73. As ISED continues to undertake initiatives to repurpose portions of spectrum between 3500 and 4200 MHz for flexible use, it is timely to address the status of FSS in the 3500-3650 MHz band. There are currently only two earth stations in operation and they are listed in annex C.

74. In 2003, the 3475-3650 MHz became available for fixed wireless access (FWA) and FSS earth stations operating in the 3500-3650 MHz band prior to 2003 were grandfathered. At the time, footnote C20 in the CTFA was adopted to limit deployment of new FSS earth stations to locations that would not constrain the deployment of FWA. Footnote C20 was modified to also include mobile systems as part of the [Decisions Regarding Policy Changes in the 3500 MHz Band \(3475-3650 MHz\) and a New Licensing Process](#), published in 2014. This modification reflects the decision to add mobile services to the 3475-3650 MHz band, which was considered a fundamental reallocation.

75. Given the decisions that have already been made, the initiatives underway to repurpose spectrum, and the limited FSS use in the band, ISED proposes to remove the primary FSS allocation from 3500-3650 MHz, as shown in annex B. ISED believes that removing this FSS allocation aligns with the policy decisions made in the 3500 MHz band and policies being proposed in this consultation. Through Standard Radio System Plan SRSP-520, [Technical Requirements for Fixed and/or Mobile Systems, Including Flexible Use Broadband Systems, in the Band 3450-3650 MHz](#), provisions have been in place concerning coordination between existing FSS earth stations and new flexible use stations. Specifically, fixed spectrum licensees or flexible use spectrum licensees planning to establish fixed or mobile systems within 80 km of FSS earth stations (80 km zone) in the 3500-3650 MHz band are required to coordinate with earth station licensees. This 80 km zone excludes any area that overlaps a large or medium population centre. Therefore, ISED proposes that the two earth stations be grandfathered and their existing operations be protected in accordance with these provisions within the 3500-3650 MHz band until the end of life of the existing satellites. ISED further proposes to suppress Canadian footnote C20 in the CTFA accordingly.

Q11

ISED is seeking comments on its proposal to remove the FSS allocation in the 3500-3650 MHz band and to suppress Canadian footnote C20 in the CTFA as detailed in annex B. In addition, ISED is seeking comments on the proposed grandfathering of the existing earth station operations listed in annex C, such that fixed or mobile stations in the 3500-3650 MHz band will be required to coordinate with these earth stations as specified in SRSP-520.

In providing comments, respondents are requested to include supporting rationale and arguments.

7.4.2 Change in status of FSS in 3650-3700 MHz

76. Although there is a primary allocation to FSS in the CTFA, footnote C33 stipulates that any new FSS earth stations as of June 2009 are required to operate on a secondary basis so as not to constrain the deployment of WBS systems in 3650-3700 MHz. In addition, the authorization of new FSS earth stations for large antenna applications, such as gateways, is limited to remote areas outside of urban centres.

77. Given the proposals outlined in this consultation to introduce flexible use in the 3650-3700 MHz band, and taking into consideration that there are no longer any grandfathered FSS stations in the band, ISED proposes to remove the primary FSS allocation from 3650-3700 MHz, and suppress Canadian footnote C33, as detailed in annex B. ISED is of the view that removing this FSS allocation aligns with the policies being proposed in this consultation.

Q12

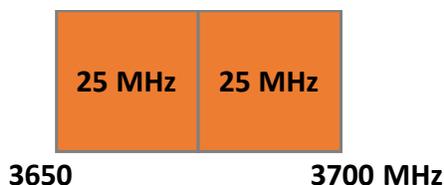
ISED is seeking comments on its proposal to remove the primary FSS allocation from 3650-3700 MHz and suppress Canadian footnote C33 in the CTFA as detailed in annex B.

In providing comments, respondents are requested to include supporting rationale and arguments.

8. Block sizes in the 3650-4000 MHz band

78. **Changes to the block sizes in 3650-3700 MHz:** As specified in SRSP-303.65, [Technical Requirements for Wireless Broadband Services \(WBS\) in the Band 3650-3700 MHz](#), the current band plan for WBS includes two unpaired 25 MHz blocks as depicted in figure 6, with restrictions on the use of the upper block in urban areas to equipment that employs unrestricted contention-based protocols (e.g. WiMAX).

Figure 6: Current WBS band plan



79. ISED recognizes that the existing 3650-3700 MHz band plan and the current restrictions discussed above for WBS systems do not provide for optimal licensing of systems using the anticipated future 5G equipment.

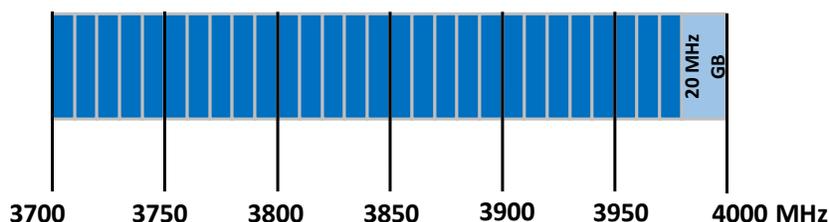
80. Today, all LTE and 5G equipment available for the 3650-3700 MHz band is based on TDD technology. For this reason, ISED is proposing a band plan composed of five unpaired blocks of 10 MHz as depicted in figure 7, which provides a channel spacing size supported by both LTE and 5G. The adoption of the proposed band plan does not preclude ISED from licensing blocks as aggregated packages of multiples of 10 MHz blocks to facilitate large bandwidth channels for 5G technologies.

Figure 7: Proposed block sizes for the 3650-3700 MHz band



81. **Proposed block sizes for the 3700-3980 MHz band:** The FCC adopted a band plan with unpaired blocks of 20 MHz for their flexible use licences in the 3700-4200 MHz band. ISED recognizes that all LTE and 5G equipment available for the 3700-3980 MHz band will be based on TDD technology and can operate using a 10 MHz channel bandwidth. For this reason, ISED is proposing a band plan composed of 28 unpaired blocks of 10 MHz in 3700-3980 MHz and one 20 MHz GB in 3980-4000 MHz as depicted in figure 8, which provides a channel spacing size supported by both LTE and 5G NR. The adoption of the proposed band plan does not preclude ISED from licensing blocks as aggregated packages of multiples of 10 MHz blocks to facilitate large bandwidth channels for 5G technologies.

Figure 8: Proposed block sizes for the 3700-3980 MHz band



Q13

ISED is seeking comments on:

- a) establishing unpaired blocks of 10 MHz for the 3650-3700 MHz band
- b) establishing unpaired blocks of 10 MHz for the 3700-3980 MHz band

In providing comments, respondents are requested to include supporting rationale and arguments.

9. Treatment of existing users

82. The following sections discuss the treatment of various incumbent users.

9.1 WBS systems in 3650-3700 MHz

83. This section discusses the proposed treatment of WBS incumbents in 3650-3700 MHz including the proposed transition process.

9.1.1 Proposal for treatment of WBS incumbents

84. ISED recognizes that WBS is a popular band for providing fixed-wireless high-speed broadband access in rural and remote areas, and other services such as automatic meter reading and video surveillance, due to the current low barrier licensing process and lack of licence fee. ISED aims to support the continued role of WISPs in providing high-speed broadband connectivity to Canadians in rural areas, particularly as expectations for broadband Internet rise to speeds of 50 Mbps download and 10 Mbps upload (50/10 Mbps) and beyond. With the lower adjacent band having been repurposed and the proposed repurposing of the upper adjacent band, this is an opportune time to consider long-term solutions that increase the efficient use of the band while considering the spectrum needs of WISPs that provide high-quality services to Canadians.

85. Under the current rules, there is no limit on the number of WBS licences that may be issued for the same spectrum and geographic area. Existing WBS stations are deployed in various densities in urban, rural and remote areas and often have overlapping coverage. Licensing is on an all-come, all-served basis and all licences have equal access to the spectrum. ISED recognizes that there have been some challenges (e.g. coordination between licensees and a limited availability of spectrum) in the WBS band due to these licensing procedures. ISED is of the view that with the current licensing process and changes to the available equipment ecosystem, these issues will continue and potentially worsen as operators expand their systems and/or upgrade their equipment to new LTE or 5G technologies. These developments are expected to increase the challenges of inter-user coordination as the existing interference environment may densify and create potential coordination challenges that may necessitate changes and could require licensees in the same area to upgrade their equipment at the same time to maintain services.

86. Furthermore, coordination between systems within the 3650-3700 MHz band and expected flexible use systems in the adjacent bands could be challenging if the existing WBS rules are maintained. ISED is of the view that additional technical or operational constraints would be required (e.g. guard bands) on the band edges of the 3650-3700 MHz band to minimize the potential of interference between flexible use licensees in the adjacent bands and licensees in the 3650-3700 MHz band. These additional constraints would reduce the amount of spectrum available for both the 3650-3700 MHz band as well as the adjacent bands.

87. ISED is considering two options to address the future use of the 3650-3700 MHz by WBS licensees. Option 1 allows WBS licensees to remain in 3650-3700 MHz but subject to new technical rules that would also align with the proposed block sizes and increase the efficiency of the band for flexible use. Option 2 displaces WBS licensees from 3650-3700 MHz while introducing a new licensing process for a portion of the 3800 MHz band, specifically in the frequency range 3900-3980 MHz, which would optimize the 3800 MHz band for flexible use while giving WISPs a means of accessing alternate spectrum.

88. Under Option 1, ISED would maintain the current all-come, all-served licensing process and the requirement for licensee to licensee coordination. Option 1 would allow eligible current licensees to continue providing services in the 3650-3700 MHz band under a new flexible use licence after a transition process. ISED recognizes that in order to better reflect advances in technologies and enable Canadians access to such technologies, as well as to ensure efficient use of a scarce resource, the current technical rules would have to be updated. ISED would impose new flexible use technical rules such as mandating TDD synchronization, imposing guard bands and/or reducing the power levels allowed in the band to facilitate sharing between licensees within the band and coexistence with licensees in adjacent bands. Licensees currently operating LTE equipment might be able to change their software to meet the new technical rules. Licensees with older technology systems would likely be required to invest in new equipment to meet the new technical rules.

89. Under Option 2, ISED would establish a displacement period and process for existing WBS licensees and include the 3650-3700 MHz band in a future competitive process for flexible use licences (i.e. as part of the auction of the 3800 MHz band). Option 2 also proposes to designate a portion of the 3800 MHz band for a new shared spectrum licensing process that would provide access to spectrum for flexible use systems in the frequency range 3900-3980 MHz, which would provide 80 MHz of spectrum for these operations. However, ISED recognizes that existing WBS licensees would likely have to invest in new equipment to use this new band, as existing equipment would not be able to tune to the 3900-3980 MHz band. Current WBS licensees could be eligible for a new licence in this portion of the band through a transition process. Details on the conditions of licence and the licensing process would be part of a future consultation.

90. ISED is of the view that Option 2 would provide long-term stability throughout the full 3450-3980 MHz range as it will allow for more efficient use of the spectrum for future 5G applications by supporting access to a standardized equipment ecosystem across the band. In addition, the new licensing process would provide increased certainty for both existing and new licensees. As such, ISED is proposing to implement Option 2.

91. Under the existing sharing rules and equipment restrictions, WBS operators may experience challenges in meeting the announced targeted speeds of at least 50/10 Mbps for Canadian homes and businesses. The proposed changes would align with the new equipment ecosystem and would provide additional spectrum for flexible use, increasing opportunities for existing or new operators to deploy systems in rural and remote areas that can provide the

targeted 50/10 Mbps, and potentially higher speeds given the large blocks of spectrum that would be available through a new licencing process.

92. ISED recognizes that achieving the target of at least 50/10 Mbps may be economically challenging in rural and remote areas. As such, funding through the Universal Broadband Fund (UBF) has been made available through the federal budget to support broadband in rural and remote areas. Certain costs of transitioning to a new frequency band and upgrading equipment in order to achieve speeds of at least 50/10 Mbps could be considered eligible costs for successful applicants under the UBF. Given the proposal to implement Option 2, ISED is seeking information on potential costs that may be incurred by WISPs currently operating in the 3650-3700 MHz band, in order to provide services using the 3900-3980 MHz band.

93. In addition to the 3500 and 3800 MHz bands, existing licence-exempt or lightly licensed frequency bands with low regulatory barriers could facilitate the delivery of applications similar to those in the current WBS band. WBS licensees that are displaced could also choose other bands that are either available or may become available in the near future. For example, the higher power and outdoor RLAN devices (HPODs) band from 5150-5250 MHz is accessible under a light-licence regime and access to unused television channels is expected to be available on a licence-exempt basis using white space devices. In addition, ISED had been monitoring the U.S. process for the 5925-7125 MHz (6 GHz) band. In the Spectrum Outlook, ISED classified this band as a Priority 3 with a plan to monitor international activities, given that discussions in the U.S. had just begun at the time of its publication. However, ISED now considers the 6 GHz band as Priority 1 based on the developments taking place internationally, and will be developing a consultation on making this spectrum available in Canada.

94. ISED's proposal to implement Option 2 and its plans to make additional spectrum available in the near term will support the national connectivity target of 50/10 Mbps while providing time for existing licensees to deploy systems that are able to meet those targets.

Q14

Subsequent to changes to the spectrum utilization described in section 7 and recognizing the need to change the current WBS licensing model, ISED is seeking comments on its proposal to displace the existing WBS licensees and designate 80 MHz of spectrum available for the development of a new shared licensing process in the 3900-3980 MHz band as described in Option 2. Specifically, ISED is seeking comments on:

- a) the amount of spectrum proposed (80 MHz) under a shared spectrum licensing process
- b) whether there should be a provision that allows certain users (e.g. existing WBS licensees) priority licensing (e.g. an initial application window before accepting applications from others)

Preliminary comments on a future shared spectrum licensing process are being sought in section 9.1.4 below.

Q15

Given the proposal to implement Option 2, ISED is seeking information on potential costs such as upgrading equipment, which may be incurred by WISPs that are displaced from 3650-3700 MHz to provide services using the 3900-3980 MHz band.

In providing comments, respondents are requested to include supporting rationale and arguments.

9.1.2 Proposed transition period for the displacement of WBS licensees

95. If a decision is made to proceed with the changes in Option 2 noted above, a transition period would be established. ISED is proposing a transition period for WBS incumbents that balances two objectives: i) providing timely access to flexible use spectrum in order to facilitate the introduction of 5G technologies for Canadians, and ii) supporting the provision of high-speed Internet to all Canadians.

96. In the U.S., the 3650-3700 MHz band was also available for WBS. In its process to change the use of the band described in section 5.1, the FCC protected their existing WBS deployments for up to five years, allowing time for these licensees to update equipment to align with the new rules.

97. ISED recognizes that many new flexible use licensees will be planning to launch mobile services in a timely manner, with the first deployments expected in large urban population centres. ISED notes that some WBS incumbents, in particular smaller operators in rural and remote areas, may face challenges with transitioning to new spectrum within a new band plan. In an effort to address the needs of the rural WBS incumbents and the needs of the new flexible use licensees wanting to deploy 5G services, ISED is considering a transition process and timelines that provide for expedited transition in urban areas and longer transition in rural areas. The proposed transition would minimize the potential disruption of existing services allowing additional time for rural licensees to continue operating at their current technical and operational parameters while they plan to move to the 3900-3980 MHz band or to alternative licence-exempt or lightly licensed frequency bands. As such, ISED is proposing a transition plan that will allow for the timely deployment of 5G services in urban areas while providing rural users with more time to transition their existing systems.

98. In some bands, for example the 3500 MHz and AWS bands, ISED has developed transition plans based on the “where and when necessary” principle. ISED is of the view that applying this principle to the existing WBS licences would be impractical. As discussed above, there are many licensees and many sites, often with multiple sites overlapping. This current state will make sharing between existing WBS operation and future flexible use operation very challenging across the whole 3450-4000 MHz range. Applying a where and when necessary approach where licensees are overlapping in the same area and have a licence for the same 50 MHz would mean transition would often be triggered throughout the whole tier when a future

flexible use licensee planned to deploy. ISED would normally impose a six-month to one-year notification period for a where and when necessary approach, however, ISED is of the view that this could be onerous for existing and new licensees to manage and create an uncertain business environment. As such, ISED is of the view that a fixed displacement date respects the needs of urban and rural users, and would provide certainty for existing licensees, allowing them to plan a move to other bands or apply for the proposed new licensing process.

99. In an effort to provide timely access to flexible use spectrum and to facilitate the introduction of 5G technologies for Canadians, while also accommodating the existing WBS operations in rural areas, ISED is proposing the following deadlines for the displacement of all WBS licensees:

- WBS operations in urban Tier 4 service areas would be displaced by December 2023
- WBS operations in all other areas would be displaced by December 2025

100. It should be noted that voluntary agreements between the new flexible use licensees and incumbent WBS licensees may be established to support mutually agreeable alternate displacement timelines. Coexistence between flexible use operations and FSS operations in the adjacent 3700-4200 MHz band is detailed in section 10.3.

101. ISED proposes that the 24 Tier 4 service areas that contain a [large population centre](#), as defined by the 2016 Census of Population from Statistics Canada, would be considered urban under this proposal (see annex D).

102. Under this proposal, prior to the displacement deadlines, WBS stations could continue to operate as per their technical and operational parameters that have been provided to ISED and would receive protection from new flexible use licensees operating in the 3650-3700 MHz band. Modifications to the stations in which the technical and/or operational parameters have been previously provided to ISED would be permitted. Coexistence with flexible use licensees in adjacent bands is detailed in section 10.2.

103. ISED believes that the proposed displacement deadlines would balance the development of 5G in urban areas where 5G is first expected to be deployed while recognizing that a longer timeline may be required for WBS licensees that are offering services in rural and remote areas.

Q16

Based on the proposal to implement Option 2, ISED is seeking comments on the proposed displacement deadlines, with WBS operations in urban areas being displaced by December 2023 and all others by December 2025. Respondents are invited to propose other protection and displacement options for consideration, provided they include a strong rationale.

Q17

ISED is seeking comments on the Tier 4 service areas that would be considered urban as defined above and as listed in annex D.

In providing comments, respondents are requested to include supporting rationale and arguments.

9.1.3 Moratorium on new WBS station deployments

104. As a result of the considerations and potential changes raised in this consultation, ISED is now placing a moratorium on the deployment of new WBS stations in urban Tier 4 service areas listed in annex D. Incumbent WBS licensees in these service areas will be able to renew their current licences on an annual basis and to operate existing stations but will not be allowed to deploy new stations. Similarly, ISED will no longer issue any new licences in urban Tier 4 service areas in the band effective the date of this consultation.

105. In order for current deployments in all service areas to be able to continue to operate and be protected going forward, licensees must provide ISED with their updated site-specific data as required under their conditions of licence as outlined in CPC-2-1-23, [Licensing Procedure for Spectrum Licences for Terrestrial Services](#). Licensees deployed in urban Tier 4 service areas that have not already provided their current site-specific data to ISED, are being requested to do so within the next 120 days in order to ensure that current deployments are not considered to be new deployments.

106. Accurate WBS station location is essential for coordinating interactions between and among users in the band and for protecting WBS incumbent users from harmful interference during the proposed transition periods. As such, ISED is also requesting that WBS licensees deployed in all other areas also provide their site data within the next 120 days. This information will provide further insight into the landscape of the WBS band and will assist ISED in developing a decision as it relates to the future of the WBS band and its licensees.

Decision 1

Effective the date of this consultation, a moratorium is in place on the deployment of new WBS stations in urban Tier 4 service areas listed in annex D. As of the date of this consultation, incumbent WBS licensees in these areas will be able to operate existing stations only. Similarly, ISED will no longer issue any new licences in these areas as of the date of this consultation. Incumbent WBS licensees in these areas will be able to renew their annual licences.

ISED is requesting that all WBS licensees in all licence areas provide up-to-date site-specific data as required under their conditions of licence within the next 120 days.

Licensees in urban Tier 4 service areas must have provided ISED with the site data for existing deployments or must do so within the next 120 days following the publication of this consultation in order to ensure that their deployments are to be considered as “existing deployments” in the context of this consultation.

Q18

ISED is seeking comments on whether the moratorium should be extended to include all Tier 4 service areas.

In providing comments, respondents are requested to include supporting arguments and rationale.

9.1.4 Initial consideration of the shared spectrum licensing process for 3900-3980 MHz

107. ISED recognizes that access to spectrum is often a challenge, particularly for small WISPs in rural areas. Furthermore, as discussed in section 5, other countries have made additional spectrum available to enable innovation and the introduction of new uses for vertical industries such as utilities, mining, manufacturing and health care. Having continued access to spectrum with minimal barriers to entry is critical for wireless innovation and helps to support Canada's goal to be at the forefront of 5G innovation. This in turn will enable Canadians to leverage the benefits of new technologies and applications as they emerge over the next 10 years.

108. As described in Option 2 above and with due consideration to the policy objectives listed in section 3, ISED is proposing to make 80 MHz of spectrum available within the 3900-3980 MHz frequency range through a shared spectrum licensing process.

109. ISED expects that the use cases for the 3900-3980 MHz frequency range would include:

- fixed wireless access systems to provide faster Internet speeds in rural, remote, and northern communities, including indigenous communities
- private networks to support vertical industries such as industrial automation (e.g. farming, manufacturing, mining)
- private broadband networks on enterprise campuses (e.g. universities/colleges, stadiums, shopping centres, office buildings, etc.)

110. As described in Option 2, the proposed amount of 80 MHz of spectrum would not be licensed through the planned upcoming auction, but rather through an alternate shared licensing process. In order to inform the development of the future consultations and proposals, ISED is seeking preliminary comments on the policy, technical and operational considerations for this spectrum.

111. Given the amount of spectrum available, its potential for fostering innovation, and the international trend of alternate spectrum access models, ISED believes this spectrum could be made available for uses such as high-speed Internet in rural and remote areas and new innovative operations as outlined above. It should be noted that in satellite-dependent areas, where earth stations could continue to operate over the full range of the 3700-4200 MHz band, deployment in certain geographical areas may be limited, restricted or require coordination in order to protect the existing FSS operations.

Q19

ISED is seeking preliminary comments on the future spectrum licensing process for 3900-3980 MHz, including the following:

- a) what type of applications are envisioned for this spectrum
- b) what type of shared licensing process ISED should consider (e.g. database approach, licensee to licensee coordination)
- c) what additional measures ISED should consider employing to manage access to the band in high demand areas, such as major metropolitan centres
- d) what technical restrictions should be considered (e.g. technical rules similar to adjacent 3500 MHz flexible use band with reduced power levels, a guard band between new flexible use systems below 3900 MHz, shared use above 3900 MHz, etc.)
- e) what type of eligibility criteria, if any, should be established

In providing comments, respondents are requested to include supporting rationale and arguments.

9.2 FSS earth stations in 3650-3700 MHz

112. The following paragraphs discuss treatment of FSS earth stations operating in 3650-3700 MHz band.

9.2.1 Proposal for treatment of FSS incumbents in 3650-3700 MHz

113. Through the SP 3650 MHz, which was released on June 11, 2009, ISED grandfathered the existing FSS earth stations that were operating in the 3650-3700 MHz band. A list of these earth stations can be found in SAB-001-09, [*Revised List of Grandfathered Fixed Satellite Service \(FSS\) Receive Earth Stations in the Band 3650-3700 MHz*](#). However, as noted in section 6, there are no remaining grandfathered earth stations in ISED's SMS database. As such, ISED is rescinding SAB-001-09.

Decision 2

ISED is rescinding SAB-001-09, [*Revised List of Grandfathered Fixed Satellite Service \(FSS\) Receive Earth Stations in the Band 3650-3700 MHz*](#).

114. The SP 3650 MHz also limited the authorization of new FSS earth stations to large antenna applications, such as gateways located in remote areas outside of urban centres. It also noted that any future FSS earth stations in this band would be authorized on a secondary basis. As such, existing FSS earth stations that are licensed in the 3650-3700 MHz band after June 11, 2009, are permitted to operate on a secondary basis.

115. Given the proposal in section 7.4 to remove the FSS allocation in the 3650-3700 MHz band, it is proposed that consistent with the current rules, existing FSS earth stations that were licensed after June 11, 2009, on a secondary basis with respect to WBS may continue to operate.

ISED proposes that these FSS earth stations operate on a no-protection basis with respect to new flexible use operations.

Q20

ISED is seeking comments on its proposal that existing FSS earth stations licensed in 3650-3700 MHz after June 11, 2009, be permitted to continue to operate on a no-protection basis with respect to proposed new flexible use operations.

In providing comments, respondents are requested to include supporting rationale and arguments.

9.2.2 Moratorium on new FSS earth stations in 3650-3700 MHz

116. As a result of the considerations and potential changes raised in this consultation, including in the 3650-3700 MHz band, effective as of the date of this consultation, a moratorium is placed on the licensing of new earth stations in 3650-3700 MHz. ISED will no longer issue new licences for earth stations in the 3650-3700 MHz band.

Decision 3

Effective the date of this consultation, a moratorium is in place on the licensing of new earth stations in the 3650-3700 MHz band.

9.3 Definition of satellite-dependent areas

117. As discussed in section 7.3, in considering the introduction of commercial mobile services in the 3700-4000 MHz band, and the transitioning of FSS to 4000-4200 MHz, ISED is conscious of the need to ensure that there is sufficient capacity to meet the ongoing needs of satellite-dependent areas. Consequently, as proposed in section 7.3, ISED is considering allowing licensed FSS operations in the 3700-4200 MHz band to continue in satellite-dependent areas.

118. As part of the mmWave Decision, ISED recognized the important and often critical role of satellite communications in providing broadband connectivity in rural and remote areas such as the North. Subsequently, the interim guideline GL-10, [*Interim Guideline for Licensing of Earth Stations in the Fixed-Satellite, Earth Exploration-Satellite and Space Research Services in the Frequency Bands 26.5-28.35 GHz and 37.5-40.0 GHz*](#), identified a preliminary list of Tier 4 areas that are exempted from certain provisions.

119. ISED is seeking to define the satellite-dependent areas where it would allow continued operations of licensed FSS in 3700-4200 MHz band. One approach would be to use the same Tier 4 areas that were identified in GL-10. The service areas identified in GL-10 were motivated by the demand for high capacity services in the mmWave bands balanced with the critical role of satellite communications in certain communities. However, given the different propagation characteristics and capacity of the 3700-4200 MHz band compared to the mmWave bands, ISED

recognizes that the areas identified in GL-10 may require adjustment for the 3700-4200 MHz band. ISED is seeking feedback on the possibility that these service areas could be further refined than the Tier 4 areas used in GL-10. For example, using the definitions in ISED's DGSO-006-19, [Decision on a New Set of Service Areas for Spectrum Licensing](#), which classifies new [Tier 5](#) service areas into four categories based on the 2016 Census (i.e. Metropolitan areas, Urban areas (medium and large population centres), Rural areas and Remote areas).

120. The definition of areas in GL-10 focused on service areas with low populations and remote communities. However, ISED recognizes that FSS earth stations in the 3700-4200 MHz have been used to provide connectivity to some industry operations in remote areas such as mines and oil and gas companies. Although ISED generally intends to define satellite-dependent areas as areas with low populations and remote communities, it recognizes that some industry operations may fall in areas that are in proximity to larger population centres in the same service area and may not be captured if the definition is based on communities. ISED is seeking comments on whether it should take into account these remote industry operations, for example offshore oil drilling platforms, when determining the definition of satellite-dependent areas.

Q21

ISED is seeking comments on whether the Tier 4 service areas identified for exemption of certain provisions in GL-10 for mmWave bands as listed in annex E would be appropriate to apply for FSS operations in the 3700-4200 MHz band. ISED invites alternative proposals for areas that would be considered satellite-dependent (e.g. based on Tier 5 categories).

Q22

ISED is seeking comments on whether certain remote industry operations, for example offshore oil drilling platforms, should be included in the definition of satellite-dependent areas.

In providing comments, respondents are requested to include supporting rationale and arguments.

9.4 FSS space station operations in 3700-4200 MHz

121. Existing space station licensees and foreign satellites operating in the 3700-4200 MHz band approved to provide service in Canada can be found in annex F. If the proposals described above are adopted, then ISED would consider changes to FSS space station operations.

122. CPC-2-6-02, [Licensing of Space Stations](#), specifies that to operate a satellite in the FSS authorized by ISED, an operator must apply for and obtain a spectrum licence. This licence relates to a specific satellite or satellites and authorizes the use of certain frequency bands, at a specific orbital position or orbit, over a certain area, for the provision of specified services. FSS satellites operating in the 3700-4200 MHz band are authorized for the full band and include coverage of visible Earth from the respective orbital location.

123. Foreign operators that provide FSS in Canada or that communicate with an earth station in Canada must be approved by ISED as per CPC-2-6-01, [Procedure for the Submission of](#)

[Applications to License Fixed Earth Stations and to Approve the Use of Foreign Satellites in Canada.](#)

124. As noted earlier, FSS operations in the contiguous U.S. are planned to be transitioned to 4000-4200 MHz by December 5, 2023. Given the adoption of the accelerated timelines, the band will be cleared in two phases. In the first phase, the lower 120 MHz (3700-3820 MHz) must be cleared in 46 partial economic areas (PEAs) by December 5, 2021. In the second phase, the lower 120 MHz must be cleared in the remaining PEAs, in addition to clearing the remaining 180 MHz by December 5, 2023. If the incumbents successfully transition their services to the upper portion of the band according to both deadlines, they will be eligible for accelerated relocation payments, paid for by the flexible use licensees, in addition to the reimbursement of costs incurred in the transition. ISED is of the view that aligning the Canadian transition deadline for FSS operations in non satellite-dependent areas with the 2023 deadline in the U.S. would be advantageous as it would minimize potential interference in the border areas. The availability of filters based on the U.S. timelines would also allow Canadian FSS operators to make the necessary adjustments to earth stations within that timeframe.

125. Recognizing that satellite footprints in this band can serve the North American market, U.S. transition timelines may determine the availability of Canadian services in the 3700-4000 MHz band, particularly for video and radio distribution. Furthermore, given that satellite operators providing broadcast content in the U.S. are also serving the Canadian market from the same satellites, these channels may be impacted in Canada regardless of any intervention from ISED.

126. For Canadian-licensed satellites, based on the proposed changes to FSS use in section 7.3, ISED proposes to modify the existing licences to limit operations to 4000-4200 MHz in all areas of Canada with the exception of satellite-dependent areas, as of December 2023 (the FSS transition deadline). ISED would continue to license space stations for the full 3700-4200 MHz band. However, FSS space station operations within Canada in non-satellite-dependent areas would be on a no-interference basis after the transition deadline and the conditions of licence would be adjusted to reflect the proposed coverage changes, including the possible removal of a high expectation of renewal for the 3700-4000 MHz portion of the band. There would be no coverage restrictions outside of Canada. ISED would make consequential amendments to CPC-2-6-02 and Radio Systems Policy RP-008, [Policy Framework for Fixed-Satellite Service \(FSS\) and Broadcasting-Satellite Service \(BSS\)](#), as appropriate.

127. For foreign-licensed satellites that are approved by ISED for service in Canada, it is proposed that existing approvals be amended to limit operations in 3700-4000 MHz in all areas of Canada with the exception of satellite-dependent areas, as of the transition deadline. Any operations outside those areas would be on a no-interference basis. New approvals would be similarly limited. ISED would make consequential amendments to CPC-2-6-01 and RP-008, as appropriate.

Q23

ISED is seeking comments on its proposal to modify the existing FSS satellite authorizations to limit FSS operations in 3700-4000 MHz in non-satellite-dependent areas of Canada to a no-interference basis. ISED is also seeking comments on the proposal to adjust the conditions of licence for FSS operations to reflect the proposals as of the FSS transition deadline, including the possible removal of a high expectation of renewal for the 3700-4000 MHz portion of the band.

Q24

ISED is seeking comments on its proposed date of December 2023 as the Canadian FSS transition deadline.

Q25

ISED is seeking comments on how the U.S. transition will impact the availability of FSS capacity in Canada.

In providing comments, respondents are requested to include supporting rationale and arguments.

128. **Information on satellite operations:** As part of the U.S. transition, the FCC will modify the licences and grants of market access for satellite operators providing services in the contiguous U.S. Recognizing that these same operators may also be using the same satellites to provide FSS services in Canada and to ensure the continuity of services to Canadian users, ISED is requesting information from Canadian satellite licensees and those with approvals to provide services in Canada on their plans for continuing to serve Canadian users.

Q26

ISED is requesting information to assist with the consequent decision following this consultation. This information includes satellite transponder migration plans, frequencies, and how satellite operators serving the Canadian market will accommodate all Canadian customers, and on which frequencies. Requested information could include, but is not limited to:

- the names and number of satellites that will need to migrate to the 4000-4200 MHz band
- the number of new satellites that may be required to serve the Canadian market
- the locations of earth stations communicating with these satellites
- the number of antennas and locations of associated earth stations that will need to be retuned and/or repointed
- the flexibility of existing satellites to modify operations according to the different areas of Canada

This information should be submitted on a confidential basis, as instructed in section 13.

9.4.1 Moratorium on authorizing satellites to operate within Canada

129. Recognizing that the coverage area of satellites is broader than Canadian territory, ISED will not impose a moratorium on new satellite licence applications under CPC-2-6-02. However, any new satellite licences issued in the 3700-4200 MHz band while this consultation is ongoing will exclude Canada from the licensed service area. Amendments to existing satellite licences in the band may be considered, except those that involve the addition of frequencies within the 3700-4200 MHz range. Once a decision on the use of this band is issued, licensees can request an amendment to include Canada in the service area, in the frequencies and areas where an FSS allocation remains.

130. A moratorium will be imposed on the approval of foreign-licensed satellites for use in Canada in the 3700-4200 MHz range, effective from the date of publication of this consultation until the publication of a decision.

Decision 4

Effective the date of this consultation, and until a decision is published, a moratorium is in place to exclude Canada from the service area on any new satellite licences issued by ISED in the 3700-4200 MHz band. Amendments to existing licences that would add frequencies within this range will be considered. No foreign-licensed satellites will be approved for use in Canada in the 3700-4200 MHz band.

9.5 Existing licensed FSS earth stations in 3700-4200 MHz

131. As discussed in section 9.4, ISED is proposing to modify the authorizations of satellite operations in non-satellite-dependent areas of Canada to limit their operational frequencies to the 4000-4200 MHz band with a transition deadline of December 2023. Consequently, ISED is proposing to make similar changes to existing earth station licences in all areas in Canada with the exception of satellite-dependent areas. As such, FSS earth station licences in non-satellite-dependent areas would be modified to 4000-4200 MHz as of December 2023.

132. **FSS earth stations prior to the transition deadline:** ISED proposes that existing licensed FSS earth station operations in the 3700-4200 MHz band in all areas receive protection from interference from flexible use operations, both in-band and adjacent-band, until the transition deadline.

133. **FSS earth stations after the transition deadline:** ISED proposes that existing licensed FSS earth stations operating in 3700-4000 MHz in satellite-dependent areas be allowed to maintain a licence for the entire band and continue to be protected from interference from in-band flexible use operations in 3700-3980 MHz, past the transition deadline. However, ISED is of the view that implementing technical rules for flexible use to protect FSS earth stations from adjacent band interference could limit access to equipment and deployment of future flexible use operations in the 3450-3700 MHz band. As such, ISED proposes that these licensed FSS earth stations no longer be protected from interference from adjacent band flexible use operations in

3450-3700 MHz. ISED recognizes that FSS earth station operators will require time to adjust their operations (e.g. implement a filter or move up in the band). Thus, ISED further proposes that flexible use licensees deploying stations in the 3450-3700 MHz band within 25 km of an existing licensed FSS earth station in the 3700-4200 MHz band be required to provide a notification to the operators of these earth stations in satellite-dependent areas, one year prior to the deployment of fixed or mobile stations.

134. Given the proposals above, after the transition deadline, FSS earth stations in non-satellite-dependent areas would no longer be licensed to operate in 3700-4000 MHz band. Any earth stations that continue to operate would do so on a no-protection basis (i.e. no protection from interference from in-band or adjacent band flexible use operations).

135. For those licensed FSS earth stations operating in 4000-4200 MHz after the transition deadline, ISED proposes that these FSS earth stations be protected from interference from flexible use operations in 3700-3980 MHz.

136. Protection and coexistence measures for the above deployment scenarios are discussed further in section 10.3.

137. To reflect the proposals mentioned above, ISED further proposes to include the following footnote in the CTFA:

ADD CZZ: As of [Transition deadline], FSS earth stations in the band 3700-4000 MHz will operate on a no-protection basis, except for in satellite-dependent areas, as per [future decision paper].

138. **Gateways that serve satellite-dependent areas:** Provision of satellite services in satellite-dependent areas often relies on licensed gateway earth stations that connect the satellite network to the terrestrial network. These stations are often located near fibre and other infrastructure outside of satellite-dependent areas and are essential to the provision of service, similar to backhaul for terrestrial services.

139. In the U.S., satellite operators have agreed to consolidate these gateways to four sites. Based on preliminary review, ISED is of the view that such an approach would also be suitable in Canada, and that consolidation to two gateway teleport sites would be feasible. Ideally, the two sites would be located in remote areas, away from larger urban centres while maintaining access to the required infrastructure such as fibre and major roads. ISED is seeking comments on the ongoing need for gateways in non-satellite-dependent areas to support services in satellite-dependent areas where it is proposed that gateway earth stations may access the full 3700-4200 MHz band. In addition, ISED is also seeking comments on limiting the number of sites such that these gateways are consolidated to two sites in non-satellite-dependent areas, and on possible locations for such sites.

Q27

ISED is seeking comments on its proposed transition deadline of December 2023 for FSS earth stations, in which existing FSS earth station licences would be modified to 4000-4200 MHz in the relevant areas.

Q28

ISED is seeking comments on making amendments to the relevant conditions of licence and technical rules in the 3700-4200 MHz band as well as the 3450-3700 MHz band in order to implement the following proposals with respect to protection from interference:

- a) **prior to the transition deadline**, existing licensed FSS earth stations may operate in the entire 3700-4200 MHz band in **all areas** and be protected from interference from flexible use operations both in-band (3700-3980 MHz) and the adjacent 3450-3700 MHz band
- b) **after the transition deadline**, existing licensed FSS earth stations may continue to operate in the entire 3700-4200 MHz band in **satellite-dependent areas** and be protected from interference from in-band flexible use operations in 3700-3980 MHz, but would not be protected from flexible use operations in the adjacent 3450-3700 MHz band; however, ISED also proposes that flexible use licensees deploying stations in the 3450-3700 MHz band within 25 km of an existing licensed FSS earth station in the 3700-4200 MHz band be required to provide a notification to these operators, one year prior to the deployment of fixed or mobile stations
- c) **after the transition deadline**, FSS earth stations would only be licensed to operate in the 4000-4200 MHz band in **non-satellite-dependent areas** and would be protected from flexible use operations in the adjacent 3700-3980 MHz band
- d) **after the transition deadline**, FSS earth stations operating in 3700-4000 MHz, in all areas, which are not eligible for licensing could continue to operate as a licence-exempt station without protection from flexible use operations both in-band and adjacent band(s)

Q29

ISED is seeking comments on the proposed change to the CTFA to add the new footnote CZZ proposed above and shown in annex B.

Q30

ISED is seeking comments on how to ensure the continued operation of gateways that support the provision of services in satellite-dependent areas, specifically:

- a) how much spectrum would be required at these gateway sites
- b) if these stations could be consolidated into two sites, away from major population centres, and where the best locations for those sites would be

In providing comments, respondents are requested to include supporting rationale and arguments.

9.5.1 Moratorium on new or modified earth station licences

140. As a result of the considerations and potential changes raised in this consultation, including in the 3700-4200 MHz band, ISED is issuing a moratorium on new or modified applications of earth station authorizations until a decision has been made on the future of the band. Exceptions will be considered by ISED on a case-by-case basis in order to allow for continued services.

Decision 5

Effective the date of this consultation, a moratorium is in place on new or modified applications of satellite earth station authorizations, effective until decision has been made on the future of the 3700-4200 MHz band.

9.6 Existing licence-exempt FSS earth stations in 3700-4200 MHz

141. **Proposed interim authorizations:** As indicated in section 6, the majority of earth stations operate on a licence-exempt basis, with foreign satellite operators providing most of the content (video and radio) to cable head-ends and broadcast distribution undertakings. Currently, most earth stations communicating with satellites in the FSS are operating in the 3700-4200 MHz band on a receive-only, licence-exempt basis and are not protected from interference from licensed systems.

142. Given their importance to broadcasting, some measures to protect these earth stations from interference from new flexible use systems in the 3700-3980 MHz band would be beneficial to the content-distribution industry. The FCC recognized the importance of these stations in deciding to allow licence-exempt earth stations to register and receive protection from flexible use services during the transition to, and operation in, the 4000-4200 MHz band. ISED shares this view and is proposing a similar approach. For certain licence-exempt earth stations operating in 3700-4200 MHz, ISED is proposing to provide the opportunity for those stations to be issued interim authorizations.

143. Current licensing rules based on the radio licence model would require each earth station to be authorized individually, imposing a significant administrative burden on licensees. For this reason, ISED considers that such an approach would not be practical given the large number of licence-exempt earth stations. However, allowing earth stations to be authorized by geographic area, based on an interim spectrum licensing model, would benefit existing users and would protect the broadcast content distribution network.

144. In 2015, ISED adopted CPC-2-6-01, [*Procedure for the Submission of Applications to License Fixed Earth Stations and to Approve the Use of Foreign Satellites in Canada*](#), for the licensing of significant numbers of identical earth stations. In CPC-2-6-01, ISED made provisions for the licensing of “Typical Earth Stations” such as very small aperture terminal networks on an interim basis in some of the Ku and Ka bands. This measure was adopted on an interim basis, pending a public consultation on the licensing and fee regime for earth stations.

145. As with the existing policy in certain Ku and Ka bands, ISED is proposing that a single authorization would be issued to each entity to allow all of its systems of identical receive-only earth stations to remain in operation across Canada in 3700-4200 MHz. Unlike the Ku and Ka bands however, ISED is proposing to require individual site information for each earth station in order to facilitate the transition and future coordination. These interim authorizations would be issued on an annual renewable basis with no associated fee until such time a public consultation is undertaken on the overall earth station licensing and fee framework.

146. In addition, these proposed authorizations will allow eligible FSS operators to be protected from flexible use operations in 3700-3980 MHz until the FSS transition deadline. After the transition deadline, it is proposed that in non-satellite dependent areas, only operations in the 4000-4200 MHz band would be authorized. Therefore, after the transition deadline, ISED proposes the following:

- **non-satellite-dependent areas:** any operations in the 3700-4000 MHz would not be authorized and therefore not protected
- **satellite-dependent areas:** interim authorizations would allow earth stations to continue operating in the entire 3700-4200 MHz band beyond the FSS transition deadline, and be protected from interference from flexible use operations in the 3700-3980 MHz band
- **all areas:** operations in the 4000-4200 MHz band in accordance with the terms of the authorization would continue to be protected from flexible use operations in the 3700-3980 MHz band

147. Those who are not eligible for an interim authorization or choose not to apply for an interim authorization operating earth stations anywhere in Canada in any portion of the band would continue on a licence-exempt basis, before and after the transition described above. As they are licence-exempt, these earth stations must operate on a no-protection basis.

148. With respect to flexible use and WBS operations in the adjacent 3450-3650 MHz and 3650-3700 MHz bands, ISED notes that the requirements set out in SRSP-520 and SRSP-303.65 regarding FSS earth stations operating in 3700-4200 MHz band only apply to licensed stations. As such, licence-exempt earth stations operating in the 3700-4200 MHz are currently not protected from flexible use or WBS stations operating in 3450-3650 MHz and 3650-3700 MHz bands. Based on this and the likelihood that a large number of these licence-exempt FSS earth stations could impose a potentially significant burden on flexible use licensees below 3700 MHz, ISED is of the view that the existing protection requirements should be maintained. Thus, after licence-exempt earth stations are issued with authorizations, ISED proposes that they would not be protected from flexible use or WBS stations operating in the 3450-3650 MHz and 3650-3700 MHz bands. Licence-exempt FSS operators may need to take into consideration any potential modifications (e.g. installation of effective filters) that may be required in order to avoid receiving harmful interference from adjacent band flexible use operations. Other technical considerations are addressed in section 10.3.

149. The proposed authorizations would permit the continued operation of existing receive-only FSS earth stations through the transition period in the entire band and after the transition in the relevant portion of the band as described above. In addition, ISED is proposing that the same type of authorizations would apply to new receive-only FSS earth stations only in the 4000-4200 MHz portion of the band, which would be entitled to protection from the future proposed flexible use in the 3700-3980 MHz band. The proposed conditions for interim authorizations for licence-exempt FSS earth stations in 3700-4200 MHz and new receive-only FSS earth stations in the 4000-4200 MHz portion of the band are outlined in annex G.

150. **Eligible entities and application deadline:** There are two types of licence-exempt earth stations in use in Canada: those that are part of an enterprise network, such as those used in broadcast distribution; and those that are used by individuals to directly receive satellite broadcast signals intended for the general public, which are exempt from licensing under paragraph 4(1)(b) of the *Radiocommunication Act*. ISED proposes to limit the interim authorizations to those stations that are not exempt under paragraph 4(1)(b) of the Act, i.e. entities that are part of enterprise networks. This approach would protect the enterprise networks in Canada without disrupting the licence-exempt regime that has been put in place for direct-to-home (DTH) satellite television.

151. ISED proposes that eligible entities seeking an interim authorization for existing licence-exempt FSS earth stations would be required to submit an application up to 90 days after the publication of a decision following this consultation. Only those entities that currently have stations deployed would be eligible and as part of an application, the operator must provide full site information for all of its eligible existing sites. Eligible entities must also ensure that an agreement is in place with the space station operator, or its representatives, which provides for access to the space station capacity or signals, and may be requested by ISED.

152. This approach is not proposed for those receive-only earth stations that are only capable of receiving broadcasting signals and are not part of a distribution undertaking (i.e. exempt from licensing under section 4(1)(b) of the *Radiocommunication Act*), and would not be extended to earth stations used for direct-to-home television viewing.

Q31

ISED is seeking comments on its proposal to issue interim authorizations for certain existing licence-exempt earth stations in the 3700-4200 MHz band.

Q32

ISED is seeking comments on the proposed deadline of up to 90 days after the publication of a decision for submitting applications for these interim authorizations of existing licence-exempt FSS earth stations in the 3700-4200 MHz band.

Q33

ISED is seeking comments on its proposal that receive-only earth stations that are not eligible for an interim authorization or whose operators do not seek authorization, could continue to operate as a licence-exempt earth station on a no-protection basis.

Q34

ISED is seeking comments on its proposal that in non-satellite-dependent areas, existing earth stations that operate under interim authorizations receive in-band protection from flexible use operations in the 3700-3980 MHz band until the transition deadline.

Q35

ISED is seeking comments on its proposal that in satellite-dependent areas, existing earth stations that operate under an interim authorization receive in-band protection from flexible use operations in the 3700-3980 MHz band before and after the transition deadline.

Q36

ISED is seeking comments on its proposal that in all areas, existing licence-exempt earth stations that operate under an interim authorization receive no protection from adjacent band WBS stations and flexible use stations operating below 3700 MHz before and after the transition deadline.

Q37

ISED is seeking comments on whether the interim authorization process should also apply to new receive-only FSS earth stations in the 4000-4200 MHz band.

Q38

ISED is seeking comments on the proposed conditions for interim authorizations for licence-exempt FSS earth stations in 3700-4200 MHz and new receive-only FSS earth stations in the 4000-4200 MHz portion of the band as detailed in annex G.

Q39

ISED is seeking comments on the proposed eligibility of licence-exempt stations that could apply for an interim authorization.

In providing comments, respondents are requested to include supporting rationale and arguments.

9.7 Fixed service in 3700-4200 MHz

153. As discussed in section 6.2, there are currently two fixed systems in operation located in two separate Tier-4 areas. Given the limited number of fixed point-to-point links currently deployed within the band, ISED is proposing to no longer issue new fixed licences for fixed point-to-point applications in the 3700-4000 MHz band and that point-to-point operations under existing fixed licences that operate between 3700-4000 MHz be grandfathered and protected from flexible use operations.

154. Given the nature of point-to-point operations such as the use of narrow beams at fixed locations and new technologies to be deployed by flexible use systems, ISED expects that with cooperation, coexistence between the two systems should be achievable.

155. Although the continued operation of fixed service sites in the 4000-4200 MHz band could complicate the potential repacking/relocation of FSS operations, the likelihood is anticipated to be small since the existing fixed links and existing FSS earth stations already coexist well and have high antenna discrimination.

156. As the two licensed systems currently operating in the fixed service are located in remote areas of the country, ISED is proposing to grandfather the licences indicated in annex A.

Q40

ISED is seeking comments on its proposal to no longer issue new licences for fixed services to operate fixed point-to-point applications in the 3700-4000 MHz band.

Q41

ISED is seeking comments on whether to allow new licences for fixed services to operate fixed point-to-point applications in the 4000-4200 MHz band.

Q42

ISED is seeking comments on the proposal to grandfather existing point-to-point operations in the 3700-4000 MHz band under existing licences for fixed service (as identified in annex A), such that flexible use systems in these two tiers may not claim protection from, nor cause interference to these fixed service stations.

In providing comments, respondents are requested to include supporting rationale and arguments.

157. **Moratorium on new fixed microwave links:** In order to preserve the current landscape of authorized fixed service operations in the 3700-4200 MHz band, ISED is issuing a moratorium on new or modified applications of fixed microwave links in the band until a decision has been made on the future of the 3700-4200 MHz band.

Decision 6

Effective the date of publication of this consultation, ISED is now placing a moratorium on the deployment of new fixed microwave links. ISED will no longer issue new licences authorizing fixed microwave links in the 3700-4200 MHz band, or grant modifications to licences that lead to new fixed microwave links effective until a decision has been made on the future of the 3700-4200 MHz band.

10. Technical considerations

158. ISED generally develops technical rules through consultation with the Radio Advisory Board of Canada (RABC). However, given the proposals in the previous sections and variety of scenarios, ISED is seeking comments on some of the key elements for the future technical rules as they will impact both the 3500 MHz and 3800 MHz bands.

10.1 Coexistence between flexible use systems

159. ISED typically develops technical rules that will allow for a wide range of usage scenarios, while also encouraging spectral efficiency and orderly coexistence with other users in the band and in adjacent bands.

160. In the case where two or more flexible use TDD systems operate in the same or adjacent frequency blocks and in close geographic proximity, there exists a potential for mutual inter-system interference. This can be mitigated by measures such as TDD synchronization between systems. For the 3500 MHz band, ISED sought comments in the Preliminary Consultation on what measures should be taken to limit potential interference issues with the 3500 MHz flexible use TDD band plan.

161. Responses received as part of the Preliminary Consultation indicated that TDD synchronization of networks constitutes a means to minimize interference between networks. However, most respondents recommended that ISED not mandate specific technology solutions to limit potential interference in the band and that operators coordinate their systems instead.

162. As such, ISED did not mandate specific technology solutions (e.g. TDD synchronization between systems) to address interference issues. However, as with current practice, SRSP-520 and Radio Standards Specification RSS-192, [Flexible Use Broadband Equipment Operating in the Band 3450-3650 MHz](#), provide technical limits and coordination procedures to minimize interference between flexible use systems. For similar reasons, ISED proposes to implement the same approach for flexible use licensees to coordinate their operations using the most appropriate means available for the 3650-3980 MHz band.

Q43

ISED is seeking comments on the proposal to rely on technical limits and coordination procedures rather than mandate specific technology solutions (e.g. TDD synchronization between systems) to address interference issues between TDD flexible use systems in the 3650-3980 MHz band.

Q44

ISED is seeking comments on whether any additional measures should be taken to limit potential interference issues between flexible use systems in the 3650-3980 MHz band.

In providing comments, respondents are requested to include supporting rationale and arguments.

10.2 Coexistence between flexible use systems and WBS systems prior to displacement

163. If the proposal to displace WBS incumbents (i.e. Option 2 specified in section 9.1) is adopted, ISED is proposing that existing WBS operations be protected from interference from

co-channel flexible use operations and adjacent bands flexible use operations until the displacement deadline.

164. Under Option 2 in section 9.1, existing WBS technical rules as specified in SRSP-303.65 and RSS-197, [*Wireless Broadband Access Equipment Operating in the Band 3650-3700 MHz*](#), would continue to apply to WBS operations until the displacement deadline. Currently, adjacent band coexistence between flexible use in the 3450-3650 MHz and WBS in the 3650-3700 MHz is addressed through the adoption of OOB limits (see RSS-192), and there is a general requirement to coordinate as necessary (see SRSP-520).

165. Since potential flexible use deployments in the 3650-3700 MHz band and in the adjacent flexible use bands (i.e. 3450-3650 MHz and 3700-3980 MHz) could be planned in the same or nearby service areas to WBS, ISED is seeking comments on protection and coordination requirements relative to the WBS receiver. ISED also seeks comments on the potential impact these requirements have on the deployment of flexible use, taking into consideration the goal to minimize any unnecessary coordination and deployment burden.

Q45

ISED is seeking comments on whether specific technical measures should be adopted to address potential interference issues between flexible use systems and WBS systems until the displacement deadline.

- a) **For co-channel flexible use and WBS operations in the 3650-3700 MHz band**, what specific measures may be needed to protect WBS? For example, should new flexible use stations be required to coordinate with WBS stations within a specified distance prior to deployment? Alternatively, should a technical parameter such as a power flux density (pfd) trigger for coordination measured at the WBS receive antenna be adopted? Are there other more appropriate measures that ISED should consider? Should multiple measures, such as a combination of distance and pfd trigger for coordination, be adopted? How would these requirements impact the deployment of new flexible use stations?
- b) **For adjacent band flexible use systems**, is there a need to adopt any additional measures, beyond what is currently specified in RSS-192 and SRSP-520, to further address coexistence between these flexible use and WBS systems? If so, what should they be? How many flexible use frequency blocks (or MHz) immediately adjacent to the 3650-3700MHz band could potentially affect WBS systems? How would these requirements impact the deployment of flexible use stations?

In providing comments, respondents are requested to include supporting rationale and arguments.

10.3 Coexistence between flexible use systems and licensed or authorized FSS earth stations

166. ISED recognizes that OOB power limits and/or operational requirements facilitate the coexistence between adjacent band services. In general, OOB limits specified by 3GPP for base stations are not necessarily tailored to address coexistence with adjacent band services. As a result, in order to protect adjacent-band operations (e.g. FSS earth stations), additional technical requirements could be put in place by national regulators. These additional technical requirements could include more stringent OOB limits. However, it is noted that more stringent OOB limits may have an impact on equipment costs. In some cases, national OOB limits that are different than 3GPP specifications may be achieved by digital filtering through software changes, minimizing the additional costs of deployment. However, due to the limitation of digital filtering technology, modifications to the base station's cavity filter may be required, which could potentially lead to the development of regional or country specific equipment. Alternatively, instead of equipment-specific requirements, operational requirements (e.g. guard bands or exclusion zones) could be introduced to enable coexistence.

167. For the EU, the ECC recommended a block edge mask, which incorporates strict out-of-band requirements (more stringent than the 3GPP specifications) for the protection of other services such as FSS above 3800 MHz.

168. In the U.S., the FCC adopted typical OOB requirements that are inline with the 3GPP specifications. As noted in section 7.3, flexible use systems in the 3700-3980 MHz band in the U.S. may not commence operations until the necessary clearing has been completed. In order to protect adjacent band earth stations from unwanted emissions and receiver blocking from flexible use stations, the FCC implemented pfd limits, and a 20 MHz guard band. This protection is granted to earth stations that meet a baseline minimum filter specification.

169. ISED recognizes that the implementation of a pfd limit avoids the complexity of a flexible use licensee having to coordinate with the large number of earth stations.

170. The FCC will require a pfd limit of -124 dBW/m²/MHz as measured at the earth station antenna to protect earth stations from unwanted emissions (i.e. unwanted emissions from flexible use station into the FSS pass-band). This pfd limit applies to all emissions within the earth station's authorized band of operation.

171. The FCC will also require a pfd limit of -16 dBW/m²/MHz measured within any 1 MHz outside the FSS pass-band across the 3700-3980 MHz band at the earth station antenna as a means to prevent receiver blocking. This blocking limit applies to all emissions within the 3800 MHz flexible use authorized band of operation.

172. The pfd limit of -124 dBW/m²/MHz adopted by the FCC to protect earth stations from flexible use OOB is based on a reference antenna gain of 0 dBi, interference-to-noise (I/N) protection criterion of -6 dB, an earth station receiver noise temperature of 142.8K, and an additional margin of -4 dB to account for aggregate interference effects. The pfd limit of -16 dBW/m²/MHz to protect earth stations from flexible use receiver blocking is based on a

reference antenna gain of 0 dBi, receiver saturation limit of -59 dBm, the filter's total rejection, the flexible use service bandwidth, and a baseline minimum specification for the FSS earth station filters.

173. In Canada, in order to address adjacent band coexistence issue between flexible use in 3450-3650 MHz and licensed FSS operations in 3700-4200 MHz, a coordination distance of 25 km is applied, as stated in SRSP-520. Given the proposals in section 9, after the transition deadline, licensed FSS earth stations in the 3700-4000 MHz band in all areas would not be protected from adjacent band flexible use systems below 3700 MHz. ISED proposes that after the transition deadline, the current SRSP-520 coexistence requirements for flexible use operations in 3450-3650 MHz to protect adjacent band FSS be removed.

174. Section 9.5 proposed that before the transition deadline, existing licensed FSS earth stations in all areas in the 3700-4200 MHz band would be protected from flexible use operations. There may be areas in the 3650-3700 MHz band that could be used for flexible use prior to both the WBS displacement deadline and the FSS transition deadline, provided the flexible use licensee is able to come to an agreement with affected WBS operators and does not create harmful interference to FSS. In this situation, in order to protect the licensed FSS earth stations above 3700 MHz, ISED is proposing to apply the same requirements of SRSP-520 to flexible use operations in the 3650-3700 MHz band. That is, all areas will be required to coordinate with the operators of these earth stations (i.e. flexible use licensees deploying stations in the 3650-3700 MHz band within 25 km of a licensed FSS earth station in the 3700-4200 MHz band, not including interim FSS authorization).

175. ISED takes note of the values, methodology and limits adopted by the ECC and FCC to protect FSS earth stations from flexible use stations operating in adjacent band(s), as well as the current Canadian technical/operational rules to address coexistence between FSS operations in 3700-4200 MHz and adjacent band fixed and mobile services.

176. As noted above, given the extent of FSS earth station deployment, co-channel flexible use operations in the same areas could be challenging. Nevertheless, there may be technical measures that can be put in place to reduce the potential for interference and continue to enable some flexible use operations where feasible.

177. Given ISED's proposals in sections 9.5 and 9.6 about the protection of authorized FSS earth stations in the 3700-4200 MHz band from flexible use stations in the same or adjacent areas, ISED seeks comments on the coexistence measures that may be required.

Adjacent band

Q46

Until the transition deadline, in all areas for flexible use in the 3650-3700 MHz band:

ISED is seeking comments on the proposal that until the transition deadline, those flexible use licensees deploying stations in 3650-3700 MHz within 25 km of a licensed FSS earth station (not including interim FSS authorization) in the 3700-4200 MHz band will be required to coordinate with the operators in these earth stations.

Q47

After the transition deadline, in all areas for flexible use in the 3450-3650 MHz band:

ISED is seeking comments on its proposal that the current SRSP-520 coexistence requirements for flexible use operations in the 3450-3650 MHz band to protect FSS operations in the adjacent band 3700-4200 MHz be removed.

Q48

For FSS earth stations licensed in the 4000-4200 MHz band and flexible use in the 3800 MHz band, in all areas: ISED is seeking comments on adjacent band coexistence measures, taking into account the coexistence measures adopted by the EU (i.e. a stringent OOB limit) and the U.S. (i.e. a combination of guard band, a typical OOB limit, pfd limits, and baseline minimum filter specifications for earth station operations) and the current Canadian requirements (i.e. a typical OOB limit and coordination distance):

- a) What are the benefits and technical limitations associated with the above coexistence measures?
- b) Which set of coexistence measures above (i.e. EU, U.S., Canada) is preferred? If applicable, comments are sought on the values of the limits in relation to the supported measures.
- c) Given the proposal in section 9.1 to displace WBS in 3650-3700 MHz and identify 3900-3980 MHz for shared use, are there any additional considerations that may impact the response to a) and b) above?
- d) Which portion of the 3800 MHz band should the above measures be applied to in order to protect FSS in the 4000-4200 MHz band (i.e. how many frequency blocks or MHz)?

Co-channel

Q49

ISED is seeking comments on what technical requirements should be imposed to ensure co-channel protection of FSS earth stations from flexible use systems, in the relevant scenarios and timeline as stated in sections 9.5 and 9.6. For example, could the pfd limit of -124 dBW/m²/MHz measured at the earth station antenna proposed by FCC above be used to protect co-channel FSS earth station? Alternatively, should other measures be adopted, such as a separation distance as described in section 7.3? Or should a combination of measures be adopted? If applicable, what are the specific values that should be adopted?

Earth station technical parameters

Q50

ISED is seeking comments on whether the assumptions made by the FCC about earth stations, including baseline minimum filter specifications for earth station operations as stated above, are applicable to Canadian operations. Is there any additional information that ISED should consider in the development of appropriate technical rules to enable coexistence both co-channel and in adjacent bands?

In providing comments, respondents are requested to include supporting technical arguments and rationale.

In providing comments to Q46-Q49, respondents are requested to consider the coordination burdens such coexistence and protection measures could impose on either flexible use services or FSS earth stations.

10.4 Coexistence between flexible use systems and aeronautical radionavigation systems

178. The 4200-4400 MHz band is allocated to the aeronautical mobile (route) and aeronautical radionavigation services on a primary basis. Altimeters onboard airplanes and helicopters operate worldwide in this band and provide height measurements above the surface of the Earth with a high degree of accuracy and integrity during the approach, landing, and climb phases of aircraft operation. As noted in ITU-R Recommendation M.2059, [*Operational and technical characteristics and protection criteria of radio altimeters utilizing the band 4 200-4 400 MHz*](#), aircraft altimeters are considered safety-of-life systems that must operate without harmful interference.

179. The 4200-4400 MHz band is also used for Wireless Avionics Intra-Communications (WAIC) systems. These systems provide communications between two or more stations on a single aircraft. WAIC transmissions are not limited to the interior of the aircraft structure (e.g. sensors mounted on the wings or engines could communicate with systems within the airplane) but will not provide communications between an aircraft and the ground, another aircraft or a satellite. ISED understands that WAIC systems have not yet been deployed in aircraft as the standards governing these systems are currently being developed in the International Civil Aviation Organization (ICAO).

180. In the United States, a number of companies and organizations provided comments and preliminary test results to the FCC regarding the potential for interference to altimeters. The FCC points to two studies that reach different conclusions about the performance of altimeters in the presence of 5G emissions and concludes that the technical limits (power and emissions) imposed on 5G, coupled with a 220 MHz guard band, is sufficient to protect aeronautical services. The FCC does recognize that more study is warranted on the potential for interference to such equipment and has encouraged the aviation industry to participate in a multi-stakeholder group to further study this issue.

181. As ISED is also proposing to license flexible use below 3980 MHz and leaving FSS in the upper portion of the band, there will be a significant frequency separation between flexible use service and aeronautical services in the 4200-4400 MHz band. A frequency separation of 220 MHz would serve to mitigate the potential for interference between the flexible use allocation and the 4200-4400 MHz band. Therefore, ISED is not proposing any technical requirements for the coexistence between flexible use stations operating in 3650-3980 MHz and aeronautical radionavigation operating in 4200-4400 MHz.

Q51

ISED is seeking comments on its proposal to not implement any technical requirements for the coexistence between flexible use operation in the 3650-3980 MHz band and radionavigation operations in the 4200-4400 MHz band, noting the 220 MHz frequency separation between the bands of operation. If this is not sufficient for coexistence, what other measures would be appropriate?

In providing comments, respondents are requested to provide technical analysis to substantiate such proposals.

11. Licensing process for the new flexible use licences

182. The [Framework for Spectrum Auctions in Canada](#) indicates that ISED will generally consider using an auction process as the spectrum assignment mechanism where the demand for spectrum is expected to exceed the available supply and where government policy objectives can be fully met through the use of an auction. As such, ISED indicated in the Preliminary Consultation and its subsequent 3500 MHz Decision that ISED will be using an auction as the licensing process for the 3800 MHz band.

183. Depending on the decisions related to the proposals noted above, ISED proposes that if a band plan in accordance with section 8 is adopted, then flexible use licences, including those in satellite-dependent areas, be assigned by way of auction **except for** that portion of the band that either:

- remains available for WBS as described in Option 1 in section 9.1.1 (i.e. 3650-3700 MHz) **OR**
- is made available for new flexible uses under an alternate licensing process, as described in Option 2 in section 9.1.1 (i.e. 3900-3980 MHz)

184. This would result in either 25 or 28 blocks of 10 MHz that would be made available for flexible use via an auction process, depending on the decisions made in regard to the proposals above. The timing of that auction would be subject a further consultation on the licensing policy (including auction rules, competition measures and conditions of licence) but would be expected to take place in 2023.

Q52

ISED is seeking comments on the use of an auction as the licensing process for the flexible use spectrum that would be considered as the 3800 MHz band, noting a separate consultation process would be issued, if required, to determine the licensing framework for the range 3900-3980 MHz.

In providing comments, respondents are requested to include supporting arguments and rationale.

12. Proposed accelerated spectrum clearing approach

185. Telesat has written to ISED with its own proposal to enable an accelerated repurposing of C-band spectrum for 5G services. As described by Telesat in annex H, the proposal is for a two-phased approach, through which ISED would repurpose 3700 MHz to 4100 MHz for flexible use, with Telesat directly being issued flexible use licences for 3700-3900 MHz. Telesat proposes that it would take responsibility for clearing this portion of the band from incumbent users and would request a transfer of the entirety of these flexible use licences and thus make these available to proposed licensees via the secondary market instead of an ISED licensing process by 2021. Telesat proposes that it would facilitate clearing the 3900-4100 MHz band by 2025 to be made available for flexible use through a future ISED auction licensing process. The 4100-4200 MHz band would remain available for satellite services. Telesat is of the view that its proposal is in the public interest as it would accelerate the availability of C-band spectrum for deployment of terrestrial 5G services, and support development of its LEO project, which has benefits of its own in terms of remote connectivity and economic opportunity.

186. ISED is seeking stakeholder feedback on the Telesat proposal included as annex H and, specifically, to provide answers to the following questions.

In providing comments for the following questions, respondents are requested to include supporting arguments and rationale, taking into consideration of ecosystems for 5G services and the adjacent WBS operations in the 3650-3700 MHz band.

Q53

ISED is seeking general comments on the proposal submitted by Telesat found in annex H, including whether such an approach would be in the best interest of Canadians and more specifically, whether it would result in the faster deployment of 5G services in the affected frequencies; more efficient use of spectrum and what the implications of this repurposing plan would be for other users of the band.

Q54

ISED is seeking comments on whether the Telesat proposal meets ISED's policy objectives outlined in section 3, including:

- a) supporting rural/remote connectivity
- b) promoting competition in mobile services
- c) making more mid-band spectrum available to support 5G services

Q55

ISED is seeking comments on what elements from sections 7 to 10 of this consultation would still apply or need to change if ISED were to implement the Telesat proposal, in particular:

- a) the proposal for maintaining the primary allocation for FSS in the 3700-4200 MHz band
- b) the proposed implementation of an exemption to transition for satellite-dependent communities and the proposed changes to satellite licenses to apply it
- c) the proposal for treatment of WBS incumbents
- d) the proposal to issue interim authorizations for certain existing licence-exempt earth stations in the 3700-4200 MHz band
- e) technical considerations for coexistence between FSS and flexible use
- f) technical considerations for coexistence between FSS and aeronautical radionavigation systems
- g) the overall impact on existing users in the 3700-4200 MHz band

Q56

If ISED were to implement the Telesat proposal, ISED would need to consider the licensing framework for the 3700-3900 MHz band. Thus, ISED is seeking comments on:

- a) whether it should, as proposed by Telesat, issue flexible licences in the 3700-3900 MHz band using the same conditions of licence as those contained in [annex H](#) of the 3500 MHz Framework, noting that some conditions may need to be adjusted to reflect the differences in the two bands and the decisions resulting from this consultation process
- b) whether it should issue a single Tier 1 flexible use licence as proposed by Telesat or align with the 3500 MHz band and issue Tier 4 licences
- c) what deployment conditions should apply to these licences including Telesat's proposal that the deployment requirements would only come into force after the Minister approves a transfer
- d) any additional conditions of licence that should apply given the nature of the proposal

Q57

In its proposal, Telesat indicates that it takes no position on ISED imposing a pro-competitive measure such as a spectrum cap or set-aside on the 3700-3900 MHz licences. ISED would review any request for transfer in accordance with provisions related to commercial mobile spectrum through section 5.6 of CPC-2-1-23, [Licensing Procedure for Spectrum Licences for Terrestrial Services](#). However, ISED would also consider the competitive implications on the 3500 MHz and 3800 MHz bands and consider pro-competitive measures in accordance with the *Framework for Spectrum Auctions in Canada*. As such, ISED is seeking comments on:

- a) the need for a pro-competitive measure (e.g. spectrum cap or set-aside)
- b) the type of competitive measure that should be applied
- c) the amount of spectrum that should be considered under any such competitive measure

Q58

ISED is seeking comments on Telesat's proposals for the transition of FSS earth stations and whether any additional measures are required to ensure a smooth transition.

Q59

Telesat's proposal includes ISED allocating an additional 80 MHz for flexible use in the 4000-4100 MHz band. ISED is seeking comments on the feasibility of making this extra spectrum available, specifically:

- a) whether there would be standardized 5G equipment available for this 80 MHz, given that it does not align with the U.S. band plan
- b) whether there would be FSS filters available, given the reduced amount of FSS spectrum and that it would not align with the U.S. band plan
- c) whether there would be enough capacity to continue FSS services in Canada with the proposal to reduce the amount of FSS spectrum to 100 MHz
- d) to what degree would the requirement to protect U.S. FSS earth stations in the border areas have an impact on the ability to deploy flexible use stations near the border and to what degree would this impact the value of this spectrum

13. Submitting comments

187. Respondents are requested to provide their comments in electronic format (Microsoft Word or Adobe PDF) by [email](#). Information on satellite operations in response to Q26 in section 9.4 must be submitted as a separate document and clearly marked "Confidential."

188. All submissions should cite the *Canada Gazette*, Part I, the publication date, the title and the notice reference number (SLPB-002-20). Parties should submit their comments no later than **October 26, 2020**, to ensure consideration. Soon after the close of the comment period, all comments received will be posted on ISED's Spectrum Management and Telecommunications website.

189. ISED will also provide interested parties with the opportunity to reply to comments from other parties. Reply comments will be accepted until **November 30, 2020**.

190. Following the initial comment period, ISED may, at its discretion, request additional information if needed to clarify significant positions or new proposals. In such a case, the reply comment deadline may be extended.

14. Obtaining copies

191. All spectrum-related documents referred to in this paper are available on ISED's Spectrum Management and Telecommunications website.

192. For further information concerning the process outlined in this document or related matters, contact:

Innovation, Science and Economic Development Canada
c/o Director, Spectrum Regulatory Best Practices
235 Queen Street (6th Floor, East Tower)
Ottawa ON K1A 0H5
Telephone: 613-219-5436
TTY: 1-866-694-8389
Email: ic.spectrumauctions-encheresduspectre.ic@canada.ca

Annex A: Site-licensed fixed service operations in the 3700-4200 MHz band

Table A1 lists the site-licensed fixed service licences in the 3700-4200 MHz band. It is based on data from ISED's Spectrum Management System (SMS) database as of August 2020.

Table A1: Site-licensed fixed service licences in the 3700-4200 MHz band

Licence number	Location of fixed systems by Tier 4 service area
010038451	Tier 4-104 (Kenora/Sioux Lookout, Ontario)
010677429	Tier 4-131 (Medicine Hat/Brooks, Alberta)

Annex B: Proposed changes to the Canadian Table of Frequency Allocations

Canadian Table of Frequency Allocations — MHz

<p>3 500 - 3 650</p> <p>FIXED FIXED-SATELLITE (space-to-Earth) MOBILE</p> <p>SUP C20: In the frequency band 3 500-3 650 MHz, the fixed-satellite earth stations will be located in areas so as not to constrain the implementation of fixed wireless access and mobile systems.</p>
<p>3 650 - 3 700</p> <p>FIXED FIXED-SATELLITE (space-to-Earth) MOBILE <u>except aeronautical mobile</u></p> <p>SUP C33: As of June 11, 2009, in the frequency band 3650-3700 MHz, new fixed-satellite service earth stations are only authorized to operate on a secondary basis so as not to constrain the implementation of wireless broadband services.</p>
<p>3 700 - 4 200 <u>4 000</u></p> <p>FIXED FIXED-SATELLITE (space-to-Earth) CZZ <u>MOBILE except aeronautical mobile</u></p> <p>ADD CZZ: As of [Transition deadline], FSS earth station operations in the band 3700-4000 MHz will operate on a no-protection basis, except for in satellite-dependent areas, as per [future decision paper].</p>
<p><u>4 000</u> - 4 200 MHz</p> <p>FIXED FIXED-SATELLITE (space-to-Earth)</p>

Annex C: List of FSS earth stations proposed to be grandfathered in the 3500-3650 MHz frequency band

Table C1 provides the licence and location information of the fixed satellite services (FSS) earth stations operating in the 3500-3650 MHz band. These earth stations are proposed to be grandfathered, as detailed in section 7.4. If this proposal is adopted, new fixed or mobile stations in the 3500-3650 MHz band will be required to coordinate with these FSS earth stations as specified in SRSP-520, [*Technical Requirements for Fixed and/or Mobile Systems, Including Flexible Use Broadband Systems, in the Band 3450-3650 MHz*](#).

Table C1: FSS earth stations in the frequency band 3500-3650 MHz

Licence number	Licensee information	Station location	Latitude	Longitude
010001485	INMARSAT SOLUTIONS (CANADA) INC.	Weir, Quebec	45°56'40"	74°31'58"
010001493	INMARSAT SOLUTIONS (CANADA) INC.	Weir, Quebec	45°56'39.44"	74°31'57.9"

Annex D: Proposed urban Tier 4 service areas for WBS displacement

Table D1 lists the 24 Tier 4 service areas that contain at least one large population centre, as defined by the 2016 Census of Population from Statistics Canada. These are proposed to be defined as urban Tier 4 areas for the wireless broadband service (WBS) displacement.

Table D1: Tiers with large population centres

Tier 4	Service area name	Large population centre	Population of large population centre
4-077	Toronto	Toronto	5,429,524
4-077	Toronto	Hamilton	693,645
4-077	Toronto	Oshawa	308,875
4-077	Toronto	Milton	101,715
4-051	Montréal	Montréal	3,519,595
4-152	Vancouver	Vancouver	2,264,823
4-152	Vancouver	Abbotsford	121,279
4-136	Calgary	Calgary	1,237,656
4-141	Edmonton	Edmonton	1,062,643
4-055	Ottawa/Outaouais	Ottawa-Gatineau	989,567
4-055	Ottawa/Outaouais	Kanata	117,304
4-111	Winnipeg	Winnipeg	711,925
4-030	Québec	Québec	705,103
4-079	Guelph/Kitchener	Kitchener	470,015
4-079	Guelph/Kitchener	Guelph	132,397
4-086	London/Woodstock/ St. Thomas	London	383,437
4-154	Victoria	Victoria	335,696
4-010	Halifax	Halifax	316,701
4-090	Windsor/Leamington	Windsor	287,069
4-125	Saskatoon	Saskatoon	245,181
4-084	Niagara-St. Catharines	St. Catharines-Niagara Falls	229,246
4-124	Regina	Regina	214,631
4-001	St. John's	St. John's	178,427
4-151	Kelowna	Kelowna	151,957
4-094	Barrie	Barrie	145,614
4-042	Sherbrooke	Sherbrooke	139,565
4-070	Kingston	Kingston	117,660
4-037	Trois-Rivières	Trois-Rivières	114,203
4-018	Moncton	Moncton	108,620
4-028	Chicoutimi-Jonquière	Chicoutimi-Jonquière	104,222

Annex E: Tier 4 service areas identified for exemption from certain provisions in GL-10 for mmWave

Table E1 lists the preliminary Tier 4 service areas that were exempted from certain provisions in GL-10, [*Interim Guideline for Licensing of Earth Stations in the Fixed-Satellite, Earth Exploration-Satellite and Space Research Services in the Frequency Bands 26.5-28.35 GHz and 37.5-40.0 GHz*](#), for mmWave.

Table E1: Preliminary Tier 4 service areas exempted from certain provisions in GL-10 for mmWave

Tier	Service area name
4-005	Labrador
4-062	Val-d'Or
4-066	Chibougamau
4-103	Kapuskasing
4-104	Kenora/Sioux Lookout
4-105	Iron Bridge
4-107	Marathon
4-109	Fort Frances
4-112	Lac du Bonnet
4-115	Portage la Prairie
4-117	Creighton/Flin Flon
4-118	Thompson
4-130	Northern Saskatchewan
4-147	Peace River
4-157	Powell River
4-161	Ashcroft
4-164	Williams Lake
4-165	Quesnel/Red Bluff
4-166	Skeena

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Tier	Service area name
4-168	Smithers
4-169	Dawson Creek
4-170	Yukon
4-171	Nunavut
4-172	Northwest Territories

Annex F: C-band satellites

Tables F1 and F2 list C-band Canadian satellites and C-band foreign satellites operating in the 3700-4200 MHz band approved to provide service in Canada.

Table F1: C-band Canadian satellites (3700-4200 MHz)

Authorization holder	Satellite name	Orbital position	Frequencies (MHz)
Telesat Canada	Anik G1	107.3W	3700-4200
Telesat Canada	Anik F1	107.3W	3700-4200
Telesat Canada	Anik F1R	107.3W	3700-4200
Telesat Canada	Anik F2	111.1W	3700-4200
Telesat Canada	Anik F3	118.7W	3700-4200
Telesat Canada	Anik G2V (not yet in operation)	109.2W	3700-4200

Table F2: C-band foreign satellites (3700-4200 MHz)

Satellite operator	Satellite name	Orbital position	Frequencies (MHz)
ABS	ABS3A	3W	3745-4065
SES	AMC-1	103W	3700-4200
SES	AMC-6	83W	3700-4200
SES	AMC-7	137W	3700-4200
SES	AMC-8	139W	3700-4200
SES	AMC-11	131W	3700-4200
SES	AMC-12	37.5W	3700-4200
SES	AMC-18	104.95W	3700-4200
SES	NSS-7	20W	3625-4200
SES	NSS-9	177W	3625-4200
SES	SES-1	101W	3700-4200
SES	SES-2	87W	3700-4200
SES	SES-3	103W	3700-3701
SES	SES-3	103W	3702-4198
SES	SES-3	103W	4199-4200
SES	SES-4	22W	3700-4200
SES	SES-6	40.5W	3700-4200
SES	SES-11	104.95W	3702-4198
SES	SES-14	47.5W	3700-4200
ARSAT	ARSAT-2	81W	3700-4200

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Satellite operator	Satellite name	Orbital position	Frequencies (MHz)
Eutelsat	E115WB	114.9W	3700-4200
Eutelsat	EUTELSAT 8WB	8W	3700-4200
Eutelsat	EUTELSAT 172B	188W	3700-4200
Eutelsat	EUTELSAT 174A	186W	3700-4200
Eutelsat	SATMEX 5	116.8W	3700-4200
Eutelsat	E113WA	113W	3700-4200
Eutelsat	E117WA	116.8W	3700-4200
Intelsat	Galaxy 3C	95W	3700-4200
Intelsat	Galaxy-11	93.1W	3700-4200
Intelsat	Galaxy 13 / Horizons I	127W	3700-4200
Intelsat	Galaxy 14	125W	3700-4200
Intelsat	Galaxy 15	133W	3700-4200
Intelsat	Galaxy 16	99W	3700-4200
Intelsat	Galaxy 17	91W	3700-4200
Intelsat	Galaxy 18	123W	3700-4200
Intelsat	Galaxy 19	97W	3700-4200
Intelsat	Galaxy 23	121W	3700-4200
Intelsat	Galaxy 25	93.1W	3700-4200
Intelsat	Galaxy 28	89W	3700-4200
Intelsat	Intelsat 1-R	50W	3700-4200
Intelsat	Intelsat 11	43.1W	3700-4200
Intelsat	Intelsat 14	45W	3700-4200
Intelsat	Intelsat 19	194W	3700-4200
Intelsat	Intelsat 21	58.1W	3700-4200
Intelsat	Intelsat 23	53W	3700-4200
Intelsat	Intelsat 25	31.5W	3500-4200
Intelsat	Intelsat 35e	34.5W	3625-4200
Intelsat	INTELSAT 901	27.5W	3700-4200
Intelsat	INTELSAT 903	34.5W	3700-4200
Intelsat	INTELSAT 905	24.5W	3700-4200
Intelsat	INTELSAT 907	27.5W	3700-4200
Intelsat	IS-18	180W	3700-4200
Intelsat	IS-34	55.5W	3700-4200
Intelsat	IS-37e	18W	3875.05-4085.95
Intelsat	IS-37e	18W	4106.25-4189.65
Intelsat	IS-904	29.5W	3704-3945

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Satellite operator	Satellite name	Orbital position	Frequencies (MHz)
Intelsat	IS-904	29.5W	3955-4200
Intelsat	IS-1002	1W	3625-3650
Intelsat	IS-1002	1W	3650-3700
Intelsat	IS-1002	1W	3700-4200

Annex G: Proposed conditions for interim authorizations for licence-exempt FSS earth stations in the 3700-4200 MHz band and new receive-only FSS earth stations in the 4000-4200 MHz portion of the band

G1. Term: This authorization will expire on the date indicated on the authorization. This authorization is also subject to renewal and termination in accordance with the transition plan and decisions as set out in [future decision paper].

G2. Future consultation and amendments: This authorization may be amended by the Minister of Innovation, Science and Industry at any time and is subject to the decisions, licensing requirements and fees that will follow Innovation, Science and Economic Development Canada's (ISED) consultation on the licensing and fee regime for fixed earth stations.

G3. Fees: This authorization will be subject to fees once they are established through ISED's consultation on the licensing and fee regime for fixed earth stations or through any other applicable process.

G4. Operation of earth stations: The holder of this authorization may install, operate or possess systems of identical earth stations as follows:

- a) **Earth stations in existence as of the date of initial application:** All earth stations operating as part of a system of identical earth stations for which technical information was provided at the time of initial application for authorization immediately following [future decision paper] are authorized under this authorization provided that earth stations operating in the portion of the band 3700-4000 MHz in non-satellite-dependent areas will be no longer authorized under this authorization after the transition deadline as set out in [future decision paper].
- b) **Earth stations established after the date of initial application:** The holder of this authorization may install earth stations authorized under this authorization after the date of initial application set out above provided that the earth stations operate only in the 4000-4200 MHz portion of the band and that technical information for each earth station is provided to and approved by ISED prior to the installation or operation of the earth station.

“Identical earth stations” has the meaning as set out in CPC-2-6-01, [*Procedure for the Submission of Applications to License Fixed Earth Stations and to Approve the Use of Foreign Satellites in Canada*](#), for the licensing of significant numbers of identical earth stations. This authorization authorizes “receive-only” earth stations.

G5. Protection: Earth stations authorized in accord with paragraph (a) above are afforded co-channel protection from 3700-3980 MHz flexible use stations before the transition deadline in all areas, and after the transition deadline in satellite-dependent areas as set out in [future decision paper]. However, earth stations may not claim protection from licensees in adjacent band(s).

Earth stations authorized in accord with paragraph (b) above are afforded adjacent band protection from flexible use stations operating in the 3700-3980 MHz band.

G6. Technical acceptability: All earth station equipment must comply with the applicable Canadian technical requirements as specified in ISED's SRSP-101, [Technical Requirements for Fixed Earth Stations Operating Above 1 GHz in Space Radiocommunication Services and Earth Stations on board Vessels \(ESVs\) Operating in the Fixed-Satellite Service.](#)

G7. Radio station installations: The holder of this authorization must comply with the procedures, as outlined in CPC-2-0-03, [Radiocommunication and Broadcasting Antenna Systems](#), as amended from time to time.

G8. Provision of technical information: The holder of this authorization must provide, and maintain, up-to-date technical information on each earth station in accordance with the definitions, criteria, frequency and timelines specified by ISED.

G9. Compliance with legislation, regulations and other obligations: The holder of this authorization is subject to, and must comply with, the [Radiocommunication Act](#) and the [Radiocommunication Regulations](#), as amended from time to time. The holder of this authorization must use the assigned spectrum in accordance with the Canadian Table of Frequency Allocations and the spectrum policies applicable to this band, as amended from time to time. The authorization is issued on condition that all representations made in relation to obtaining this authorization are all true and complete in every respect.

Annex H: Telesat proposal

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[Telesat proposal](#) (July 5, 2020)