



Spectrum Management and Telecommunications

Decision on Revisions to the 3500 MHz Band to Accommodate Flexible Use and Preliminary Decisions on Changes to the 3800 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, announces the decisions resulting from the consultation process undertaken in Canada Gazette Notice 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 3500 MHz Consultation). The 3500 MHz band includes the frequency range 3450-3650 MHz and the 3800 MHz band includes the frequency range 3650-4200 MHz.

2. All [comments](#) and [reply comments](#) received on the 3500 MHz Consultation are available on ISED's website. Comments and/or reply comments were received from ABC Communications, Awesense, Bell Mobility Inc. (Bell), British Columbia Broadband Association (BCBA), Rachel Blaney, MP: North Island-Powell River, Calgary Economic Development, Canadian Association of Wireless Internet Service Providers (Canwisp), Canadian Broadcasting Corporation/Société Radio Canada (CBC/Radio-Canada), Canadian Communication Systems Alliance (CCSA), Cariboo Regional District, Cogeco Communications Inc. (Cogeco), Comcentric Networking Inc. (Comcentric), Commsult Engineering Ltd. (Commsult), Corridor Communications Inc. (CCI), Corus Entertainment Inc. (Corus), Eastern Ontario Regional Network (EORN), Bragg Communications Inc., carrying on business as Eastlink (Eastlink), Écotel Inc. (ÉCOTEL), Enbridge, Ericsson Canada Inc. (Ericsson), Federation of Canadian Municipalities (FCM), First Mile Connectivity Consortium (FMCC), Huawei Technologies Canada Co., Ltd. (Huawei Canada), Marvin Hunt, MLA: Surrey-Cloverdale, Intelsat US LLC (Intelsat), Inmarsat (Inmarsat), SES S.A. (SES), iTétract Inc. (iTétract), Municipality of Killarney, Nokia, Planetworks, Public Interest Advocacy Centre (PIAC), Québecor Média (Québecor), Regional District of Bulkley Nechako, Regional District of East Kootenay, Regional District of Kitimat-Stikine, Regional District of Okanagan-Similkameen, Rogers Communications Canada Inc. (Rogers), Rural Municipalities of Alberta (RMA), Saskatchewan Telecommunications (SaskTel), Seaside Wireless Communications Inc. (Seaside), Shaw Communications Inc. (Shaw), Sogetel inc. (Sogetel), Squamish-Lillooet Regional District, SSi Micro Ltd. (SSi), Strathcona Regional District, Jackie Tegart, MLA: Fraser-Nicola, Telesat Canada (Telesat), TELUS Communications Inc. (TELUS), Todd Doherty, MP: Cariboo-Prince George, Todd G. Stone, MLA: Kamloops-South Thompson, Tom Shypitka, MLA: Kootenay East, Twin Island Communications (TwinComm), Vancouver Economic Commission, Wayne Stetski, MP: Kootenay-Columbia, and Xplornet Communications Inc. (Xplornet).

2. Legislative mandate

3. The Minister of Innovation, Science and Economic Development, 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 goals and policies for spectrum utilization and for ensuring effective management of the radio frequency spectrum resource.

3. Background and context

4. The [Commercial Mobile Spectrum Outlook](#) published in March 2013 signalled the likely repurposing and release of 100 to 175 MHz of spectrum for commercial mobile services in the 3500 MHz band by 2017. In 2014, ISED released DGSO-007-14, [Decisions Regarding Policy Changes in the 3500 MHz Band \(3475–3650 MHz\) and a New Licensing Process](#) (the 2014 Decision), which included a decision to implement a fundamental reallocation of the 3475–3650 MHz band to allow mobile services in addition to existing fixed services. The 2014 Decision also stated that flexible use in this band would be implemented after further consultation on a flexible use band plan and licensing framework. The 2014 Decision determined that the future licensing framework should permit existing licensees that are in compliance with existing conditions of licence, and who would have a high expectation of spectrum licences under the 3500 MHz flexible use policy, to continue to provide fixed wireless access (FWA) services. However, until recently, there was uncertainty regarding the future use of this band internationally.

5. In June 2018, ISED published SLPB-003-18, [Spectrum Outlook 2018 to 2022](#) (the Spectrum Outlook), outlining its overall approach and planning activities related to the release of spectrum for commercial mobile services, licence-exempt applications, satellite services and wireless backhaul services over the years 2018 to 2022. The Spectrum Outlook resulted from the consultation process SLPB-006-17, [Consultation on the Spectrum Outlook 2018 to 2022](#) (the Outlook Consultation).

6. In the Spectrum Outlook, ISED reaffirmed its commitment to ensuring that Canadian consumers, businesses and public institutions continue to benefit from access to high quality wireless networks at competitive prices in urban as well as rural and remote communities. With the anticipated increased demand for spectrum for a variety of uses and the growing importance of wireless services, ISED committed to develop licensing policies that consider ongoing service provision in rural areas to ensure that Canadians in all areas of the country benefit from the latest technologies including 5G.

7. Wireless technology, whether through fixed, satellite, or mobile broadband, is a key component of connectivity for rural homes and businesses, particularly in areas where wireline solutions are not feasible. The Spectrum Outlook highlighted a number of recent spectrum decisions such as SLPB-001-18, [Spectrum Licence Renewal Process for Advanced Wireless Services \(AWS-1\) and Other Spectrum in the 2 GHz Range](#) and SLPB-002-18, [Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band](#), that place an emphasis on promoting rural connectivity through deployment requirements that go beyond the major urban areas. Another element of ISED's approach to encouraging wireless coverage to rural and remote areas is making spectrum available at a lower cost. This includes providing additional spectrum for licence-exempt use such as white space devices, as well as the benefits of licensing spectrum on a shared basis (e.g. all-come, all-served such as wireless broadband service (WBS) in 3650 MHz), which allows access to spectrum for all entities, including small providers, non-profit providers, and new providers that may be interested in a low-cost spectrum option for broadband deployment in rural and remote areas.

8. The Spectrum Outlook also noted that, internationally, the 3500 MHz band is now considered one of the key bands for future 5th generation (5G) technologies and that there have been developments towards making the larger 3400-4200 MHz band available for flexible use. Comments from the Outlook Consultation indicated support for a review of the 3400-4200 MHz band. Responses also indicated that the 3500 MHz band is considered a priority and that there is significant interest in the release of this mid-band spectrum to enable 5G deployments. Concerns regarding continued access to the band and protection of existing services were expressed by fixed satellite service (FSS) providers, wireless Internet service providers (WISPs) and other existing licensees.

9. Comments received in the Outlook Consultation supported releasing low-, mid- and high-band spectrum to enable the development and adoption of 5G technologies. 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 is undertaking the following processes to address the 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 began in March 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 initiated the 3500 MHz Consultation. This decision paper responds to the issues raised in the 3500 MHz Consultation, taking into consideration the comments provided by respondents and the objectives outlined below.
- **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 2017, ISED launched a consultation on the release of millimetre wave spectrum and making it available for 5G, taking a key step in making this high-band spectrum optimal for low-latency and high-bandwidth use.

10. ISED considers that this approach of planning the release of spectrum in low, medium and high frequency bands will be beneficial to the deployment of 5G technologies offering higher speeds, low-latency and improved capacity and coverage.

4. Policy objectives

11. Canadians want high-quality services, ubiquitous coverage and affordable prices from their telecommunications service providers. Canadians rely on wireless telecommunications services to access a variety of applications, multi-media services, social networking and Internet browsing; to do business and connect with others; and to manage finances, health and homes.

12. ISED is committed to ensuring that Canadian consumers, businesses and public institutions continue to benefit from the latest wireless telecommunications services across the country. A robust wireless telecommunications industry drives the adoption and use of digital technologies and enhances the productivity of the Canadian economy.
13. 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 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.
14. Beyond initial improvements to the speed and capacity of mobile broadband networks and services, 5G technologies are expected to transform services across all sectors of the economy including manufacturing, healthcare and transport. Testing and demonstrations of different use cases are taking place domestically and internationally. Initial 5G deployments appear to be focussed on capacity expansions for current 4G networks in the mid-band and various fixed wireless access 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 benefits to Canadians. This decision will ensure that Canadians can benefit from the initial improvements to mobile broadband networks and be ready to embrace new applications and services as they develop.
15. Spectrum releases in Canada are designed to align with international market developments and the continual evolution of wireless technologies around the world. 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 positions itself to benefit from the next generation of smartphones and other advanced wireless devices. Canadian consumers benefit from the economies of scale that come when manufacturers produce equipment for many markets. In addition, specific Canadian circumstances must be taken into account, which in this case, include the reliance of some Canadians on fixed wireless access using the 3500 MHz band for broadband connectivity, and the competitive dynamics of the market for commercial mobile services.
16. Some rural areas may continue to rely on fixed wireless access in the 3500 MHz band over a longer period of time than urban areas. As such, and in accordance with one of the objectives of the *Telecommunications Act*—to promote the availability of reliable and affordable services to all regions of Canada—ISED continues to consider options for promoting access in rural areas within the context of managing this spectrum resource, and within a broader policy context, noting that challenges may vary based on geography, population density and the state of the marketplace.
17. In developing this decision, the Minister has been guided by the policy objectives stated in the *Telecommunications Act*, and the policy objective of the [Spectrum Policy Framework for Canada](#) (SPFC), to maximize the economic and social benefits that Canadians derive from the use of the radio

frequency spectrum resource. These objectives, and the enabling guidelines listed in the SPFC, will continue to guide the Minister in managing the spectrum resource.

18. Through Canada's [Innovation and Skills Plan](#) and its focus on people, technologies and companies, the Government of Canada is committed to promoting innovation-led growth across all sectors of the Canadian economy. Decisions made in this document support the Innovation and Skills Plan priorities and the SPFC policy objective by positioning Canada at the leading edge of the digital economy through the enabling of flexible use of the 3500 MHz band to support 5G technologies. Consequently, ISED's policy objectives for the 3500 MHz band are to:

- foster innovation, investment and the evolution of wireless networks by enabling the development and adoption of 5G technologies
- support sustained competition, so that consumers and businesses benefit from greater choice
- facilitate the deployment and timely availability of services across the country, including rural areas

5. International situation and ecosystem development in the 3500 MHz and 3800 MHz bands

19. In the 3500 MHz Consultation, ISED sought comments on its assessment of the timelines identified for the development of a 5G equipment ecosystem in the 3500 MHz and 3800 MHz bands. In its assessment, ISED noted that portions of the band ranging from 3400-3800 MHz are either available or being made available for commercial mobile or flexible use in several countries, including the United States (U.S.), the United Kingdom, Ireland, Japan, China, Singapore and Australia. As the 3500 MHz band is viewed as key spectrum to support 5G technologies, many countries have begun work to make this spectrum available for this purpose. In most cases, a licensing process is the first step in advancing the development and deployment of new technologies. Subsequent network deployment can occur a few years after the licences have been issued, with consumers making use of the network and services only once devices and handsets have been fully developed.

20. ISED noted in the 3500 MHz Consultation that the 3rd Generation Partnership Project (3GPP) has completed specifications for three Long-Term Evolution (LTE) bands that cover the 3400-3800 MHz band to operate with time-division duplex (TDD) technologies. 3GPP has also identified the 3300-4200 MHz band for its 5G New Radio (NR) standards. Specifications were developed in late 2017 for two TDD 5G NR bands: band n77 (3300-4200 MHz) and band n78 (3300-3800 MHz). ISED also noted that specifications for additional advanced features such as ultra-reliable low latency communications, massive machine-to-machine communication and network slicing are expected to be completed in early 2020, when Release 16 specifications are finalized.

Summary of comments

21. ABC Communications, BCBA, Bell, Canwisp, CCI, Cogeco, Huawei Canada, Québecor, Rogers, SaskTel, Seaside, Shaw, TELUS and Xplornet generally agreed with ISED's assessment of timelines.

22. Responses from Bell, Canwisp, Cogeco, Nokia, Québecor, Rogers, SaskTel, Seaside, and TELUS were of the view that equipment for the 3500 MHz band would be ready before equipment for the 3800 MHz band. Nokia and Xplornet believe 5G equipment using band n78 (3300-3800 MHz) should be available in 2019, while equipment for band n77 (3300-4200 MHz) should be available in 2020, roughly a year later.

23. CCI agreed with the timeline presented by ISED for 5G technologies in the 3500 MHz band. However, it disagreed with the timeline discussed for 5G technologies in the 3800 MHz band, given the prevalence of legacy C-band fixed satellite systems internationally that will hamper the development of the 5G equipment ecosystem required to use the band.

Discussion

24. As noted in section 3, both the 3500 MHz and 3800 MHz bands have been identified for 5G technology development and deployment. ISED notes that access to specific bands in Canada (e.g. band n77) may be more difficult depending on current use and number of existing users.

25. Based on comments received, and the development of specifications, ISED is of the view that the timelines for development of a 5G equipment ecosystem will not be the same for both bands, with equipment for the 3500 MHz band coming out before equipment for the 3800 MHz band. ISED expects that 5G equipment for band n78 will be available in 2019, while equipment for band n77 will be available in 2020 or later. ISED will continue to monitor international development and availability of equipment for 5G services.

6. The 3500 MHz band

26. In Canada, the 3100-3500 MHz band is allocated to radiolocation on a primary basis; however, radiolocation is not used in the 3475-3500 MHz portion of the band. Radiolocation use in the 3300–3450 MHz band is limited to government use. The 3400-3475 MHz portion of the band is reserved for aeronautical and maritime radars, but currently has limited use. The 3450-3475 MHz band is also allocated to fixed services on a co-primary basis.

27. The 3475-3650 MHz band is currently allocated to fixed and mobile services on a co-primary basis (radiolocation and fixed-satellite services are other co-primary services in separate parts of the band) and is being used for fixed wireless access systems as flexible-use licences have not yet been issued.
28. The 3500 MHz Consultation indicated that the 3475-3650 MHz band is primarily used to provide fixed wireless Internet services, often in rural and remote communities. Most of the licences were issued for 10-year terms, through auction processes between 2004 and 2009, and were geographically defined using Tier 4 service areas. Through three separate auctions, 674 licences were issued to 17 licensees, with the first set of licences having expired in 2014. As part of the 2014 Decision, upon expiry of auctioned licences, ISED allowed licensees to apply for new licences with 1-year terms, provided that all their conditions of licence had been met. The majority of the auctioned licences have already passed their initial 10-year licence term, and eligible licensees have applied annually and received new 1-year licences. There are a small number of auctioned licences that are still within their initial licence term and will expire in 2019.
29. Where deployment conditions were only partially met, the 2014 Decision allowed incumbent licensees to apply for grid cell based licences. These licences encompassed their existing coverage area, allowing licensees to continue to offer services in those areas. The spectrum that was not renewed (i.e. the spectrum holdings that reverted to ISED due to non-compliance) in rural areas was made available on a first-come, first-served (FCFS) basis for 1-year licence terms, with a high expectation of renewal. A total of 10 licensees have been issued 26 licences through this process since 2014.
30. Prior to 2004, ISED licensed spectrum for fixed wireless access systems on an FCFS basis in rural areas of Canada. These licences are limited to the specific grid cells required for the coverage area. There are 12 licensees and a total of 34 licences that are still authorized from this licensing process.

6.1 Changes to the allocations in the 3500 MHz band

31. In the 3500 MHz Consultation, ISED sought comments on its proposal to add a primary mobile allocation to the 3450-3475 MHz band, remove the radiolocation allocation in the 3450-3500 MHz band, and suppress footnote C15 in the [Canadian Table of Frequency Allocations](#). The corresponding changes to the Canadian Table of Frequency Allocations were proposed as follows:

3 450 - 3 475	FIXED MOBILE RADIOLOCATION 5.433 Amateur C15
3 475 - 3 500	FIXED MOBILE RADIOLOCATION 5.433 Amateur C15

**SUP
C15**

(CAN-14) In certain locations in Canada the radiolocation service has priority over the fixed service in the 3450-3500 MHz band, and over the mobile service in the 3475-3500 MHz band. ISED will identify through spectrum policy the general area of radiolocation system operation.

Summary of comments

32. There was strong support for this proposal. Most of the respondents to this issue directly supported the addition of a mobile allocation to the 3450–3475 MHz band and the removal of the radiolocation allocation in the 3450–3500 MHz band. ABC Communications, Bell, Canwisp, Cogeco, CCI, EORN, Eastlink, ÉCOTEL, Ericsson, Huawei Canada, Nokia, Québecor, Rogers, SaskTel, Seaside, Shaw, Sogetel, SSI, and TELUS all agreed with ISED’s proposal to add a primary mobile allocation in the 3450-3475 MHz band, and remove the priority for radiolocation use in the 3450-3475 MHz band. BCBA supported the addition of a mobile allocation in the band.

Discussion

33. The 2014 Decision indicated that flexible use would be allowed in 175 MHz of spectrum within the 3475-3650 MHz band. In the 3500 MHz Consultation, ISED proposed that the amount of flexible use spectrum could be expanded by 25 MHz, allowing for 200 MHz of flexible use spectrum, by also changing the allocation in the 3450–3475 MHz band, which is currently used for radiolocation and fixed services.

34. Based on current use of the band and as confirmed by existing government users, ISED remains of the view that removing the priority for radiolocation use in the 3450-3475 MHz band will not negatively impact the operation of government radiolocation systems or the existing fixed point-to-point use. As such, ISED is reallocating the 25 MHz of spectrum in the 3450-3475 MHz band from the radiolocation service to the mobile service, as proposed in the 3500 MHz Consultation. This will enable flexible use across the entire 3450–3650 MHz band in Canada.

Decision

D1. ISED is adopting the changes to the Canadian Table of Frequency Allocations as proposed. ISED will add a primary mobile allocation to the 3450-3475 MHz band, remove the radiolocation allocation in the 3450-3500 MHz band, and suppress footnote C15.

6.2 Flexible use in the 3500 MHz band

35. The 2014 Decision reallocated the 3500 MHz band to allow mobile use and to adopt a flexible use (i.e. fixed and/or mobile services) policy throughout the 3475-3650 MHz band. In the 3500 MHz Consultation, ISED sought comments on its proposal to also allow flexible use in the 3450-3475 MHz band, which would provide the ability to issue flexible use licences across 3450-3650 MHz.

Summary of comments

36. The majority of respondents agreed with the proposal to allow flexible use. Bell, CCSA, CCI, Cogeco, Eastlink, EORN, Ericsson, and Nokia supported the proposal to allow flexible use as suggested. Huawei Canada, PIAC, Québecor, Rogers, SaskTel, Shaw, SSi and TELUS also supported the proposal, stating that it will promote innovation and early adoption of 5G technologies in Canada. They noted that flexible use licensing will allow operators to deploy the best-suited technology to meet demand, whether it be for fixed or mobile services.

37. ABC Communications, BCBA, Canwisp and Seaside supported the proposal, adding that ISED should create an auction framework that permits small, regional and rural carriers to acquire spectrum. BCBA suggested making spectrum available in rural areas using an FCFS licensing process and light licensing.

38. Xplornet supported the proposal and suggested that ISED allow flexible use licensing for as much of the 3400-3800 MHz spectrum as possible to align with international standards and equipment.

39. In the reply comments, the Rural Municipalities of Alberta noted that it would be more comfortable with the introduction of flexible use in the band if it were accompanied by a plan to ensure the continued availability of fixed services or affordable deployment of 5G services in rural areas. iTéract stated that any licensing changes in rural areas would be detrimental to small operators and the subscribers they serve. This aligns with comments received from the Federation of Canadian Municipalities, which submitted that the government should ensure the continuation of existing services in rural areas, and First Mile Connectivity Consortium, which expressed concern that the proposal makes no reference to the importance of rural broadband.

40. CBC/Radio-Canada recommended that the impact to adjacent bands be studied. CBC/Radio-Canada has concerns that ubiquitous deployment of mobile devices may interfere with its downlink operations in the adjacent band 3968-3998 MHz, since they use low noise amplifiers that amplify signals within the frequency range 3625-4200 MHz. TELUS noted, in its reply comments, that the concerns raised by CBC/Radio-Canada seem to relate to interference from mobile devices operating in 3625-3650 MHz, not 3450-3475 MHz.

Discussion

41. The 3500 MHz band provides opportunities to promote innovation and early adoption of 5G technologies while maintaining current uses through the adoption of a flexible use licensing model. Flexible use licensing will enable licensees to better target their services to the needs of their customers. This approach is intended to enable new technology and innovation to evolve, while supporting a variety of different needs and use cases. It will enable the continuation of existing services and support the growing demand for new services.

42. The concerns raised regarding the continued availability of fixed services and affordable 5G services in rural areas have been taken into account throughout the various aspects of this decision. ISED is of the view that rural connectivity continues to be an important consideration and has integrated this view into its approach for the development of the consultation leading to a licensing framework for this band.

43. As indicated previously, ISED remains of the view that sound engineering techniques could mitigate potential interference into adjacent bands. For the reasons stated above, ISED will allow flexible use in the 3450-3475 MHz band, as proposed in the 3500 MHz Consultation.

Decision

D2. ISED is adopting a flexible use licensing model for fixed and mobile services in the 3450-3475 MHz band, which will provide ISED with the ability to issue flexible use licences in a 200 MHz frequency range from 3450-3650 MHz.

6.3 Coexistence of radiolocation and other services in the 3400-3450 MHz band

44. The Spectrum Outlook stated that ISED would review the use of the entire 3400-4200 MHz band. Accordingly, the 3500 MHz Consultation stated that ISED is exploring mechanisms to optimize use in the 3400-3450 MHz band, and sought comments regarding the level of interest in sharing spectrum between radiolocation and other services and the options for doing so.

Summary of comments

45. ABC Communications, Bell, BCBA, Canwisp, CBC/Radio-Canada, CCSA, Cogeco, CCI, ÉCOTEL, Ericsson, Huawei Canada, Nokia, Rogers, SaskTel, Seaside, Shaw, TELUS and Xplornet supported potential sharing between radiolocation and flexible use in this band with some suggesting that additional information would be needed to assess the viability of sharing.
46. Some respondents, including ABC Communications, Bell, Canwisp, CCSA, CCI, Ericsson, Huawei Canada, Rogers and SaskTel, suggested that exclusion zones be used to enable sharing of the band between the radiolocation service and other services, and to enable flexible use.
47. Comments received from ABC Communications, BCBA, Canwisp, CCSA, CCI, Cogeco, ÉCOTEL, Seaside and Shaw, supported the use of a database access system or dynamic spectrum access, or at least the exploration of the concept, to coordinate assignments between flexible use and radiolocation.
48. Bell, Québecor, Rogers, and SaskTel stated that dynamic spectrum access or other similar spectrum sharing techniques and technologies were considered emerging technologies and therefore not ready to implement. In these submissions, respondents suggested that geographic exclusion zones may be more appropriate to optimize the use of the 3400-3450 MHz band.
49. Bell, Canwisp, CCSA and Shaw supported even further restrictions, for example limiting use to indoor and underground locations, and/or limiting the time of use, to enable sharing in the 3400-3450 MHz band. Shaw emphasized that most mobile data traffic is generated indoors.
50. Ericsson, SaskTel and TELUS indicated that technical parameters from incumbent government users are required to determine the impact of interference between the radiolocation service and mobile-fixed services under flexible use. In addition to the parameters, Huawei Canada, SaskTel and TELUS recommended further interference studies between flexible use and radiolocation services in the band to determine whether this sharing is possible. Ericsson, Huawei Canada, SaskTel and TELUS submitted that sharing, if possible, should be based on geographic separation.
51. BCBA, Rogers and Xplornet suggested that wireless broadband services (WBS) operators should be allowed to operate in the 3400-3450 MHz band. While BCBA suggested 3400-3450 MHz as an additional band for WBS operators, Rogers and Xplornet suggested a migration of WBS operations to this band from the 3650-3700 MHz band. They argued that with this migration 5G operators would gain access to additional contiguous spectrum from 3450-3700 MHz for 5G systems. In their reply comments, Bell, EORN and TELUS indicated support for a transition of WBS from the 3650-3700 MHz band to the 3400-3450 MHz band.

Discussion

52. As demand for spectrum increases, traditional services are competing with new services to use the same spectrum. Depending on the extent to which the spectrum is already being used, it may not always be possible to completely repurpose spectrum for new uses. ISED recognizes that there are new technologies and techniques (e.g. cognitive radio, dynamic spectrum access) being developed that will change the way spectrum is accessed through intelligent decision-making solutions and geographic/operational awareness of the radio environment. These technologies and techniques will provide new opportunities for optimizing the use of spectrum and promise to make it increasingly feasible to share spectrum in real-time between multiple different services. Recognizing that these new sharing paradigms are still in the early stages of development, ISED is monitoring progress and exploring ways to implement provisions that would enable such opportunities in the future. ISED continues to examine new approaches to spectrum licensing in order to enable and support the development, adoption, and use of new and future wireless technologies and applications.

53. In Canada, the 3400-3450 MHz portion of the band is reserved for use by aeronautical and maritime radars. The U.S. has similar allocations. However, due to the high level of confidentiality requirements associated with the radiolocation applications in Canada and the U.S., exact deployment details for radiolocation stations are difficult to study. Therefore, as indicated in the Spectrum Outlook, the 3400-3450 MHz band is being treated separately from the rest of the band.

54. As indicated by Rogers and Xplornet, moving WBS operators out of the 3650-3700 MHz band and into the 3400-3450 MHz band could be feasible in the future. ISED notes that this will have to be carefully considered due to the potential impact on services delivered to Canadians. Some difficulties may be encountered by WBS operators, more specifically with regards to whether the equipment is able to operate in the 3400-3450 MHz band. Any change would also have to consider their potential impact on the operation of the radiolocation service and the need to protect this service.

55. As sharing technologies continue to evolve, ISED is exploring other mechanisms for optimizing spectrum use in the 3400-3450 MHz band. Many countries are including this band in their plans for 5G flexible use, and equipment is being developed to support this frequency range. However, while radiolocation is intermittent in nature, this interference may be more pronounced in areas close to large ports, airports, the border, and other areas where radars are located. Further work is required to address the complexities of potential interference issues with radiolocation services operating in Canada, along the Canada-United States border and in Canadian coastal waters.

Decision

D3. ISED will continue to monitor and study the 3400-3450 MHz band to assess its potential use in the future for other services. Any changes to the use of the band will be subject to a future consultation.

6.4 Provisions to allow existing licensees to continue services in the 3500 MHz band

56. In accordance with the 2014 Decision, ISED is developing a flexible use policy framework to accommodate both current and future users. The 3475-3650 MHz band is primarily being used to provide wireless Internet through fixed broadband systems. The results of recent international spectrum auctions and stakeholder feedback on ISED's Outlook Consultation suggest that the importance of the 3500 MHz band has increased significantly with the introduction of the mobile allocation and the expectation of it being a key band for the deployment of 5G services.

57. In order to address the requirements of the various stakeholders, ISED has considered different approaches for determining the amount of spectrum that will be licensed to existing licensees to allow them to continue offering services and the conditions of these authorizations, while noting that licensees would be required to reduce their spectrum holdings and transition to different frequencies in the new band plan.

58. In the 3500 MHz Consultation, ISED proposed that, to be licensed for flexible use, existing licensees in this band will be required to apply to ISED for a new flexible use spectrum licence. At that time, ISED would cancel the fixed use spectrum licences for the areas where licensees apply for new flexible use licences. Eligibility for new flexible use licences that are based on existing fixed use licence holdings would be based on the holdings as of June 6, 2018, the date on which the [*Consultation on Revisions to the 3500 MHz Band to Accommodate Flexible Use and Preliminary Consultation on Changes to the 3800 MHz Band*](#) was published. Any subsequent licence transfers or divisions of a licence by area and/or frequency will not alter the total amount of spectrum available to incumbents for flexible use. All existing licensees would be subject to transition/displacement under the new band plan.

59. In the 3500 MHz Consultation, ISED sought comments on two proposed options that would allow incumbents to continue providing wireless services, while providing additional stakeholders with an opportunity to acquire flexible use spectrum. In addition, comments were sought on any alternative options that could also be considered. The two proposed options were as follows:

- **Option 1:** For each licence area, existing licensees would be issued flexible use licences for one-third of their current spectrum holdings rounded to the nearest 10 MHz, with a minimum of 20 MHz.
- **Option 2:** For each licence area, existing licensees would be issued flexible use licences for a fixed amount of spectrum. Any licensee that holds 50 MHz of spectrum or more would be licensed for 50 MHz, and all other licensees would be licensed for 20 MHz.

Summary of comments

Summary of comments: Option 1

60. Of the two options presented, Cogeco, Eastlink, PIAC, SaskTel, and Shaw generally supported Option 1. TELUS supported Option 1 but only in rural areas. Rogers viewed Option 1 as superior to Option 2, but did not support either of the options.

61. Eastlink argued that although it would be preferable for all spectrum to be returned, it would support Option 1. It submitted that Option 1 is fair in that all licensees would be treated equally, by allowing them to keep one-third of their holdings, and would ensure that any fixed wireless provider actually serving customers would retain a sufficient amount to continue providing services. Similarly, Shaw favoured Option 1 stating that it best balances the objectives of service continuation, competition in the provision of 5G services, and the development of new and innovative 5G services. Cogeco also supported Option 1 but recommended that the amount of spectrum that any one licensee could retain should be capped at 50 MHz. Both Shaw and Cogeco recommended that existing licensees be permitted to retain only the portion of the spectrum that they are actively using to provide services to customers. They argued that where an incumbent licensee cannot demonstrate that they are providing services to customers, as opposed to merely operating a transmitter, they should be required to return the spectrum in question.

62. SaskTel argued that Option 1 provides a fair exchange as incumbents would receive flexible use spectrum licences of a much higher value, for one-third of their current fixed use spectrum licences. It noted that this would give existing licensees the flexibility to deploy fixed and/or mobile services, including 5G services to customers, while freeing spectrum for auction and allowing for the deployment of new 5G technologies and services. It suggested that this would also result in the most efficient utilization of the spectrum.

63. TELUS only supported Option 1 as it applies to rural areas, and offered a variation of this option for urban areas. It noted that both Options 1 and 2 adequately provide for the continuation of existing services for WISPs operating outside of large population centres, but that Option 2 would cause serious problems for the availability of new 5G services for Canadians. It argued that neither option is necessary in urban areas claiming that there are little to no services currently being provided with this spectrum, and therefore, all the spectrum should be returned in those areas.

64. Wayne Stetski opposed Option 1 claiming that reducing the spectrum available for rural broadband networks will adversely affect broadband services in rural communities across Canada.

Summary of comments: Option 2

65. ABC Communications and Xplornet supported neither option. If they were forced to select between the two, they would settle on Option 2, while suggesting that both of the options would risk causing harm to rural consumers and arguing that operators would not be able to maintain service levels with reduced spectrum holdings or keep pace with increasing consumer demand. ABC Communications also argued that the reduction of spectrum holdings based on an increase in value discriminates unfairly against small carriers with limited spectrum holdings in other bands. It added that many spectrum bands have increased in value since the first cellular licences were issued for analog services in the 1980s; however, it claimed that no incumbent licence holder has ever been subject to an involuntary reduction in spectrum holdings.

66. BCBA and Canwisp argued that Option 2 provides better support for the continuation of existing services, particularly in rural areas, while allowing ISED to recuperate a sufficient amount of spectrum to promote competition in the Canadian marketplace and availability of new 5G services. In the same way, CCI supported Option 2 because it is less disruptive to the marketplace, but it did not hold the view that having more spectrum holders will increase the competitiveness of the marketplace.

67. The Cariboo Regional District, Commsult, Enbridge, Marvin Hunt, Planetworks, Regional District of Bulkley Nechako, Regional District of Okanagan-Similkameen, Todd Doherty, Todd G. Stone, and TwinComm supported Option 2, claiming that it does not significantly reduce spectrum holdings of small rural providers. They also urged ISED not to reduce any spectrum holdings that are currently used for providing service in rural communities and rather, to make additional spectrum available for the provision of fixed wireless services in these communities. Similarly, the Regional District of Kitimat-Stikine argued that Option 2 is preferred because it seems to better protect the small to medium-sized entities that are more likely to serve smaller communities. Rachel Blaney supported Option 2 and emphasized the importance of connectivity in rural and remote communities. Ms. Blaney argued that any action that risks this connectivity is unacceptable, especially given the CRTC's basic service objective.

68. Seaside supported Option 2 as it would better allow service providers that currently hold licenses in this spectrum to continue to offer existing services. SSi favoured Option 2 as well noting that it provides for greater certainty for existing licensees, while reserving adequate bandwidth for new uses including 5G. Likewise, Sogetel expressed support for Option 2 because it holds 50 MHz of spectrum and requires this bandwidth to continue its operations and maintain the level of quality and performance offered to its customers.

69. ÉCOTEL was of the opinion that Option 2 maximizes the possibility of achieving healthy competition in the more urban areas where there are already wireline options to serve customers. They argued that in rural areas, on the other hand, companies using the spectrum to serve customers should retain 100% and those that are not serving customers should face an additional 50% reduction in the proposed values.

Other relevant comments on the proposed options

70. Bell argued that returning spectrum under either proposal would be inappropriate because the licences were acquired through auction or other legitimate means, and the spectrum is now (or soon will be) used to provide broadband services to customers, many of whom are in rural areas. They reasoned that a forced return of spectrum would discourage future investment and innovation because existing licensees have invested tens of millions of dollars to acquire the spectrum and deploy networks.

71. Bell also highlighted concerns about how Inukshuk, a Bell and Rogers partnership, would be treated as a single licensee for the purpose of determining any reduction of existing spectrum or future spectrum allocation. It argued that in this case, the licences held by Inukshuk should be treated as if Bell and Rogers each hold a portion of the licences. In reply comments, Rogers supported this argument but ABC Communications, Shaw and TELUS rejected it on the grounds that Inukshuk is a single licensee and should be treated consistently with other licensees.

72. Rogers argued that both options presented would be sub-optimal for ensuring 5G facilities-based competition between national carriers and did not recognize the investments made by current licensees. It argued that under Option 1, current licensees should be allowed to retain two-thirds of the current holdings, combined with an expansion of the band to include a total of 300 MHz of spectrum for flexible use. Rogers suggested that ISED should follow the precedent established in the introduction of flexible use in the 2500 MHz Broadband Radio Service Band, where one-third of spectrum was returned to ISED as part of the adoption of a new band plan. Rogers also argued that under Option 2, Bell and Rogers should be treated as separate licence holders with respect to the Inukshuk's spectrum holdings and added that only then should Option 2's formula be applied.

73. Comcentric and iTétract expressed concern with both options, noting that Option 1 would make it impossible to provide a reasonable broadband experience and that even with the provisions in Option 2 there will be situations where significant capital investment will be required. EORN was also concerned about the potential impact of forcing licensees to return spectrum in eastern Ontario and recommended that ISED not do so in rural areas where it will impact existing users.

74. Québecor argued that introducing mobile in the 3500 MHz band is a fundamental reallocation of the band that represents a major turning point in the evolution of the Canadian wireless market given the vital importance of the 3500 MHz band for 5G. They reasoned that it is only by reclaiming all licences in this band that ISED will be able to maximize the benefits of the decision it made in 2014 for the entire Canadian population. Furthermore, allowing current licensees to keep spectrum would amount to undeserved gains at the expense of other mobile network operators, and in particular regional providers.

75. The Rural Municipalities of Alberta had concerns with how both options could impact rural Internet service providers, noting that Option 1 would require small Internet service providers to invest in "equipment upgrades" in order to maintain current service levels, and Option 2 could result in potentially significant loss of spectrum for large fixed wireless providers. The Squamish-Lillooet Regional District was of the view that fixed wireless spectrum is an important component of rural

connectivity and therefore encouraged ISED to ensure the spectrum available for rural broadband networks is maintained at a level that promotes the growth of rural communities.

Summary of comments on alternative options

76. ABC Communications, Canwisp, Cariboo Regional District, Cogeco, EORN, Eastlink, ÉCOTEL, Marvin Hunt, Enbridge, Planetworks, Regional District of Bulkley Nechako, Todd Doherty, Twin Island, and Wayne Stetski argued that ISED should not reduce any spectrum holdings that are used for providing service in rural communities. ABC Communications, BCBA and Canwisp noted that ISED should also give consideration to licensees who have engaged in subordinate licensing arrangements with smaller regional and rural carriers. Canwisp suggested that a potential option could be that any licensee that holds 40 MHz of spectrum or more would be licensed for 40 MHz, and all other licensees would be licensed for 20 MHz, and that subordinated spectrum should also be taken into consideration.

77. Cogeco, Eastlink, ÉCOTEL, FMCC, Shaw and Sogetel argued that licences that are unused or inefficiently used should not be eligible for conversion. EORN and Rural Municipalities of Alberta provided similar comments, arguing that existing licensees who can demonstrate full license usage, should be allowed to keep the full amount of spectrum in a service area if they commit to introduce either mobile or fixed 5G services at some reasonable time. Similarly, ÉCOTEL reasoned that those who are using the spectrum to serve customers should keep their licences and those who are not serving customers should be subject to the options presented in the 3500 MHz Consultation, but with an additional 50% reduction. Eastlink submitted that all spectrum should be returned to ISED with the exception of spectrum being used to serve retail end-users in very remote areas for fixed wireless.

78. The Regional District of Kitimat-Stikine suggested that there could be a solution that better balances rural-urban as well as small-large companies, but did not provide specific options.

79. Bell and Rogers argued that if ISED requires existing licence holders to return a portion of their spectrum, the amount returned should be no greater than one-third of their spectrum holdings.

80. CCI expressed a view that no licences should be returned, but rather the terms of licences should be amended to require greater spectrum sharing across all frequency bands, based on tariffed rates.

81. Comcentric claimed that a minimum of 60 MHz or 30 MHz is required to efficiently utilize the bandwidth, as most solutions utilize 10 MHz or 20 MHz channels, and at least three channels are needed to operate a system even with synchronization. They suggested that licensees with 60 MHz or more should be able to keep 60 MHz, licensees with between 40 MHz and 60MHz should be able to keep 40 MHz, and licensees with less than 40 MHz should keep 20 MHz. They claim that this would align better with the technology that is available.

82. TELUS suggested that Option 1 should apply except in large population centres, where 5G is most likely to be initially deployed and there is little demand for fixed services. In those areas, all existing licences should be returned to ISED. SSi supported TELUS's proposal in its reply comments.

83. Québecor argued that all spectrum should be returned. Awesense, Calgary Economic Development, Jackie Tegart, the Regional District of East Kootenay, the Strathcona Regional District, Tom Shypitka, and the Vancouver Economic Commission recommended that a sufficient amount of spectrum be reclaimed to support competition in all areas of Canada, including rural areas.

84. Xplornet suggested that an approach similar to pro-competitive measures in other bands should be applied to determine how much spectrum existing licensees could retain. This would involve applying a 100 MHz cap for each licensee in each Tier 4 licence area and a concentration cap of 40% of the national MHz/pop in the existing 175 MHz of spectrum that is currently licensed in the 3500 MHz band. The 100 MHz cap would be similar to the 50 MHz proposed under Option 2, but less impactful on rural deployments. Xplornet noted that applying the concentration cap could allow ISED to prioritize making spectrum available in large urban areas where 5G services are most likely to be initially deployed.

85. ABC Communications supported the Xplornet proposal, arguing that it mitigates the harm caused by recuperating spectrum that is currently in service while permitting the reallocation of spectrum to support urban mobile 5G deployment in Canada. Whereas Bell and Rogers recommended that ISED should reject Xplornet's proposal, arguing that it is a self-serving proposal that results in Xplornet retaining nearly all of their existing spectrum holdings while disadvantaging other licensees.

Discussion

86. ISED appreciates the views provided by respondents and has considered the impacts of the proposed changes on both existing licensees and future licensees seeking an opportunity to provide 5G services in this band. It has also considered the potential impact on current services provided to Canadians in rural and remote areas, who currently rely on fixed services.

87. All spectrum in the band is subject to a fundamental reallocation and will be licensed through a flexible use licensing process and the transition plan outlined in section 6.9. The views of respondents regarding the options presented by ISED were polarized. In general, incumbent licensees were of the view that they should be eligible to apply for new licences representing the same amount of spectrum holdings currently licensed for fixed services (or as much spectrum as possible). Other stakeholders that are interested in acquiring new spectrum licences in this band were of the view that most, if not all, of the spectrum licences should be made available through an auction process, and that current licensees should have a more limited eligibility to apply for new licences.

88. While some respondents addressed the two options presented by ISED, others offered variations or alternative options to consider. In response to the views that existing licensees should be eligible for new licences representing the same amount as their current holdings, or at least two-thirds of their current holdings, ISED notes that the [*Framework for Spectrum Auctions in Canada*](#) states that, as a condition of licence, licences will have a high expectation of renewal, unless a breach of licence condition has occurred, a fundamental reallocation of spectrum to a new service is required or an overriding policy need arises. Given ISED's 2014 Decision to fundamentally reallocate this band to enable mobile use, in addition to fixed use, ISED is now proceeding to accommodate the introduction of new mobile services in the band and to encourage the most efficient use of the spectrum. Allowing current licensees to retain all or a large portion of their current holdings, given the new allocation in the band, would result in some licensees receiving competitive advantage in the provision of 5G services and would limit ISED's ability to support the policy objective of sustained competition that will provide Canadian consumers and businesses with greater choice. Moreover, by limiting the amount of spectrum available for a subsequent auction process, potential new licensees would be constrained in their ability to use this band for the deployment of 5G services. This would work against ISED's policy objective to foster innovation, investment and the evolution of wireless networks by enabling the development and deployment of 5G services. ISED also notes that licensees and other authorized users have been required to return spectrum licences and other authorizations (such as broadcasting certificates) following past fundamental reallocations of spectrum, for example in the AWS band, PCS band, 2500 MHz band, 600 MHz band and 700 MHz band. In these cases, the former authorized entities have been subject to a transition plan and eligible for new authorizations as part of the reallocation process.

89. With regards to the view that all spectrum should be licensed in a subsequent auction process, ISED notes that although there has been a fundamental reallocation of the spectrum in this band, in its 2014 Decision, ISED recognized the importance of broadband connectivity in rural areas and considered that it was in the best interest of Canadians to allow the continuation of existing fixed wireless broadband services within the band across Canada. Accordingly, it stated that any new licensing framework would allow existing fixed use licensees, who are in compliance with all existing conditions, to have a high expectation of spectrum licences under the 3500 MHz flexible use policy, facilitating their ability to provide services. Fixed wireless services continue to be an important means by which Canadians connect to the Internet, along with digital subscriber line (DSL), cable, fibre, geostationary orbit (GSO) satellite, and emerging non-geostationary orbit (NGSO) satellite services. A requirement that all spectrum be offered and licensed through an auction process, with no consideration given to a measure that would allow existing licensees to provide services, would be contrary to the 2014 Decision and undermine the policy objective to facilitate the deployment and timely availability of services across the country, including rural areas.

90. ISED has reviewed the proposal submitted by Xplornet and notes that while it would increase the amount of spectrum licences obtained through the transition policy by Xplornet and Inukshuk in comparison with Options 1 and 2, it would have a significant impact on the availability of spectrum licences to support 5G services in Canada. The Xplornet proposal as presented would only result in approximately one-third of the 200 MHz of spectrum being available to new licensees. ISED finds that although this approach would result in more spectrum being licensed to Xplornet and Inukshuk, it fails to address the objective of supporting competition in both rural and urban areas.

91. ISED notes that while there was some support for Option 1 from Cogeco, Eastlink, PIAC, SaskTel and Shaw, many of the small wireless Internet service providers argued that Option 1 would result in a more significant reduction of their current spectrum holdings and their ability to continue to provide existing services in rural areas. ISED noted in the 3500 MHz Consultation that Option 1 would provide more spectrum to those with spectrum holdings larger than 150 MHz. The minimum amount that a current licensee could be issued in the relevant licence area would be 20 MHz. ISED considered this to be sufficient for small service providers in rural areas to maintain service offerings, recognizing that changes to the networks may be required including equipment upgrades. Option 1 would provide more consistent amounts of spectrum in each licensing service area, generally between 120 and 140 MHz, for a future licensing process. However, ISED agrees that this option would also have a significant impact in rural areas.

92. ISED notes that there was a significant amount of support for Option 2, mainly from smaller Internet service providers, but also from a number of rural municipalities. In the 3500 MHz Consultation, ISED noted that Option 2 would provide both larger and smaller entities with sufficient spectrum to continue to provide current services. In most cases, licensees that hold small amounts of spectrum would retain a greater portion of their spectrum compared to Option 1, whereas those holding significant amounts of spectrum would see larger reductions in their holdings. Under Option 2, spectrum available for a future licensing process would range from 50 to 150 MHz in each service area. ISED, however, acknowledges the concerns raised by respondents that, while Option 2 would better support the continued provision of existing services in rural areas, some rural providers may have difficulty providing current levels of services.

93. Therefore, ISED has decided to adopt a revised approach that would allow incumbents to continue providing wireless services, while still providing additional stakeholders with an opportunity to acquire flexible use spectrum to deploy 5G services. Similar to Option 2, existing licensees would be issued flexible use licences for a fixed amount of spectrum. However, this new approach would allow existing licensees with larger spectrum holdings to retain more spectrum. Taking into account that

incumbent licensee holdings are in blocks of 25 MHz, existing licensees that meet all of their conditions of licence will be eligible to be issued flexible use licences covering the same geographic area, for the following spectrum amounts:

- any licensee that holds 75 MHz of spectrum or more will be eligible to apply for 60 MHz;
- any licensee that holds 50 MHz of spectrum will be eligible to apply for 50 MHz;
- all other licensees will be eligible to apply for 20 MHz.

94. ISED is of the view that with the use of new technologies and deployment efficiencies, the revised approach will ensure that a sufficient amount of spectrum is available for service providers in rural areas to maintain current service. Canadians will benefit not only from continued fixed wireless services in rural areas but also from the competitive deployment of 5G mobile services in all areas of the country.

95. There was a suggestion that subordinate licensees be allowed to continue to operate under their current subordinate licence. ISED notes that all subordinate licences will continue to be valid only as long as their related primary licences remain valid. Where a subordinate licence is related to current fixed use licence that will continue to operate, then the subordinate licence may also continue to be valid. Where a current licence is subject to termination via the transition process, then the subordinate licence will also be terminated. Affected subordinate licensees will not be eligible to apply for new flexible use licences through the transition process, but may continue to negotiate arrangements with a primary licensee and apply for a new subordinate licence under a new primary flexible use licence in accordance with CPC-2-1-23, [Licensing Procedure for Spectrum Licences for Terrestrial Services](#). They are encouraged to do so.

96. Treatment of Inukshuk partnership: Bell provided submissions and a legal opinion that, for the licences held by Inukshuk, ISED should treat Bell and Rogers (who are the partners in the Inukshuk partnership) as separate licensees, each holding 50% of the licences, and then calculate the eligibility to obtain new spectrum licences under the transition process. ISED has carefully reviewed Bell's submission, but has decided that Inukshuk should continue to be treated as a single licensee.

97. The *Radiocommunication Regulations* set out different types of entities that can hold licences. Those entities include individuals, corporations and "...a partnership, joint venture or trust if each partner, co-venturer or trustee is eligible to be issued a radio licence under this subsection." It is clear that Inukshuk as a partnership can legally be issued a licence under the [Radiocommunication Act](#) and ought to be treated the same as other licensees in the band.

98. Calculations of spectrum retention will be based on the spectrum holdings as of June 6, 2018, the date on which the 3500 MHz Consultation was published. Licence transfers or divisions of a licence by area and/or frequency made subsequent to this date will not alter the total amount of spectrum available to eligible incumbent licensees for flexible use through the transition process.

99. In recognition that the future flexible use in the 3500 MHz band allows for commercial mobile use, all transfer requests for existing fixed use licences in this band received prior to the future auction process will be considered as transfers of commercial mobile spectrum and assessed according with section 5.6.4 of CPC 2-1-23. During this timeframe, ISED will also take into consideration the amount of flexible use spectrum available to existing eligible licensees through this decision when assessing transfer requests for commercial mobile spectrum in other bands.

100. In anticipation of the upcoming auction for spectrum in the 3500 MHz band, transfer requests for fixed use licences must be received by ISED at least 6 months preceding the auction application date. This will allow ISED to process the transfer request and to publish the results prior to the auction. An updated list of existing licensees will be published in advance of the deadline to submit an application to participate in the auction. The exact date for the auction is undetermined; however, it is currently planned to take place in 2020.

101. Prior to the auction, where all of a licensee's existing fixed licences are transferred in a given area, the entire eligibility to request flexible use licences in that area through the transition process will also be transferred. However, where a transfer request involves a portion of a licensee's fixed holdings in a given area, the transfer applicant(s) will be required to stipulate the portion of the future flexible use spectrum eligibility that will be available to each transfer applicant through the transition process. For example, where an existing licensee holds a fixed use licence of 100 MHz in a specific area as of June 6, 2018, this licensee will be eligible to apply for a new flexible use licence of 60 MHz through the transition process. In this case, a transfer request for the fixed licence submitted prior to the auction must specify which portion of the eligible 60 MHz flexible use spectrum will be appropriated to each of the transfer applicants. The amount of transferred eligibility for flexible use licences cannot exceed the amount of spectrum transferred from the fixed licences. In the case of a division of the eligibility for a flexible use licence through a transfer request, the future flexible use licences will be treated as distinct licences. The stipulated amounts of flexible use licences will be applied at the time of the transition process.

102. All fixed licences that retain a portion of eligibility will be subject to the transition plan and process outlined in section 6.9. Any portion of a fixed licence that remains with no appropriation of eligibility for a flexible use licence will be automatically cancelled upon completion of the competitive licencing process.

Decisions

D4. For each licence area, existing licensees that meet all of their conditions of licence will be eligible to be issued flexible use licences covering the same geographic area for a fixed amount of spectrum. Existing licensees that currently hold 75 MHz or more of fixed use licences in a given area will be eligible to apply for a new flexible use licence of 60 MHz in the related area; those with 50 MHz of spectrum will be eligible to apply for a new flexible use licence of 50 MHz; and all other existing licensees will be eligible to apply for new flexible use licences of 20 MHz.

D5. Any licence transfers or divisions of a licence by area and/or frequency made subsequent to June 6, 2018, will not alter the total amount of spectrum available to eligible incumbent licensees for flexible use through the transition process.

D6. Prior to the auction, any transfer request involving a portion of 3500 MHz fixed licences must also specify the amount of flexible use spectrum that will be available for each transfer applicant, based on blocks of 10 MHz as per the new band plan described in section 6.5.

D7. All transfer requests for existing fixed use licences in the 3500 MHz band received prior to the auction process will be considered as transfers of commercial mobile spectrum and assessed according with section 5.6.4 of CPC 2-1-23. During this timeframe, ISED will also take into consideration the amount of flexible use spectrum available to existing eligible licensees through this decision when assessing transfer requests for commercial mobile spectrum in other bands. Transfer requests involving 3500 MHz fixed licences will not be accepted in the 6 months preceding the auction application date.

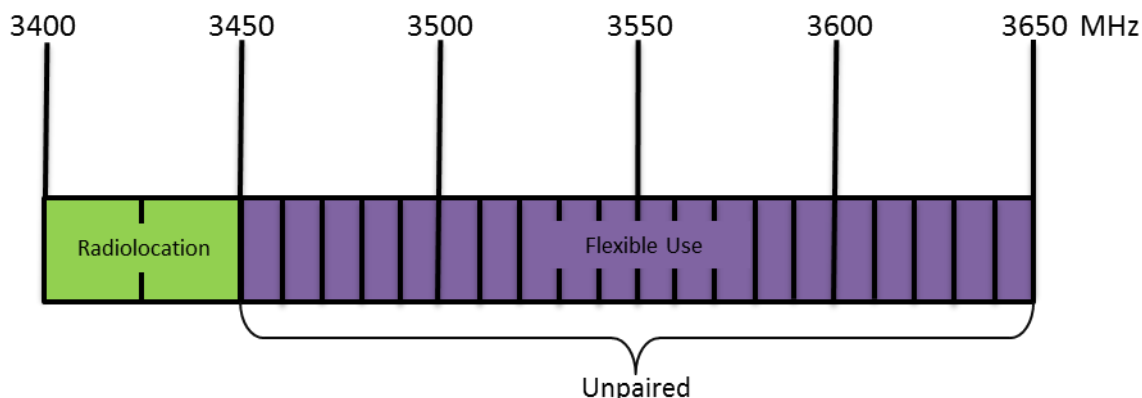
D8. Any portion of a fixed licence that remains with no appropriation of eligibility for a flexible use licence will be automatically cancelled upon completion of the competitive licencing process. All other fixed licences will be subject to the transition process outlined in section 6.9.

6.5 Changes to the 3500 MHz band plan and interference mitigation

103. The current Canadian band plan from 3475–3650 MHz consists of three paired 25 MHz blocks and one unpaired 25 MHz block. This band plan was designed in anticipation of the predominant use of equipment supporting frequency division duplexing (FDD) technologies. Currently, most of the equipment deployed in this band uses time-division duplex (TDD) technology. Practically all 4G equipment available for the band is based on TDD technology and it is expected that 5G equipment will also be TDD technology.

104. In the 3500 MHz Consultation, ISED proposed to implement a band plan composed of 20 unpaired blocks of 10 MHz, which provides a channel spacing size supported by both Long-Term Evolution (LTE) and 5G New Radio mobile technologies, as presented in figure 1 below.

Figure 1: Proposed 3500 MHz band plan



Summary of comments

105. ABC Communications, BCBA, Sogetel, and SSi supported the band plan as proposed, and ÉCOTEL supported the band plan for licences covering urban area. Bell, Canwisp, Cogeco, Huawei Canada, Nokia, Québecor, Rogers, SaskTel, Seaside, Shaw, and TELUS also supported the band plan with allowance to aggregate blocks to create larger contiguous blocks.

106. Based on the technical specifications of existing 5G-ready equipment, CCI argued that the band plan should be revised to unpaired blocks of 20 MHz to support 5G network equipment. ÉCOTEL agreed with unpaired blocks, but felt that a minimum block size of 20 MHz would be needed in rural areas in order to provide similar services to urban areas.

107. Xplornet was supportive of unpaired blocks consistent with a TDD configuration, but felt that until the size of the band or bands and the arrangement of the different uses within the band have been determined, it is difficult to comment on the proposed idea of 10 MHz blocks. From its conversations with equipment manufacturers and its work with international standards organizations, Xplornet argued that, at a minimum, 50 MHz blocks are necessary, while 100 MHz blocks are preferable to realize the full potential efficiencies available from 5G technology.

108. CBC/Radio-Canada preferred the previous band plan because potential interference between mobile equipment and their satellite downlink operations in the adjacent 3968-3998 MHz band would be easier to manage.

Discussion

109. The adoption of the proposed band plan of unpaired 10 MHz blocks would facilitate the issuance of new licences to both incumbent and new licensees. Although ISED recognizes the value of large bandwidth channels for 5G technologies, the proposed band plan does not preclude future licensees from aggregating packages of multiple 10 MHz blocks. For these reasons, ISED will adopt the band plan as proposed in the 3500 MHz Consultation.

Decision

D9. ISED is adopting a band plan using unpaired blocks of 10 MHz in the frequency range of 3450-3650 MHz, as shown in figure 1.

6.6 Interference mitigation

110. ISED also sought comments on whether any additional measures should be taken to limit potential interference issues with the TDD band plan as adopted above. For example, in the case where two or more 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 or the implementation of a guard band between operating frequencies.

Summary of comments

111. Responses received as part of this consultation indicated that there is a potential for interference between operators making use of the 3450-3650 MHz band. Key concerns raised include use of different technologies, different uplink/downlink ratios and a lack of synchronization between networks.

112. In terms of specific solutions Bell Mobility, Cogeco, Huawei Canada, Nokia, and TELUS noted that synchronization of networks constitutes a means to minimize interference between networks. Nokia and TELUS noted that guard bands can also be used to minimize interference. CCI recommended that ISED mandate technical standards, while ÉCOTEL suggested ISED adopt technical limits to minimize interference.

113. ABC Communications, BCBA, Canwisp, CCSA, Cogeco, ÉCOTEL, Nokia, Québecor, Rogers, SaskTel, Seaside, TELUS and Xplornet all recommended that ISED not mandate measures to limit potential interference in the band and that operators coordinate their operations instead.

Discussion

114. ISED does not typically mandate specific technology solutions to address interference issues. However, as with current practice, standard radio system plans (SRSP) and radio standard specifications (RSS) will be developed for the band and related equipment, which will address a number of issues raised by this question. With these documents, technical limits and coordination procedures will be adopted to minimize interference between systems. This will provide some flexibility for licensees to coordinate their operations using the most appropriate means available.

Decision

D10. ISED will establish a coordination procedure between operators and technical limits in a future standard.

6.7 Timing for the introduction of mobile services in the 3500 MHz band

115. ISED recognizes that the 3500 MHz band is one of the key bands for the development of 5G networks in many countries. It is expected that this band will be one of the first bands in which 5G technologies will be launched in Canada. In accordance with its objective of supporting sustained competition, ISED proposed that the issuance of all flexible use licences, to both existing and new licensees of the 3500 MHz band, take place at the same time. This would allow each licensee to enter the market at the same time, creating the conditions to maximize competition to the benefit of Canadians.

Summary of comments

116. Bell, Canwisp, CCSA, ÉCOTEL, PIAC, Rogers, SaskTel, Seaside, SSi and TELUS agreed with the proposal to issue all flexible use licences in the band at the same time. This would include flexible use licences acquired through the transition plan, and flexible use licences acquired as a result of the auction process. These respondents noted that this will give each licensee the opportunity to enter the market at approximately the same time, and not provide an unfair competitive advantage to an individual licensee.

117. ABC Communications, BCBA and Xplornet suggested existing licensees should receive flexible use licences as soon as possible, for example, once the band plan is established and it is known where existing licences will be reassigned within the band. They argued that given ISED's intention to facilitate 5G deployments, it would be counterproductive to delay flexible use for existing licensees. Similarly, CCI argued that delaying flexible use for existing licensees to align with the timing of a future licensing process would have a negative effect on competition.

118. Shaw and Québecor both supported ISED's principle of all parties having the ability to deploy flexible use at the same time. They noted that existing fixed licensees could deploy 5G fixed technologies at any time and could easily convert them to mobile. New licensees would require more time to purchase and install new 5G equipment after an auction. As a result, both companies suggested that there be a delay in converting existing fixed licences to flexible use. Shaw suggested a 6-month delay after the auction and Québecor a 12-month delay. In its reply comments, Eastlink supported Shaw's and Québecor's proposal to delay deployment until a period after the auction, favouring Québecor's suggested 12-month delay. Rogers suggested, in its reply comments, that ISED should reject these arguments because there is sufficient equipment available and 5G testing to facilitate network planning prior the issuance of licences.

Discussion

119. Since taking steps to introduce new competitors to the wireless market in 2008, ISED has continued to make significant efforts to sustain and strengthen competition in the Canadian wireless market. National and regional service providers have made substantial investments to deploy and expand wireless networks in many markets across Canada and to provide wireless services to Canadians.

120. Many existing fixed use licensees may choose to voluntarily transition to new flexible use licences through the transition process, while others may choose to maintain their current fixed use licences until they are displaced through the transition plan (i.e. after the auction process). Flexible use licences will allow licensees either to continue to offer fixed services, or to offer mobile services (which are not currently available in the band). Flexible use licences must be acquired either through an auction process or through a transition process for existing licensees to deliver mobile services. ISED will not issue any flexible use licences through the transition process until those from the auction process are also issued. Therefore, no individual licensee will gain a competitive advantage as a result of this decision.

121. However, existing licensees who do not intend to take advantage of the transition process, and who meet all their conditions of licence, may continue to apply for and be issued annual fixed use licences until they are required to transition as per the transition plan (see section 6.9 of this document for the transition plan). These licensees must continue to offer fixed services in accordance with RSS 192, [*Fixed Wireless Access Equipment Operating in the Band 3450-3650 MHz*](#). For instance, fixed use licences in the 3500 MHz band may not be used to offer services to subscriber stations that are intended to be used while in motion or during halts at unspecified points.

Decision

D11. Existing licensees who are eligible and wish to provide mobile services must acquire a flexible use licence.

ISED will only begin issuing flexible use licences in the 3500 MHz band after the conclusion of the auction process. This includes those issued to existing licensees who voluntarily transition through the transition process and those licences issued as a result of an auction process.

Existing licensees will be eligible to be issued annual fixed licences until they are required to transition as per the transition plan. These annual fixed licenses would only be renewed where all conditions of licence have been met.

6.8 Future licensing process in the 3500 MHz band

122. As part of the Outlook Consultation, ISED received general comments on different licensing approaches and auction formats. ISED recognizes that there are a number of options to consider when selecting the format for a spectrum auction, each with its own set of advantages and disadvantages. To better understand the priorities of stakeholders with regards to auction format and timing, in the 3500 MHz Consultation, ISED sought comments on the importance of price discovery in a future licensing process, noting that an auction format with such capabilities would require more time to implement resulting in a later auction start date.

Summary of comments

123. ABC Communications, Bell, BCBA, Cogeco, CCI, ÉCOTEL, Eastlink, Québecor, Rogers, SaskTel, Shaw, TELUS, and Xplornet all felt that price discovery will be important in a licensing process for flexible use licences in the 3500 MHz band. None of the respondents opposed price discovery.

Discussion

124. Although the inclusion of price discovery may preclude faster and simpler licensing processes, there are clear benefits with respect to reducing uncertainty about value of spectrum. Given the support expressed in the comments received, proposals developed under the consultation on a policy and licensing framework will include an auction format with price discovery.

Decision

D12. ISED will develop and consult on a proposed auction format that includes price discovery as part of the consultation on the policy and licensing framework for flexible use licences in the 3500 MHz band.

6.9 Transition plan for incumbents of the 3500 MHz band

125. **Transition plan objectives:** In the 3500 MHz Consultation, ISED sought comments on a proposed transition plan that would address two objectives: i) to provide timely access to flexible use spectrum in order to facilitate the introduction of 5G technologies for Canadians, and ii) to accommodate the continued provision of existing fixed wireless broadband services to Canadians who rely on them. The proposed transition plan aimed to protect existing licensees from having to transition for a minimum period of time, depending on the area that they currently serve. As proposed, the plan included a minimum protection period and a minimum notification period, and applied to licensees holding tier, subdivision, and/or grid cell licences.

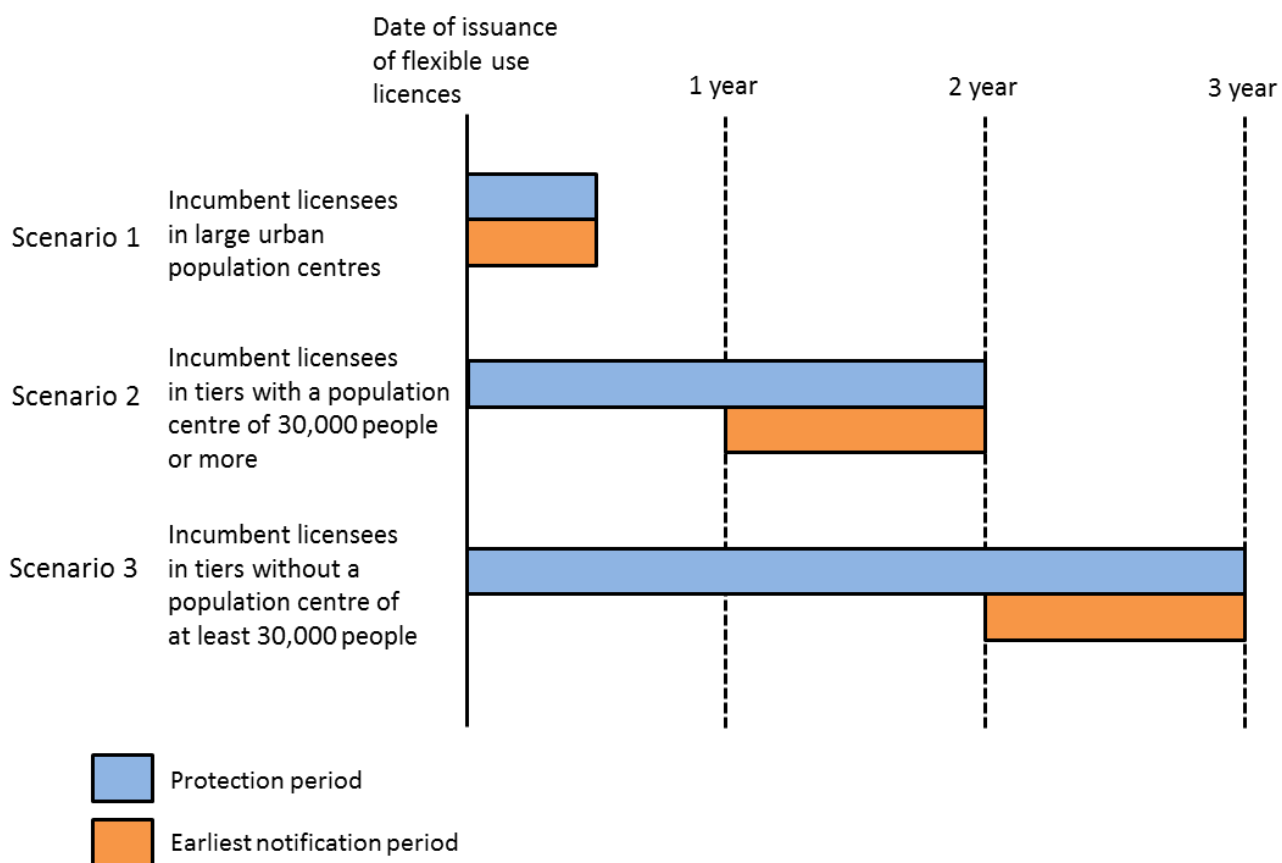
126. **Transition plan principle:** ISED also proposed that the transition plan apply to all existing licensees and be based on the “where and when necessary” principle, to allow existing licensees to continue operating where such operations would not prevent deployment by new 3500 MHz licensees.

127. **Protection period:** ISED proposed that existing licensees be protected from having to transition for a minimum period of time spanning between six months, two years, and three years, depending on the area that they are currently serving.

128. **Notification period:** ISED proposed that existing licensees in [large urban population centres](#) and in the 10 km buffer zone surrounding those centres be provided with a minimum notification period of 6 months; and that those in all other areas be provided with a minimum notification period of one year.

129. Figure 2 provides a summary of the proposed transition timelines for three scenarios.

Figure 2: Proposed minimum protection and notification periods



In scenario 1, the incumbent would be entitled to at least six months of protection, but could be notified immediately following the issuance of a new licence that they are required to transition within six months.

In scenario 2, the incumbent would be protected for a minimum of two years, and entitled to at least one year’s notice before being required to transition.

In scenario 3, the incumbent would be protected for a minimum of three years, and entitled to at least one year’s notice before being required to transition.

Where notice is never given, incumbents would not be required to transition.

130. ISED also sought comments on alternative transition plans, or variations to the times proposed in figure 2.

131. ***Voluntary Transition:*** As described above in paragraph 120, existing fixed licensees may apply to transition to flexible use licences at any time, but will only be eligible to receive new flexible use licences on the same date as licences are issued through the auction process or at a later timeframe of their choosing.

Summary of comments

132. Bell, Rogers, TELUS, CBC, PIAC, and SSi supported ISED's proposed transition plan.

133. ABC Communications, BCBA, Canwisp, CCSA, Comcentric Networking, Seaside Wireless, Rural Municipalities of Alberta and EORN suggested variations to the proposed transition plan that would extend the protection period for some or all of the existing licensees in the band, and especially for those that operate in rural areas. They suggested that longer transition periods were necessary to ensure continuity of service for existing operators that are forced to transition.

134. Cogeco, CCI, Eastlink, ÉCOTEL, Québecor and SaskTel suggested variations to the proposed transition plan that would shorten the protection periods for existing licensees outside the large urban population centres so that more Canadians can benefit from 5G services earlier. Cogeco, Eastlink and TELUS also raised the concern that some existing licensees may delay transitioning their current 3500 MHz spectrum licences while at the same time acquiring and deploying new flexible use spectrum, giving themselves a competitive advantage compared to licensees with no 3500 MHz holdings.

135. Shaw recommended that the protection and notification periods only apply in service areas where there are a sufficient number of customers that justify the need for a transition period. Xplornet advocated for a six-month transition plan if its proposal for treatment of existing users is adopted.

136. ABC Communications, Canwisp, Xplornet, BCBA, CCSA, CCI, iTétract, EORN, Rural Municipalities of Alberta and Xplornet suggested that the proposed 10 km buffer zone be reduced to 3-4 km outside the city limits or that it be eliminated entirely. Bell, Rogers, and TELUS supported the 10 km buffer zone as proposed.

137. Canwisp raised concerns about potential delays in the introduction of new service and recommended that ISED consider penalties for new licensees that displace existing operations but fail to deploy their services in a timely manner.

138. Comcentric suggested a one-year negotiation period before the transition plan begins in order to allow new and existing licensees to reach voluntary agreements for the possibility of earlier displacement or for the continued operation of existing services.

139. Bell and Rogers suggested that ISED initiate a “Stakeholder Proposal Development” process, hosting discussions between existing licence holders to facilitate the development of a plan to arrange the spectrum that they would retain following the transition and to coordinate the timing of the transition for existing licensees.

Discussion

140. Canada is moving forward to align with international market developments for the expected development of a 5G equipment ecosystem. ISED continues to be of the view that 5G mobile services will first be deployed in large urban population centres. As proposed, the transition plan would provide for shorter transition timelines in these urban areas, thereby allowing the introduction of new 5G mobile services in a timely manner. Most respondents agreed with the suggested six-month transition period for these areas. Given that the majority of existing operators are not located in or providing services in these urban areas, ISED is of the view that the shorter protection period as proposed, would have negligible impact on current operations in these areas.

141. ISED proposed a transition plan that allowed for longer protection periods for rural areas, where consumers may continue to rely on fixed services, until such a time as mobile services progressively expand to these areas. Comments regarding the protection periods outside the large urban population centres were varied. In general, the smaller wireless providers and rural broadband associations advocated for a longer protection period whereas others advocated for a shorter protection period. ISED continues to be of the view that the proposed two- and three-year protection periods would provide sufficient time for existing licensees outside of the large urban population centres to transition to the new band plan. In addition, given ISED’s proposal to apply a “where and when necessary” principle, many existing licensees in rural areas will likely have longer than two or three years to transition. In some of the more rural and remote areas, operators may not have to transition for a significant period. For the reasons outlined above, ISED will adopt the “where and when necessary” principle, as proposed in the 3500 MHz Consultation.

142. To address the concern raised by Cogeco, Eastlink, and TELUS that existing licensees may delay transitioning while at the same time deploying new flexible use spectrum in the same area, ISED is clarifying the following: An existing licensee will be issued a flexible use licence in a given partial or full licence area only if a transition has been triggered and a date has been established for the termination of their fixed licence. The licensee will not be able to operate under both a fixed licence and a new flexible use licence in the same geographical area, except for a limited time within the transition period, which will be established by ISED where necessary. During this limited time, the licensee may be issued a new flexible use licence for the frequencies to which it has been displaced, and its fixed use licence for the displaced area will be revoked after the transition is complete. In other areas where no displacement notice is given, the licensee can continue to operate using its fixed use spectrum but will have the option of converting its licence to flexible use. If it chooses to convert, then it must abide by the transition policy timelines relative to any displacement that may be required for the conversion.

143. Cogeco and Québecor suggested reducing the population centre definition of 30,000 or more persons as the criteria used to distinguish the different tiers of the transition plan. Statistics Canada defines “medium population centre” as having a minimum population of 30,000 or more persons and this definition has been used in previous 3500 MHz consultations by ISED. Lowering this figure would significantly increase the number of rural tiers where the two-year transition period would apply instead of the current three-year period. Existing licensees operating in rural areas have advocated for longer transition periods to ensure continuity of service.

144. There were differing viewpoints about the need for and the size of the buffer zone surrounding the large urban population centres. ISED considers that a buffer zone is necessary to improve coverage continuity surrounding large population centres, given that it would not be feasible to customize the frequency signals to follow the exact contours of a city boundary. The buffer zone provides an opportunity for the growth of the urban centres, and it helps to mitigate the potential interference between new mobile and existing fixed systems.

145. ISED estimates that there are approximately 70 existing sites currently located within the 10 km buffer zones that surround the [30 large urban population centres in Canada](#). This represents less than 1% of existing sites in the 3500 MHz band. Therefore, decreasing the size of the buffer zone would not have a material impact on the number of sites that would be subject to the shorter six-month transition period.

146. ISED is clarifying that the buffer zone applies to the coverage area of the new flexible use licences. New licensees may transmit to the edge of the buffer zone as part of their deployment in the large urban population centres. Existing sites that are located within the buffer zone must transition as per the timelines of the transition plan. Existing sites located adjacent to, but outside the buffer zone, and that transmit signals into the buffer zone may not constrain the deployment of new mobile services that are deployed. As such, licensees may have to adjust their systems to transmit to areas outside the buffer zone only. Conversely, new mobile services will not be permitted to transmit to areas outside of the buffer zone until the mandatory two-year transition period is complete or alternative transition arrangements have been made.

147. ISED will retain oversight and monitor the effectiveness of the spectrum policy provisions related to the transition/displacement of existing licensees. In the longer term, changes to these provisions and/or licence conditions may be implemented to ensure that the continued availability of spectrum for new and existing systems is accomplished in the most efficient manner. ISED may intervene, where appropriate, to ensure that interference among different systems does not result in harmful interference. For example, in cases where there are multiple compounding transitions, ISED will work with the affected parties to ensure that the overall transition process does not inadvertently disrupt services to customers. In all cases, ISED encourages existing and new licensees to come to arrangements to ensure a smooth transition process for all parties. Changes to the conditions of licence would generally be undertaken following a consultation process.

148. In response to the suggestion that penalties be applied for licensees who displace existing operations in an area, but then fail to deploy to that area in a timely manner, ISED notes that compliance measures could be applied to prevent such instances. The application of a “where and when necessary” principle, along with the proposed notification process would require an existing licensee to transition only when its continued operations in a specific area would constrain deployment by the new licensee. Specifically, licensees that acquire flexible use licences through the future licensing process will be required to demonstrate to ISED the timeframes required for the deployment of their planned systems, as well as the specific operations by existing licensees that will prevent deployment, including the specific areas and spectrum frequencies. ISED may take into account other spectrum management factors in determining the size of the displacement zone being submitted by the new licensee, such as to ensure contiguity of the service area to be deployed as part of its assessment of the submission. ISED will assess the request and, if satisfied, will issue a displacement notice to the existing licensee. ISED has enforcement tools at its disposal and will be monitoring the deployment progress of new licensees. Therefore, ISED will adopt the notification process as proposed in the 3500 MHz Consultation.

149. The transition plan timelines will be applicable as of the date of issuance of the new flexible use licences, following the conclusion of the auction. ISED encourages existing and new licensees to seek mutually beneficial alternative transition arrangements if necessary. Current operations that are not hindering the deployment of new 3500 MHz systems may opt to not convert to flexible use licences until required to do so via the transition plan.

150. The specific procedures for triggering the transition and ISED’s measures to monitor the progress of the transition will be outlined in a future public release, which will be published prior to the application deadline to participate in the auction.

151. To support the objectives outlined in this section, the following transition plan will be applied.

Decision

D13. The following transition plan applies to all existing fixed use licensees in the 3450-3650 MHz band:

The transition is based on a “where and when necessary” principle. Existing licensees will be allowed to continue operating where such operations do not prevent deployment by new licensees, but are subject to the transition plan and displacement process outlined below:

Protection period:

- For Tier 4 service areas in which the largest population centre is of 30,000 people or more:
 - a minimum protection period of six months for sites within large urban population centres and the 10 km buffer zone surrounding those centres
 - a minimum protection period of two years for all other sites

- For all Tier 4 service areas in which the largest population centre is of less than 30,000 people, a minimum protection period of three years or
- Another timeframe that is based on voluntary agreements between the new licensee and the existing licensee

Notification period:

- A minimum notification period of six months in large urban population centres and in the 10 km buffer zone surrounding those centres
- A minimum notification period of one year in all other areas or
- Another timeframe that is based on voluntary agreements between the new licensee and the existing licensee

Requesting that ISED issue a displacement notice:

- Licensees that either acquire new flexible use licences or are displaced and are planning to deploy fixed and/or mobile services in areas where they will be constrained by existing systems will be responsible for: (a) identifying the specific fixed station frequency assignments and stations that are preventing deployment of the new systems; (b) informing ISED of the specific areas, the spectrum frequencies required and the deployment timeframes for the new systems; and (c) requesting that ISED provide a displacement notice to the existing licensee(s).
- ISED will assess the submission and, if it is determined that the continued operation of the fixed station(s) will interfere with these new systems, will issue a displacement notice requiring the existing operator to cease or migrate its operations in accordance with the minimum protection and notification periods outlined below.
- Cognisant of the potential cascading impact as existing licensees transition to their new assignment(s) under the new band plan, ISED invites existing licensees to discuss their intentions and submit their deployment plans to ISED early in the process.
- ISED may take additional factors, such as coverage contiguity and transition complexity, into account in developing the transition plan in a given area of a tier.

Voluntary transition: Current fixed licensees may apply to voluntarily transition to flexible use licences at any time, but in accordance with decision D11, will not be eligible to receive new flexible use licences before licences are issued through the auction process.

Procedures and timelines: Procedures and timelines to apply for flexible use licences through the transition process will be published in a future public release, prior to the application deadline to participate in the auction.

6.10 Technical and cross-border considerations for the 3500 MHz band

152. In the 3500 MHz Consultation, ISED sought comments on whether the fixed and mobile equipment for LTE and 5G technologies will be able to operate with intermittent interference from radars, including cross-border interference, within the 3450–3650 MHz band and from adjacent bands.

153. Historically, Canada has limited the use of fixed systems in the 3450-3500 MHz band in certain areas of Canada due to the use of radars by Canada and the United States. However, as discussed in section 6.1, ISED is removing the radiolocation allocation in the 3450-3500 MHz band in order to increase the spectrum available for flexible use.

154. There is limited maritime radar use in Canada in the 3400-3475 MHz band, but there is still some maritime radar use in the United States in the 3400-3650 MHz band. As a result, fixed or mobile systems operating in the cities of Halifax, Dartmouth and Vancouver, and nearby coastal areas including those communities that are along the Straits of Georgia and Juan de Fuca, could be susceptible to an increased potential for interference in the 3450-3650 MHz band due to occasional radar use, particularly in the lower portion of the frequency band.

155. Further, there is the potential for intermittent interference resulting from aeronautical radar use below 3450 MHz in Canada and in the 3400-3650 MHz band in the United States.

156. In the 3500 MHz Consultation ISED sought comments on its view that new flexible use systems will be able to tolerate intermittent interference generated by the emissions of maritime and aeronautical radars that operate both within the 3450-3650 MHz band and in adjacent bands. ISED's understanding was that new LTE and 5G technologies will be more resilient to the interference than pre- and non-LTE technologies that were previously deployed for some fixed wireless access services, and sought comments to confirm this understanding.

Summary of comments

157. Comments received from ABC Communications, Bell Mobility, BCBA, Comcentric, Ericsson, Huawei Canada, Québecor, Rogers, SaskTel, TELUS and Xplornet stated that operations with intermittent interference from radar may be possible in the 3450-3650 MHz band, but may also degrade mobile operations.

158. Canwisp, CCSA, CCI, Nokia, Québecor Media, Rogers, SaskTel, Seaside and TELUS were confident that newer technologies (LTE and 5G) are able to better deal with intermittent interference from radiolocation users in this band. Xplornet reported that it has actually encountered radar interference in the past, but that it was able to rectify the issue through the application of technical measures. Bell Mobility, Canwisp, CCI, CCSA, Huawei Canada, Québecor, SaskTel, TELUS and Xplornet also noted that mechanisms or technical measures could be adopted to minimize this interference.

159. Huawei Canada further noted that while it believes that newer technology may be able to effectively deal with interference, it sees the ultra-reliable low latency services as being vulnerable to interference. BCBA and Seaside stated that interference in this band will lower the value of licenses, and that this could make them more affordable to smaller operators. ÉCOTEL, SaskTel and Shaw Communications noted that more information would be needed to better understand interference and deal with the issue of intermittent interference from radiolocation users.

160. EORN, Ericsson, Québecor, TELUS and Xplornet supported the development of a cross-border arrangement with the United States to deal with interference issues from U.S. radiolocation service users.

161. In reply comments, TELUS requested that ISED publish the results of any interference studies as requested by ÉCOTEL, Huawei Canada, SaskTel and Shaw.

Discussion

162. ISED notes that past deployments of fixed service network relied on pre-LTE technology and that the technology may have provided some resiliency to interference from operations in the radiolocation service. However, evolution of technology to LTE and 5G New Radio should provide improved resiliency to interference. Additionally, ISED notes that some additional technical measures can be adopted to further reduce the impact of interference. Measures to mitigate interference include power management and antenna redirection, available with advanced beam forming technologies.

163. Mechanisms are in place to minimize mutual interference between radiolocation systems in Canada and the United States and fixed wireless access systems in the 3475-3650 MHz band. Flexible use systems have been introduced in the United States in the 3550-3700 MHz band. ISED is of the view that fixed and mobile equipment for LTE and 5G technologies will be able to operate with intermittent interference from radars within the 3450-3650 MHz band and in adjacent bands. ISED intends to work with the Federal Communications Commission (FCC) on a new cross-border arrangement that would afford equitable access between Canadian and U.S. flexible use of the band in the areas near the Canada–U.S. border.

164. With regards to publication of interference studies, ISED notes that it may be limited in providing these studies given the classified nature of many of the systems involved.

Decision

D14. ISED will work to develop a cross-border arrangement with its counterparts in the United States.

6.11 Moratorium in the 3500 MHz band

165. In the 3500 MHz Consultation, ISED placed a moratorium on new applications for first-come, first-served spectrum licenses in the 3475-3650 MHz band. Given the decisions taken in this document, the significant reorganization of current licensees' spectrum holdings, and the intention to issue flexible use licences in this band following an upcoming auction, ISED will no longer accept new first-come, first-served spectrum licence applications in the 3475-3650 MHz band.

Decision

D15. First-come, first-served spectrum licences will no longer be issued in the 3475-3650 MHz band.

7. The 3800 MHz band (3650-4200 MHz)

7.1 Future changes to the 3650-3700 MHz band

166. As noted in the 3500 MHz Consultation, many countries have begun or are planning commercial mobile use in the 3650-3700 MHz band. There is an existing equipment ecosystem for LTE equipment up to 3800 MHz and the standards for 5G equipment will cover the frequency ranges 3300-4200 MHz (band n77) and 3300-3800 MHz (band n78) with more international interest in band n78.

167. Although this band has co-primary allocations for fixed, mobile and fixed satellite services in Canada, it is primarily used for fixed point-to-multipoint services. Licensees can use this spectrum for both fixed and mobile applications. These licences are issued on a Tier 4 basis for a one-year term and can be renewed annually. As described in SP 3650 MHz, [Spectrum Utilization Policy, Technical and Licensing Requirements for Wireless Broadband Services \(WBS\) in the Band 3650–3700 MHz](#), the 3650–3700 MHz band is currently licensed on a shared “all-come, all-served” basis.¹ That is, there is no limitation on the number of WBS licences that may be issued for the same spectrum and geographic area, which has resulted in some challenges (e.g. coordination between licensees). At this time, there are 927 licences issued to 281 licensees. The majority of licensees are using the spectrum to provide broadband Internet services, many to rural and remote communities. There are also a number of grandfathered FSS earth stations 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](#).

168. In the United States, this band was also available for WBS until the [FCC’s 2015 Report and Order](#), which included 3650-3700 MHz as part of their Citizen Broadband Radio Service (CBRS). As

¹ CPC-2-1-26, [Licensing Procedure for Wireless Broadband Services \(WBS\) in the Frequency Band 3650-3700 MHz](#)

mentioned in section 5 of the 3500 MHz Consultation, the FCC has set up a three-tiered sharing framework enabled by a Spectrum Access System (SAS). As part of this decision, the FCC has grandfathered their existing WBS deployments for five years, allowing time for these licensees to update equipment to 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) 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.

169. The current band plan for WBS in Canada includes two unpaired 25 MHz blocks with restrictions on the use of the upper block in urban areas to equipment that employs unrestricted contention-based protocols.

170. ISED recognizes that this band plan and these restrictions do not reflect the expected future equipment ecosystem, but could potentially be modified to align with either the 3500 MHz or the 3800 MHz bands. As such, ISED intends to review the band through a future consultation. This future consultation will address potential changes to the spectrum utilization policy, band plan, and the technical and policy considerations in order to optimize the use of this spectrum.

171. A SAS or a similar database approach may be considered in Canada to optimize the use of limited spectrum in the band. Such a database would have the capacity to analyse interference situations and instruct base stations to reduce power or move to a different channel in order to minimize interference. In light of current developments of SASs in the United States, and in order to better inform the development of a future consultation for WBS, ISED sought preliminary comments on how to optimize the use of the 3650-3700 MHz band, including the potential use of a database access model.

Summary of comments

172. Rogers and Xplornet suggested that WBS systems should be moved out of the 3650-3700 MHz band and the spectrum be licensed on an exclusive basis to enable larger contiguous channels in the 3500 MHz band. Both submissions recommended that WBS be moved to the 3400-3450 MHz band. In its reply comments, Bell also supported this proposal. Québecor was of the view that given the majority of WBS incumbents are in rural and remote areas, the introduction of mobile services in this band would not unduly penalize the activities of the incumbents if a transition policy is developed based on the “where and when necessary” principle.

173. Canwisp and CCSA proposed restricting use to fixed services in order to maintain spectrum to serve rural subscribers. ABC Communications, BCBA, Comcentric and CCI all argued that WBS should continue to be licensed under the current licensing framework.

174. Satellite operators, Intelsat, Inmarsat and SES and Telesat were not opposed to the introduction of 5G mobile services in the band, but argue that satellite services should maintain their access,

especially in areas where mobile services are not deployed. Telesat further argued that satellite services should be protected using parameters adopted for WBS. Finally, the satellite operators suggested that technical limits be put in place to minimize interference to satellite services.

175. CBC/Radio-Canada had concerns that the use of amplifiers in their earth stations would increase the likelihood of interference from potential future flexible uses in the 3650-3700 MHz band, but as mentioned above, it noted that SAS and other database access methods could minimize this interference.

176. Comments received on database solutions were mixed. Bell, Canwisp, CBC/Radio-Canada, Cogeco, CCSA, EORN, Eastlink, Huawei Canada, Nokia, Seaside and Telesat were of the opinion that database solutions to help mitigate interference could potentially be used in this band, after evaluation and testing. ABC Communications and BCBA were of the opinion that a database solution would be a source of uncertainty for operators; they recommended waiting until database solutions gained wider success before being considered. SaskTel and TELUS were of the opinion that a database solution would introduce unnecessary costs and complicate licensing. In addition, SaskTel along with Comcentric and Québecor believed that real-time sharing of the spectrum could result in reduced network performance and coverage. ÉCOTEL noted that some remote sites may also not be able to access a central database. In regards to a database solution similar to SAS in the United States, Bell, SaskTel and TELUS noted that U.S. SAS was developed for the unique requirements defined by the U.S. market and should not be used in Canada. TELUS is not aware of any developments extending the LTE based band 48 ecosystem, mainly limited to the U.S., in support of 5G NR; and noted a low likelihood of other global jurisdictions developing database solutions that would integrate with 3GPP band n77 or n78 radio networks.

Discussion

177. As noted earlier, the 3300-4200 MHz is envisioned for the deployment of the first wave of new mobile 5G technologies. A key characteristic of 5G technologies is the need for large channels to leverage its full benefits. ISED recognizes that the frequency range 3650-3700 MHz, given its immediate adjacency to the 3475-3650 MHz band, offers the potential for the larger contiguous blocks of spectrum necessary to support the aggregated channels necessary for carrying higher data volumes envisaged.

178. The current licensing framework for WBS allows for both fixed and mobile services in the 3650-3700 MHz band. However, overlapping channel sharing between WBS and potential new commercial mobile systems in the same geographic area may not be possible as the sharing between these systems requires separation distances that can be large in some cases (varies depending on system specification). Grandfathering existing WBS could pose limitations to the deployment of new commercial mobile systems in the frequency range 3650-3700 MHz. ISED notes though that WBS is currently heavily used in urban, rural and remote areas, and 5G mobile deployment is expected first in urban areas.

179. As suggested by some respondents, one approach to make the 3650-3700 MHz available for exclusive licensing for flexible use could be to move WBS incumbents to another band (e.g. 3400-3450 MHz). Another approach could be to allow WBS to remain in the 3650-3700 MHz band but require that WBS convert to the potential new band plan and new licensing rules. The latter approach would also require a more efficient spectrum sharing method between the flexible use and WBS (e.g. database solution). ISED is of the view that further study is warranted before any approach is adopted, including the use of a database solution.

Decision

D16. ISED will undertake further study and review this band through a future formal consultation. This future consultation will address potential changes to the spectrum utilization policy, band plan, the potential for implementing a SAS or similar database approach and other technical and policy considerations in order to optimize the use of this spectrum.

7.2 Opportunities for new uses of the 3700-4200 MHz band

180. In Canada, the 3700-4200 MHz band is licensed for use by fixed satellite service for the delivery of telephony and Internet in northern and remote communities. The band is the downlink portion of C-band fixed satellite systems, paired with 5925-6425 MHz as the uplink. However, the earth stations can be used in either the uplink/downlink configuration, or as receive-only (i.e. space-to-Earth only). Most of the receive-only fixed satellite service usage within Canada falls under licence-exempt authorization. Therefore, in most cases ISED does not have any information about the location or parameters of any of those receiver stations. In addition to these services, there are unlicensed broadcast receivers that are currently being used to receive TV programming from satellites, which is then distributed over cable infrastructure. Broadcast studios also use unlicensed receivers for programming. There are currently limited terrestrial fixed point-to-point links in operation in the 3700-4200 MHz band, which are mainly used for backhaul.

181. As mentioned in section 5 of this document and in the [Spectrum Outlook](#), many countries are examining bands from 3300-3800 MHz, and some up to 4200 MHz, to make additional spectrum available for 5G technologies. With LTE and 5G technologies being developed up to 4200 MHz, a mobile allocation will be considered in the [Canadian Table of Frequency Allocations](#) as a future change to this portion of the band to optimize the use of this spectrum.

182. In February 2018, Ofcom released an [update](#) to its 3.6-3.8 GHz paper, which states its intention to revoke fixed link licences in this frequency range with a five-year notification period. In addition, as of June 1, 2020, Ofcom will no longer take registered satellite earth stations with a receive component into account for frequency management purposes. This decision will enable future mobile services in the 3600-3800 MHz band in many areas starting in June 2020 and nationwide before the end of 2022. In

addition, in December 2018, Ofcom initiated a consultation on [Enabling opportunities for innovation – Shared access to spectrum supporting mobile technology](#) where it proposed to make unused spectrum available for mobile services in the 3800-4200 MHz band on a FCFS basis.

183. In August 2017, the FCC in its [Notice of Inquiry](#) (NOI) sought comments on expanding its multi-tiered sharing approaches for the 3500 MHz band up to 4200 MHz. Some comments to the NOI expressed concerns that the FCC lacked sufficient information regarding incumbent operations (in particular those of unlicensed earth stations). In order to gather information, the FCC announced a temporary freeze on the filings for earth stations, and fixed licenses in the 3700-4200 MHz band. This was followed by FCC's [Order and Notice of Proposed Rulemaking](#) in July 2018. In it, the FCC sought comments on how to protect incumbent earth stations, how much spectrum should be repurposed for flexible use, through what mechanism (i.e. market-based, auction, mixture), and under which timelines.

184. ISED will be monitoring the developments from other countries, in particular with respect to the potential for sharing spectrum between services in the 3400-4200 MHz frequency range, with a view to improving efficiencies throughout both bands.

185. ISED notes that initial comments from the [Outlook Consultation](#) indicated interest in the 3700-4200 MHz band from several groups, including fixed satellite service providers, small WISPs and commercial mobile operators.

186. Given the expected increase in spectrum usage as a result of the introduction of 5G services, as part of the 3500 MHz Consultation, ISED sought comments on the following to better position Canada in regard to long-term changes to the 3700-4200 MHz band:

- the importance of the 3700-4200 MHz band to future fixed satellite service (FSS) operations
- which steps Canada should take to optimize the use of the 3700-4200 MHz band in consideration of the current services being provided and the developing technologies that would permit the use of new services in this band (e.g. exclusion zones)
- the challenges and considerations related to the coexistence of other services, such as mobile and/or fixed wireless access, in the 3700-4200 MHz band
- whether unlicensed earth stations in the 3700-4200 MHz band should be required to submit their technical parameters to ISED to assist in frequency management

Summary of comments on the future of FSS C-band operations

187. CBC/Radio-Canada, Corus Entertainment and Shaw, stated that the C-band continues to be used in the reception and distribution of Canadian and foreign programming. Shaw noted, however, that C-band is required for 5G services. SaskTel and SSi stated that they see continued importance of satellite services in the 3700-4200 MHz band in order to provide service to remote communities. SaskTel noted that its use of the band will continue until alternative means are available. SSi argued that C-band's

importance will continue. More specifically, it identified coverage as important to provide mesh network capabilities over large distances. Intelsat, Inmarsat, SES and Telesat stated that the 3700-4200 MHz band continues to be an important band for the satellite industry. Telesat further argued that demand is increasing for rural and remote connectivity, 4K television service distribution, and public safety and national security services.

188. Bell, CCI, Ericsson, Nokia, Québecor, Rogers and Xplornet stated that demand for FSS C-band is declining and that the band should be made available for mobile service. Rogers and Québecor further argued that satellite operators were making use of higher frequency band to provide services, and this provided further reason to permit the operation of flexible use in the band. ÉCOTEL, Rogers and Xplornet supported continued use of C-band to provide services to remote communities for the time being.

189. Canwisp, CCSA, Huawei Canada, Seaside and Xplornet noted their belief that satellite services will be able to share the band with flexible fixed/mobile uses through technical measures. Ericsson, Nokia, Québecor, Rogers, Seaside Wireless, Shaw and Xplornet argued that the band should be authorized for flexible use, while BCBA argued that it should be used as additional bandwidth to provide service in rural areas. Huawei Canada stated that more studies are required to understand sharing between FSS and flexible use.

Summary of comments on optimization of the 3700-4200 MHz band

190. Bell, CBC/Radio-Canada, CCI, Ericsson, Intelsat, Inmarsat and SES, Nokia, Québecor, Rogers, SaskTel, TELUS and Xplornet supported deployment of flexible use in the band. Different approaches to doing this were proposed. Intelsat, Inmarsat and SES and Telesat requested that satellite services be protected.

191. Bell, CCI, Corus, Québecor, SSi, TELUS and Xplornet all proposed that exclusion zones be used to protect earth stations in operation. Bell and Rogers noted that a phased approach would assist in the transition and proposed that a portion of the band be made available in the short term, with the intent of fully transitioning FSS out of the band over the long term.

192. Other proposals were supported to enable sharing of the band between FSS and flexible use. Canwisp, CBC/Radio-Canada and CCSA were in favour of looking at SAS or dynamic spectrum access (DSA) as a means to optimize the 3700-4200 MHz band. ABC Communications, BCBA, Canwisp and CCSA suggested that the process currently used with WBS be used to authorize flexible use in the band. Shaw suggested that restrictions on outdoor use should be applied to minimize interference. Bell stated that financial compensation should be given for satellite operators to transition out of the band, while CBC/Radio-Canada stated that compensation should be given so that it can make changes to its earth stations to enable it to reject emissions from mobile transmissions.

Summary of comments on coexistence challenges/considerations

193. ABC Communications, Canwisp, CCSA, SaskTel, Seaside stated that they saw little issues with regards to coexistence between mobile and fixed services. Canwisp, CCSA and Seaside stated that SAS or dynamic spectrum access (DSA) could potentially be considered to enable sharing. Bell added that technical measures, including synchronization of networks could enable sharing of the band between flexible use licensees. ABC Communications and BCBA noted that large carriers can be a challenge when it comes to coordinating activities.

194. CBC/Radio-Canada, Corus, Ericsson, SSi, and Telesat noted that there are significant challenges, however, with FSS sharing the band with mobile service. Xplornet noted that sharing was possible with FSS, but more so in the context of the fixed service. Bell, Intelsat, Inmarsat and SES stated that exclusion zones could work in enabling sharing between FSS and flexible use systems. Cogeco, Ericsson and Rogers argued that the band should be vacated from FSS and that flexible use should be authorized in the band. Telesat on the other hand, commented that it had examined exclusion zones as a means to enable sharing between FSS and flexible use, but had determined that distances would be so large that sharing would become impractical.

195. CBC/Radio-Canada, ÉCOTEL, SaskTel, and Seaside found that there wasn't enough information to make a decision on the topic.

Summary of comments on registration of licence-exempt earth stations

196. With the exception of one, all respondents to this issue supported the requirement for unlicensed users to submit technical information on earth stations to assist with frequency management. The satellite operators Intelsat, Inmarsat, SES and Telesat, added that limitations are important so that earth station operators are not overly burdened with administrative work. Rogers, on the other hand, stated that unlicensed earth station operators in urban areas should not be permitted to submit these parameters, and that status of these stations would become secondary. It did state that earth station operators in remote areas should submit technical parameters to assist in frequency management.

Discussion

197. ISED recognizes the potential for new flexible use spectrum in the 3700-4200 MHz band. Internationally this band already includes an allocation for the mobile, fixed and FSS. However, the Canadian Table of Frequency Allocations does not currently include a primary allocation for the mobile service.

198. Possible mechanisms for allowing flexible use in the 3700-4200 MHz band include transitioning C-band fixed satellite services to another band or the use of a database solution, both of which received mixed opinions from respondents. Several respondents proposed that Ka-band capacity could be utilized for C-band fixed satellite services. Other respondents raised the concern that Ka-band capacity would not be a reliable replacement spectrum for C-band fixed satellite services. In the Spectrum Outlook, ISED notes that for the fixed satellite and broadcast satellite services in the C-band, there is an overall trend towards moving to higher frequencies (e.g. Ka-band) to better accommodate data-intensive applications that require larger bandwidths (i.e. higher capacity Internet services and high resolution images and video).

199. As a result of international developments and comments received, ISED is adding this band to its planned spectrum releases and targeting a 2022 auction process. A future consultation will address changes to the Canadian Table of Frequency Allocations (CTFA), the amount of spectrum for flexible use, the spectrum utilization policy and the band plan, as well as the potential for implementing a SAS or similar database, and technical and policy considerations to optimize the use of this spectrum.

200. Coexistence between mobile and fixed satellite services can only be ensured if the characteristics and locations of the earth stations are known. However, ISED recognizes that there are a number of areas where satellite receive-only earth stations have been deployed, which are exempted from individual licensing. As a result, there is little or no information available, either on the location or the frequencies at which these earth stations operate. To provide a better understanding of the current use of the 3700-4200 MHz band, ISED will be collecting earth station information from unregistered or unlicensed operators as outlined in the Spectrum Advisory Bulletin SAB-001-19, [*Request for Information on Fixed Satellite Service \(FSS\) Earth Stations Operating in the 3700-4200 MHz Band*](#). ISED notes that although there are provisions in the current spectrum utilization policy that allow for receive-only earth stations to be operated on a licence-exempt basis, these earth stations operate without protection from licensed systems.

Decisions

D17. In support of a future spectrum release currently planned to take place in 2022, ISED will launch a future consultation on changes to the Canadian Table of Frequency Allocations (CTFA), spectrum utilization policy, band plan, as well as the potential for implementing a SAS or similar database and technical and policy considerations to optimize the use of the 3700 – 4200 MHz band.

D18. ISED advises that the high potential of change in this band be taken into account by any new licence applicants.

8. Additional information

8.1 Next steps

201. ISED will consult further on the related licensing framework(s), as well as the technical standards, as appropriate.

8.2 Obtaining copies

202. All spectrum-related documents referred to in this paper are available on ISED's [Spectrum Management and Telecommunications](#) website.

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

Innovation, Science and Economic Development Canada
c/o Senior Director, Spectrum Licensing and Auction Operations
Spectrum Licensing Policy Branch
235 Queen Street, 6th Floor, East Tower
Ottawa ON K1A 0H5
Telephone: 613-302-3436
TTY: 1-866-694-8389
Email: ic.spectrumauctions-encheresduspectre.ic@canada.ca

Annex A. Eligibility for new flexible use licences acquired through the provisions to allow existing licensees to continue services in the 3500 MHz band

The following table includes the amount of flexible use spectrum for which existing licensees are eligible to apply, by service area. Note that the spectrum eligibility in an entire Tier 4 area where the licensee also holds subdivisions / grid cells is not cumulative. That is, a licensee is only eligible for a maximum of 60 MHz in any given area. For example, in a situation where a licensee is eligible for 20 MHz based on an existing Tier 4 licence, and 60 MHz based on an existing subdivision or grid cell licence in the same area, that licensee will be eligible for 20 MHz throughout the tier and a total of 60 MHz in the subdivision or grid cell area within that tier.

The information in this table may change as licences are assessed for renewal eligibility. The amounts of spectrum shown are based on 3500 MHz holdings as of June 6, 2018, adjusted to reflect the result of pending licence applications and subsequent licence cancellations. Existing licensees will be eligible to apply for flexible use licences for the amount of spectrum indicated in the table in the relevant licence area, provided they meet all conditions of licence. Licensees are encouraged to review this table and to contact ISED within 30 days of publication of this document in the event of discrepancies with their existing licences.

Table A1: Amount of spectrum for which existing licensees are eligible to be issued flexible use licences

Tier 4	Tier 4 name	Licensee	MHz in entire Tier 4	MHz in subdivisions or grid cells
4-001	St. John's	Inukshuk	60	
4-001	St. John's	Xplornet	20	
4-002	Placentia	Inukshuk	60	
4-002	Placentia	Xplornet	20	
4-003	Gander/Grand Falls/Windsor	Inukshuk	60	
4-003	Gander/Grand Falls/Windsor	Xplornet	20	
4-004	Corner Brook/Stephenville	Inukshuk	60	
4-004	Corner Brook/Stephenville	Xplornet	20	
4-005	Labrador	Inukshuk	60	
4-005	Labrador	Xplornet	20	
4-006	Charlottetown	Inukshuk	60	
4-006	Charlottetown	Xplornet	20	
4-007	Summerside	Inukshuk	60	
4-007	Summerside	Xplornet	20	
4-008	Yarmouth	Inukshuk	60	
4-008	Yarmouth	Xplornet	20	
4-009	Bridgewater/Kentville	Inukshuk	60	
4-009	Bridgewater/Kentville	Xplornet	50	
4-010	Halifax	Inukshuk	60	
4-011	Truro	Inukshuk	60	
4-011	Truro	Xplornet	50	

Tier 4	Tier 4 name	Licensee	MHz in entire Tier 4	MHz in subdivisions or grid cells
4-012	Amherst	Inukshuk	60	
4-012	Amherst	Xplornet	20	
4-013	Antigonish/New Glasgow	Inukshuk	60	
4-013	Antigonish/New Glasgow	Xplornet	50	
4-014	Sydney	Inukshuk	60	
4-014	Sydney	Xplornet	20	
4-015	Saint John	Inukshuk	60	
4-015	Saint John	Xplornet	60	
4-016	St. Stephen	Inukshuk	60	
4-016	St. Stephen	Xplornet	60	
4-017	Fredericton	Inukshuk	60	
4-017	Fredericton	Xplornet	60	
4-018	Moncton	Inukshuk	60	
4-018	Moncton	Xplornet	60	
4-019	Miramichi/Bathurst	Inukshuk	60	
4-019	Miramichi/Bathurst	Xplornet	60	
4-020	Grand Falls	Inukshuk	60	
4-020	Grand Falls	Xplornet	60	
4-021	Edmundston	Inukshuk	60	
4-021	Edmundston	Xplornet		20
4-022	Campbellton	Inukshuk	60	
4-022	Campbellton	Xplornet	60	
4-023	Matane	Cogeco		50*
4-023	Matane	Xplornet	50	60
4-024	Mont-Joli	Inukshuk	60	
4-024	Mont-Joli	Xplornet	60	
4-025	Rimouski	Inukshuk	60	
4-025	Rimouski	Xplornet	60	
4-026	Rivière-du-Loup	Inukshuk	60	
4-026	Rivière-du-Loup	Xplornet	60	
4-027	La Malbaie	Inukshuk	60	
4-027	La Malbaie	Xplornet		60*
4-028	Chicoutimi-Jonquière	Inukshuk	60	
4-028	Chicoutimi-Jonquière	Xplornet	60	
4-029	Montmagny	Inukshuk	60	
4-029	Montmagny	Xplornet	60	
4-030	Québec	Inukshuk	60	
4-030	Québec	Xplornet		20
4-031	Sainte-Marie	Inukshuk	60	
4-031	Sainte-Marie	iTéract		50*
4-031	Sainte-Marie	Xplornet	50	
4-032	Saint-Georges	Inukshuk	60	
4-032	Saint-Georges	iTéract		50*

Tier 4	Tier 4 name	Licensee	MHz in entire Tier 4	MHz in subdivisions or grid cells
4-032	Saint-Georges	Xplornet	50	
4-033	Lac-Mégantic	Inukshuk	50	
4-033	Lac-Mégantic	Xplornet	60	
4-034	Thetford Mines	Inukshuk	50	
4-034	Thetford Mines	Xplornet	60	
4-035	Plessisville	Inukshuk	50	
4-035	Plessisville	Xplornet	60	
4-036	La Tuque	Broadpoint	20	
4-036	La Tuque	Inukshuk	60	
4-036	La Tuque	Xplornet	50	
4-037	Trois-Rivières	Inukshuk	60	
4-037	Trois-Rivières	Sogetel	50	
4-037	Trois-Rivières	Xplornet	50	
4-038	Louiseville	Cogeco		50*
4-038	Louiseville	Inukshuk	50	
4-038	Louiseville	Xplornet	60	
4-039	Asbestos	Inukshuk	50	
4-039	Asbestos	iTéract	50	
4-039	Asbestos	Xplornet	60	
4-040	Victoriaville	Inukshuk	50	
4-040	Victoriaville	iTéract	50	
4-040	Victoriaville	Xplornet	60	
4-041	Coaticook	Inukshuk	50	
4-041	Coaticook	iTéract	50	
4-041	Coaticook	Xplornet	60	
4-042	Sherbrooke	Inukshuk	60	
4-042	Sherbrooke	iTéract	50	
4-042	Sherbrooke	Xplornet	50	
4-043	Windsor	Inukshuk	50	
4-043	Windsor	iTéract	50	
4-043	Windsor	Xplornet	60	
4-044	Drummondville	Inukshuk	20	
4-044	Drummondville	iTéract	50	
4-044	Drummondville	Sogetel		50
4-044	Drummondville	Xplornet	50	
4-045	Cowansville	Inukshuk	60	
4-045	Cowansville	iTéract	50	
4-046	Farnham	Inukshuk	60	
4-046	Farnham	iTéract	50	
4-046	Farnham	Xplornet	20	
4-047	Granby	Inukshuk	60	
4-047	Granby	iTéract	50	
4-047	Granby	Xplornet	50	

Tier 4	Tier 4 name	Licensee	MHz in entire Tier 4	MHz in subdivisions or grid cells
4-048	St-Hyacinthe	Inukshuk	50	
4-048	St-Hyacinthe	iTéract	20	
4-048	St-Hyacinthe	Sogetel	50	
4-048	St-Hyacinthe	Xplornet	50	
4-049	Sorel	Inukshuk	60	
4-049	Sorel	iTéract	20	
4-049	Sorel	Sogetel		50
4-049	Sorel	Xplornet	20	
4-050	Joliette	Bell		50
4-050	Joliette	Inukshuk	60	
4-050	Joliette	Xplornet	20	
4-051	Montréal	Inukshuk	60	
4-052	Sainte-Agathe-des-Monts	Bell		50
4-052	Sainte-Agathe-des-Monts	Inukshuk	60	
4-052	Sainte-Agathe-des-Monts	Xplornet	60	
4-053	Hawkesbury	Inukshuk	60	
4-053	Hawkesbury	Xplornet	60	
4-054	Mont-Laurier/Maniwaki	Bell		50
4-054	Mont-Laurier/Maniwaki	Broadpoint	50	
4-054	Mont-Laurier/Maniwaki	Inukshuk	60	
4-054	Mont-Laurier/Maniwaki	Xplornet	50	
4-055	Ottawa/Outaouais	Bell		50
4-055	Ottawa/Outaouais	Inukshuk	60	
4-055	Ottawa/Outaouais	Storm Internet		50
4-055	Ottawa/Outaouais	Xplornet	50	60
4-056	Pembroke	Inukshuk	50	
4-056	Pembroke	Xplornet	60	
4-057	Arnprior/Renfrew	Inukshuk	50	
4-057	Arnprior/Renfrew	Xplornet	60	
4-058	Rouyn-Noranda	Bell	20	
4-058	Rouyn-Noranda	Inukshuk	60	
4-058	Rouyn-Noranda	Xplornet	50	
4-059	Notre-Dame-du-Nord	Bell	20	
4-059	Notre-Dame-du-Nord	Inukshuk	60	
4-059	Notre-Dame-du-Nord	Xplornet	50	
4-060	La Sarre	Broadpoint	20	
4-060	La Sarre	Inukshuk	60	
4-060	La Sarre	Xplornet	50	
4-061	Amos	Inukshuk	60	
4-061	Amos	Télédistribution Amos	50	
4-061	Amos	Xplornet	20	
4-062	Val-D'Or	Bell	20	

Tier 4	Tier 4 name	Licensee	MHz in entire Tier 4	MHz in subdivisions or grid cells
4-062	Val-D'Or	Inukshuk	60	
4-062	Val-D'Or	Xplornet	50	
4-063	Roberval/Saint-Félicien	Inukshuk	60	
4-063	Roberval/Saint-Félicien	Xplornet	60	
4-064	Baie-Comeau	Cogeco		50*
4-064	Baie-Comeau	Inukshuk	60	
4-064	Baie-Comeau	Xplornet	50	
4-065	Port-Cartier/Sept-Îles	Cogeco		60*
4-065	Port-Cartier/Sept-Îles	Xplornet	50	
4-066	Chibougamau	Broadpoint	20	
4-066	Chibougamau	I.D.LOGIQUE		20
4-066	Chibougamau	KATIVIK Reg Gov		50
4-066	Chibougamau	Xplornet	50	
4-067	Cornwall	Inukshuk	60	
4-067	Cornwall	Xplornet	20	
4-068	Brockville	Inukshuk	60	
4-068	Brockville	Xplornet	60	
4-069	Gananoque	Inukshuk	50	
4-069	Gananoque	Xplornet	60	
4-070	Kingston	Inukshuk	60	
4-070	Kingston	Xplornet	50	60
4-071	Napanee	Inukshuk	60	
4-071	Napanee	Xplornet	20	60
4-072	Belleville	Inukshuk	60	
4-072	Belleville	Xplornet		50
4-073	Cobourg	Inukshuk	60	
4-073	Cobourg	Xplornet	20	60
4-074	Peterborough	Inukshuk	60	
4-074	Peterborough	Xplornet	50	60
4-075	Lindsay	Inukshuk	60	
4-075	Lindsay	Xplornet	60	
4-076	Minden	Inukshuk	60	
4-076	Minden	Xplornet	60	
4-077	Toronto	Inukshuk	60	
4-077	Toronto	Xplornet		50
4-078	Alliston	Inukshuk	60	
4-078	Alliston	Xplornet	60	
4-079	Guelph/Kitchener	Inukshuk	60	
4-079	Guelph/Kitchener	Xplornet	50	60
4-080	Fergus	Inukshuk	60	
4-080	Fergus	Xplornet	60	
4-081	Kincardine	Bell		20

Tier 4	Tier 4 name	Licensee	MHz in entire Tier 4	MHz in subdivisions or grid cells
4-081	Kincardine	Comcentric	50	60
4-081	Kincardine	Inukshuk	60	
4-081	Kincardine	Xplornet	50	60
4-082	Listowel/Goderich	Bell		20
4-082	Listowel/Goderich	Comcentric	50	60
4-082	Listowel/Goderich	Inukshuk	60	
4-082	Listowel/Goderich	Xplornet	50	
4-083	Fort Erie	Inukshuk	60	
4-083	Fort Erie	Xplornet	60	
4-084	Niagara-St. Catharines	Inukshuk	60	
4-084	Niagara-St. Catharines	Xplornet	60	
4-085	Haldimand/Dunnville	Inukshuk	50	
4-085	Haldimand/Dunnville	Rogers	60	
4-085	Haldimand/Dunnville	Xplornet	20	
4-086	London/Woodstock/St. Thomas	Bell		20
4-086	London/Woodstock/St. Thomas	Comcentric		20
4-086	London/Woodstock/St. Thomas	Inukshuk	60	
4-086	London/Woodstock/St. Thomas	Xplornet	50	60
4-087	Brantford	Inukshuk	50	
4-087	Brantford	Rogers	50	
4-087	Brantford	Xplornet	60	
4-088	Stratford	Comcentric	50	
4-088	Stratford	Inukshuk	50	60
4-088	Stratford	Xplornet	50	60
4-089	Chatham	Inukshuk	60	
4-089	Chatham	Xplornet	60	
4-090	Windsor/Leamington	Inukshuk	60	
4-090	Windsor/Leamington	Xplornet	20	
4-091	Wallaceburg	CCi Net		50*
4-091	Wallaceburg	Inukshuk	50	
4-091	Wallaceburg	Xplornet	60	
4-092	Sarnia	Bell		20
4-092	Sarnia	Inukshuk	60	
4-092	Sarnia	Xplornet	20	
4-093	Strathroy	Bell		20
4-093	Strathroy	CCi Net		50*
4-093	Strathroy	Comcentric		20
4-093	Strathroy	Inukshuk	50	
4-093	Strathroy	Xplornet	60	
4-094	Barrie	Inukshuk	60	
4-094	Barrie	Xplornet	20	
4-095	Midland	Inukshuk	60	
4-095	Midland	Xplornet	50	

Tier 4	Tier 4 name	Licensee	MHz in entire Tier 4	MHz in subdivisions or grid cells
4-096	Gravenhurst/Bracebridge	Inukshuk	60	
4-096	Gravenhurst/Bracebridge	Xplornet	60	
4-097	North Bay	Bell	20	
4-097	North Bay	Inukshuk	60	
4-097	North Bay	Xplornet	50	
4-098	Parry Sound	Inukshuk	60	
4-098	Parry Sound	Xplornet	50	
4-099	Elliot Lake	Inukshuk	60	
4-099	Elliot Lake	Wire IE		20*
4-099	Elliot Lake	Xplornet	20	
4-100	Sudbury	Inukshuk	60	
4-100	Sudbury	Xplornet	50	
4-101	Kirkland Lake	Bell	50	
4-101	Kirkland Lake	Inukshuk	60	
4-101	Kirkland Lake	Xplornet	50	
4-102	Timmins	Bell	50	
4-102	Timmins	Inukshuk	60	
4-102	Timmins	Xplornet	50	
4-103	Kapuskaing	Bell	50	
4-103	Kapuskaing	Inukshuk	60	
4-103	Kapuskaing	Xplornet	50	
4-104	Kenora/Sioux Lookout	Inukshuk	60	
4-104	Kenora/Sioux Lookout	Tbaytel	50	
4-104	Kenora/Sioux Lookout	Xplornet	20	
4-105	Iron Bridge	Bell	50	
4-105	Iron Bridge	Inukshuk	60	
4-105	Iron Bridge	Xplornet	20	
4-106	Sault Ste. Marie	Bell	50	
4-106	Sault Ste. Marie	Inukshuk	60	
4-106	Sault Ste. Marie	Xplornet	50	
4-107	Marathon	Inukshuk	60	
4-107	Marathon	Tbaytel	50	
4-107	Marathon	Xplornet	50	
4-108	Thunder Bay	Inukshuk	60	
4-108	Thunder Bay	Tbaytel	50	
4-108	Thunder Bay	Xplornet	50	
4-109	Fort Frances	Inukshuk	60	
4-109	Fort Frances	Vianet	50	
4-109	Fort Frances	Xplornet	50	
4-110	Steinbach	Inukshuk	50	
4-110	Steinbach	Xplornet	60	
4-111	Winnipeg	Inukshuk	60	
4-111	Winnipeg	Xplornet	50	60

Tier 4	Tier 4 name	Licensee	MHz in entire Tier 4	MHz in subdivisions or grid cells
4-112	Lac du Bonnet	Inukshuk	60	
4-112	Lac du Bonnet	Xplornet	50	
4-113	Morden/Winkler	Inukshuk	50	
4-113	Morden/Winkler	Xplornet	60	
4-114	Brandon	Inukshuk	60	
4-114	Brandon	Xplornet	60	
4-115	Portage la Prairie	Inukshuk	50	
4-115	Portage la Prairie	Xplornet	60	
4-116	Dauphin	Inukshuk	50	
4-116	Dauphin	Xplornet	60	
4-117	Creighton/Flin Flon	Inukshuk	50	
4-117	Creighton/Flin Flon	Xplornet	60	
4-118	Thompson	Broadpoint	50	
4-118	Thompson	Inukshuk	60	
4-118	Thompson	Xplornet	20	
4-119	Estevan	Signal Direct		20 / 50 / 60**
4-119	Estevan	Xplornet	60	
4-120	Weyburn	Signal Direct		20 / 50 / 60**
4-120	Weyburn	Xplornet	50	60
4-121	Moose Jaw	Xplornet	20	
4-122	Swift Current	Xplornet	20	50 / 60**
4-123	Yorkton	Xplornet	20	50 / 60**
4-124	Regina	Inukshuk	60	
4-124	Regina	Xplornet	50	
4-125	Saskatoon	Inukshuk	60	
4-125	Saskatoon	Xplornet	50	
4-126	Watrous	Xplornet	20	50 / 60**
4-127	Battleford	Inukshuk		50
4-127	Battleford	Xplornet	60	
4-128	Prince Albert	Xplornet	60	
4-129	Lloydminster	CCi		20
4-129	Lloydminster	Inukshuk	50	
4-129	Lloydminster	Xplornet	60	
4-130	Northern Saskatchewan	Xplornet	60	
4-131	Medicine Hat/Brooks	Inukshuk	50	
4-131	Medicine Hat/Brooks	Xplornet	60	
4-132	Lethbridge	Inukshuk	50	
4-132	Lethbridge	Xplornet	60	
4-133	Stettler/Oyen/Wainwright	CCi		20
4-133	Stettler/Oyen/Wainwright	Inukshuk	50	
4-133	Stettler/Oyen/Wainwright	Xplornet	60	
4-134	High River	Inukshuk	60	
4-134	High River	Xplornet	60	

Tier 4	Tier 4 name	Licensee	MHz in entire Tier 4	MHz in subdivisions or grid cells
4-135	Strathmore	Inukshuk	50	
4-135	Strathmore	Xplornet	60	
4-136	Calgary	Inukshuk	60	
4-136	Calgary	Xplornet		20 / 50**
4-137	Red Deer	Inukshuk	50	
4-137	Red Deer	Xplornet	60	
4-138	Wetaskiwin/Ponoka	Inukshuk	50	
4-138	Wetaskiwin/Ponoka	Xplornet	60	
4-139	Camrose	Inukshuk	50	
4-139	Camrose	Xplornet	60	
4-140	Vegreville	CCi		20
4-140	Vegreville	Inukshuk	50	
4-140	Vegreville	Xplornet	60	
4-141	Edmonton	Inukshuk	50	60
4-141	Edmonton	TELUS	50	
4-141	Edmonton	Xplornet	50	60
4-142	Edson/Hinton	Inukshuk	60	
4-142	Edson/Hinton	Xplornet	60	
4-143	Bonnyville	Inukshuk	50	
4-143	Bonnyville	Xplornet	60	
4-144	Whitecourt	Inukshuk	60	
4-144	Whitecourt	Xplornet	60	
4-145	Barrhead	Inukshuk	50	
4-145	Barrhead	Xplornet	60	
4-146	Fort McMurray	Inukshuk	50	
4-146	Fort McMurray	Xplornet	60	
4-147	Peace River	Inukshuk	60	
4-147	Peace River	Xplornet	60	
4-148	Grande Prairie	Inukshuk	60	
4-148	Grande Prairie	Xplornet	60	
4-149	East Kootenay	Cranbrook Internet	50	
4-149	East Kootenay	Inukshuk	50	
4-149	East Kootenay	Xplornet	60	
4-150	West Kootenay	Cranbrook Internet		50
4-150	West Kootenay	Inukshuk	60	
4-150	West Kootenay	Xplornet	20	
4-151	Kelowna	ABC Allen	50	
4-151	Kelowna	Inukshuk	50	
4-151	Kelowna	Xplornet	60	
4-152	Vancouver	Inukshuk	60	
4-153	Hope	ABC Allen	20	

Tier 4	Tier 4 name	Licensee	MHz in entire Tier 4	MHz in subdivisions or grid cells
4-153	Hope	Inukshuk	60	
4-153	Hope	Xplornet	20	
4-154	Victoria	Beacon Wireless		50
4-156	Courtenay	Inukshuk	50	
4-156	Courtenay	TELUS		20
4-157	Powell River	ABC Allen	20	
4-157	Powell River	Inukshuk	60	
4-157	Powell River	TELUS		20
4-157	Powell River	Xplornet	50	
4-158	Squamish/Whistler	ABC Allen		50
4-158	Squamish/Whistler	Base Tech		20
4-158	Squamish/Whistler	Inukshuk	60	
4-158	Squamish/Whistler	TELUS		20
4-158	Squamish/Whistler	Xplornet		20
4-159	Merritt	ABC Allen	50	
4-159	Merritt	Inukshuk	60	
4-159	Merritt	Xplornet	20	
4-160	Kamloops	Inukshuk	60	
4-160	Kamloops	TELUS		50
4-160	Kamloops	Xplornet	60	
4-161	Ashcroft	ABC Allen	50	
4-161	Ashcroft	Inukshuk	60	
4-161	Ashcroft	Xplornet	20	
4-162	Salmon Arm	Inukshuk	60	
4-162	Salmon Arm	Xplornet	60	
4-163	Golden	Inukshuk	60	
4-163	Golden	Xplornet	60	
4-164	Williams Lake	ABC Allen	50	
4-164	Williams Lake	Inukshuk	60	
4-164	Williams Lake	TELUS		20
4-164	Williams Lake	Xplornet	20	
4-165	Quesnel/Red Bluff	ABC Allen	50	
4-165	Quesnel/Red Bluff	Inukshuk	50	
4-165	Quesnel/Red Bluff	Xplornet	60	
4-166	Skeena	ABC Allen	50	
4-166	Skeena	Inukshuk	50	
4-166	Skeena	Xplornet	60	
4-167	Prince George	ABC Allen	50	
4-167	Prince George	Inukshuk	50	
4-167	Prince George	Xplornet	60	
4-168	Smithers	ABC Allen	50	
4-168	Smithers	Inukshuk	50	
4-168	Smithers	Xplornet	60	

Tier 4	Tier 4 name	Licensee	MHz in entire Tier 4	MHz in subdivisions or grid cells
4-169	Dawson Creek	ABC Allen	50	
4-169	Dawson Creek	Inukshuk	50	
4-169	Dawson Creek	Xplornet	60	
4-170	Yukon	Inukshuk	60	
4-170	Yukon	Xplornet	60	
4-171	Nunavut	Baffinland Minerals		50
4-171	Nunavut	Ice Wireless		20
4-171	Nunavut	SSI Micro	50	
4-171	Nunavut	Xplornet	20	
4-172	Northwest Territories	Inukshuk	60	
4-172	Northwest Territories	Xplornet	60	

* Licensee holds grid cell licences that cover the entire tier.

** Licensee holds licences in different blocks that cover different geographic areas of the tier. In an area where a 25 MHz block does not geographically overlap with another area, the licensee will be able to apply for 20 MHz of spectrum for flexible use. In an area where two 25 MHz blocks overlap, the licensee will be able to apply for 50 MHz of spectrum for flexible use. In areas where more than two 25 MHz blocks overlap, the licensee will be able to apply for 60 MHz of spectrum for flexible use.