Innovation, Science and Economic Development Canada
Innovation, Sciences et Développement économique Canada

SPB-002-22

JUNE 2022

Spectrum Management and Telecommunications

Policy and Licensing Framework for Spectrum in the 3800 MHz Band

Note (May 5, 2023):

- Main document, paragraphs 261 and D26 now reflect the correct total number of eligibility points for one 10 MHz block of unencumbered spectrum in all 172 service areas covering the country.
- Annex D and Annex E have been updated.
- Response 4.3 in the Clarification Questions has been updated.

(December 13, 2022):

- Main document, paragraph 14 contains new information.
- Annex F, paragraph 58 has a corrected reference to paragraph 54 (b).

Aussi disponible en français–SPB-002-22

Canada

Contents

1. Intent

1. Through the release of this document, Innovation, Science and Economic Development Canada (ISED), on behalf of the Minister of Innovation, Science and Industry (the Minister), announces decisions resulting from the consultation process undertaken in Canada Gazette Notice SLPB-006-21, *Consultation on a Policy and Licensing Framework for Spectrum in the 3800 MHz Band* (the Consultation), which specifically covers the 3650-3900 MHz frequency range (the 3800 MHz band).

2. Comments and/or reply comments on the Consultation were received from:

- 5G Americas
- Agricultural Producers Association of Saskatchewan (APAS)
- Air Canada
- BC Broadband Association (BCBA)
- BC Lions Football Club
- BC Tech Association
- Bell Mobility Inc. (Bell)
- British Columbia Hotel Association
- Business Council of British Columbia
- Canadian Aquaculture Industry Alliance
- Canadian Educators for Safe Technology
- Canadian Federation of Agriculture
- Canadians for Safe Technology
- Canadian Association of Wireless Internet Service Providers (CanWISP)
- Cariboo Chilcotin Coast Tourism Association
- Coalition of Aviation Industry Stakeholders: the Aerospace Industries Association of Canada (AIAC), Air Line Pilots Association, Air Transport Association of Canada (ATAC), Airborne Public Safety Association, Collins Aerospace, Embraer North America, General Aviation Manufacturers Association (GAMA), Airbus Operations S.A.S, Aircraft Electronics Association, Aircraft Owners and Pilots Association, Bell Textron Canada Ltd., The Boeing Company, Bombardier Aerospace, Canadian Business Aviation Association (CBAA), Cargo Airline Association, Garmin International, Inc., Helicopter Association International, MHI RJ Aviation Group, National Air Carrier Association, National Air Transportation Association, National Airlines Council of Canada, National Business Aviation Association, NAV CANADA, Regional Airline Association and Thales Group
- Cogeco Communications (Cogeco)
- Comcentric Networking Inc. (Comcentric)
- Community Economic Development and Employability Corporation
- Canadian Wireless Telecommunications Association (CWTA)
- Department of National Defence (DND)

- Eastlink
- ECOTEL
- Edmonton Chamber of Commerce
- Electromagnetic Pollution Illnesses Canada Foundation (EPIC)
- Exolink
- Fertilizer Canada
- Forest Products Association of Canada
- Global mobile Suppliers Association (GSA)
- Government of Northwest Territories
- Greater Vancouver Board of Trade
- Huawei
- Iristel
- Kootenay Rockies Tourism
- Manitobans for Safe Technology (M4ST)
- Michael B. McNally and Kris Joseph
- Mobile Interest Group (MIG)
- National Airlines Council of Canada (NACC), the International Air Transport Association (IATA), Airlines for America (A4A), and the Air Transport Association of Canada (ATAC)
- National Coalition of Chiefs
- Nisga'a Lisims Government
- NTT Limited
- Pearson
- Québecor Média (Québecor)
- Rogers
- Rural Municipalities of Alberta
- SaskTel
- SES SA (SES)
- Sogetel
- SSi Canada (SSi)
- TECHNATION
- TELUS
- TELUS World of Science Edmonton
- TerreStar
- Tourism Industry Association of British Columbia
- Tourism Jasper
- Transport Canada
- Western Canadian Wheat Growers
- WestJet
- Xplornet

2. Legislative mandate

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

3. Policy objectives

4. Wireless services are an important part of Canadians' lives, whether they are accessing multi-media applications, conducting business while on the move, connecting with family and friends, or managing their finances. In recent years, these services have become increasingly integrated in society, with the COVID-19 pandemic in particular accelerating the digitalization of how Canadians live and work, and how businesses operate. Now more than ever, Canadians expect wireless services to be high quality, available in every region of the country, and competitively priced.

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

6. Spectrum is a critical resource for wireless carriers. Additional spectrum for flexible use will enable providers to increase network capacity to meet the traffic demands of higher usage rates and support the provision of next-generation wireless technologies. The fifth generation of technology, known as 5G, is expected to dramatically change the telecommunications landscape. 5G technology will facilitate the delivery of high-quality and innovative services to Canadian consumers and businesses. The continued development and deployment of 5G technologies are essential to Canada becoming a global centre for innovation, and will bring Canada to the forefront of digital development and adoption by creating and strengthening our world-class wireless infrastructure. Further, this technology presents a key opportunity to support competition and provide Canadians with high quality, innovative, and competitively priced wireless services.

7. Beyond improvements to mobile and fixed wireless networks, 5G is also expected to support the expansion of new wireless applications in vertical industries such as agriculture, manufacturing, healthcare, public safety and transportation. With more spectrum available, Canadians will be able to embrace newly developed applications and services in these vertical industries. Testing and demonstrations of different use cases are already taking place domestically and internationally. Initial 5G deployments are mainly focused on capacity expansions for current 4G and fixed wireless access networks in mid-band spectrum and backhaul applications. The business cases that will drive ongoing investment in 5G networks,

and the services and applications will deliver the most significant benefit to Canadians are still emerging.

8. Making the 3800 MHz band available for flexible use will support mobile services, such as smartphones and connected devices, and continue to support fixed wireless services. In addition, promoting access to additional flexible use spectrum for mobile and fixed wireless services will enable telecommunication service providers (TSPs) and wireless Internet service providers (WISPs) to increase their network capacity. This will be crucial in accommodating greater data usage from 5G applications and services in urban, rural, and Northern areas of Canada.

9. Canadian consumers benefit from economies of scale when manufacturers produce equipment for many markets resulting in access to the latest devices at competitive prices for Canadians. In addition, by ensuring that ISED's spectrum management policies reflect global trends, emerging 5G standards, and expected materialization of the equipment ecosystem in the coming years, Canada will continue to position itself to benefit from the next generation of smartphones and other advanced wireless technologies and devices.

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

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

12. The Government of Canada is also committed to connecting all Canadians to affordable, reliable high-speed Internet and improving access to the latest mobile services. In 2019, *High-Speed Access for All: Canada's Connectivity Strategy* set a national connectivity target to make broadband speeds of at least 50 megabits per second (Mbps) download and 10 Mbps upload available to all Canadian homes and businesses. As part of this commitment, ISED is considering the need to support and encourage connectivity for rural and remote communities in the 3800 MHz licensing processes.

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

- foster investment and the evolution of wireless networks by enabling the development of high-quality 5G networks and technology

- support sustained competition in the provision of wireless services so that all consumers and businesses benefit from greater choice and competitive prices

- facilitate the deployment and timely availability of services across the country, including in rural, remote, and Northern regions

14. **ISED makes no representation or warranties about the use of this spectrum for particular services. Applicants should be aware that this auction represents an opportunity to become a licensee, subject to certain conditions and regulations. An ISED auction does not constitute an endorsement by ISED of any particular service, technology or product, nor does a spectrum licence constitute a guarantee of business success. Applicants should perform their individual due diligence before proceeding as they would with any new business venture.**

4. Background and context

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

16. In April 2019, ISED completed the auction for the 600 MHz band to support increased network capacity and the deployment of next-generation technologies using low-band spectrum. In June 2019, ISED published the *Decision on Releasing Millimetre Wave Spectrum to Support 5G, t*o begin the process to make this high-band spectrum, optimal for low-latency and high-bandwidth use, available for 5G services in the future. Furthermore, in March 2020, ISED published the *Policy and Licensing Framework for Spectrum in the 3500 MHz Band,* outlining the format and rules for the 3500 MHz auction, which was held in June 2021. This auction released up to 200 MHz of mid-band spectrum to support the deployment of 5G services and applications across Canada.

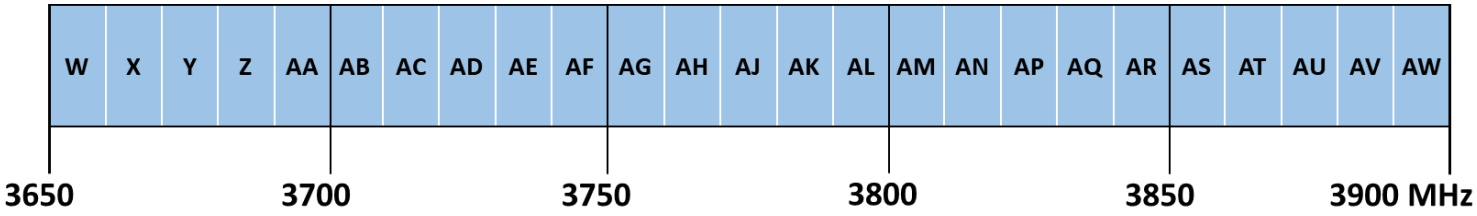
17. In May 2021, ISED released the *Decision on the Technical and Policy Framework for the 3650-4200 MHz Band and Changes to the Frequency Allocation of the 3500-3650 MHz Band* (the 3800 MHz Repurposing Decision), which reallocated spectrum in the 3650-4000 MHz band for flexible use.

18. In December 2021, ISED published the Consultation, which sought comments on policy and licensing considerations including auction format, rules, and processes as well as on conditions of licence for spectrum in the 3800 MHz band. ISED also sought comments on measures to support connectivity in rural and remote areas of the country.

5. Band plan

19. In the 3800 MHz Repurposing Decision, ISED adopted a band plan that will make the 3800 MHz band available for auction in 25 unpaired 10 MHz blocks as shown in figure 1. This band plan would support technologies such as Long Term Evolution (LTE) and 5G New Radio (NR) equipment to operate using a 10 MHz channel bandwidth. These 10 MHz blocks can be aggregated to create larger bandwidths for broadband applications.

Figure 1: 3800 MHz band plan



Description of figure 1

Figure 1 shows the band plan for the 3800 MHz band consisting of 25 unpaired blocks of 10 MHz ranging from 3650 MHz to 3900 MHz. The first four blocks from 3650 MHz to 3690 MHz are lettered W to Z. The remaining twenty-one blocks from 3690 MHz to 3900 MHz are lettered AA through AW (noting that there are no blocks labeled AI or AO).

6. Coexistence with aeronautical radionavigation systems

20. ISED sought comments on its proposal to extend the mitigation measures described in SRSP-520, *Technical Requirements for Fixed and/or Mobile Systems, Including Flexible Use Broadband Systems, in the Band 3450-3650 MHz* to protect radio altimeters from flexible use operations in the 3500 MHz band to flexible use operations in the band 3650-3900 MHz. It was proposed that these rules be put in place until domestic and international studies are completed.

Summary of comments

21. **Aviation industry:** Air Canada, the Coalition of Aviation Industry Stakeholders, DND, NACC, IATA, A4A, ATAC, and WestJet strongly supported extending the mitigation measures set forth in SRSP-520 for the 3500 MHz band to flexible use operations in the 3800 MHz band. They were of the view that the interference risk from the emissions in the 3800 MHz band would be more acute given its closer proximity to the radio altimeter operating frequency range.

22. Commercial airline operators noted that in the absence of the proposed extension of the current 3500 MHz band mitigations into the 3800 MHz band, airlines will be forced into limitations on operations that have the potential to add significant risk to the safety of their flight

operations compared to those enjoyed today, and would impose burdensome costs. In addition, increased delays due to a decrease in airport capacity, increase in frequency of diversions and increase in greenhouse gas emissions will have a negative impact on the travelling public and Canada's economy.

23. DND noted the effects of radio altimeter interference on military aircraft, especially helicopters, fighters, and search and rescue aircraft, yielded a significant airworthiness risk that differs from the risk posed to commercial aircraft. The radiation pattern of the radio altimeters used in the military aircrafts cannot be easily calculated outside their known working frequency range. DND also stated that the pattern shape and gain may change substantially outside their working range; therefore advanced studies and measurements are necessary to assess the radiation patterns in the 3650-3900 MHz band. DND is currently expending significant efforts, engaging with its partners and conducting tests in order to obtain data to quantify the risks to its activities.

24. NACC, IATA, A4A and ATAC proposed to include new measures to protect aircraft operations at all applicable runways at all airport and runway Categories of the National Airport System airports, plus Billy Bishop Airport (YTZ), at a minimum, and not be limited to only those with Category II and III Instrument Landing Systems in operation.

25. **Wireless broadband services industry:** 5G America, Bell, CWTA, GSA, Rogers and SaskTel cited numerous international reports and highlighted other international jurisdictions where the band has been deployed by 5G with no reported cases of interference to altimeters. Accordingly, Bell, CWTA and SaskTel opposed all mitigation measures in the 3800 MHz band.

26. Comcentric, Sogetel and TerreStar understood the need for ISED to err on the side of caution and the potential need to extend the 3500 MHz radio altimeters protection rules to 3800 MHz on a temporary basis until domestic and international studies are completed.

27. Bell, CanWISP, CWTA, Comcentric, GSA, Iristel, MIG, Québecor, Rogers, SaskTel, Sogetel, TELUS, TerreStar, and Xplornet stated that the finalized radio altimeters protection rules for the 3800 MHz band should be evidence-based, and encouraged ISED to continue working quickly to complete relevant studies. The majority of these respondents were concerned that the mitigation measures described in SRSP-520 are more restrictive than necessary and may place an undue burden on service providers seeking to efficiently deploy mid-band spectrum. In particular, Iristel noted the impact to Ice Wireless, an Iristel affiliate, in providing mobile service to Iqaluit's population since the exclusion zone imposed around Iqaluit airport by SRSP-520 covers roughly half of the town.

28. Rogers and TELUS proposed that any mitigation measures should be time-limited in nature with a defined and reasonable sunset date. In addition, Rogers proposed that measures should account for differences in urban, rural, and remote areas to maximize future 3800 MHz flexible use while still protecting radio altimeters until their specifications have been upgraded and new devices installed.

29. Bell, GSA, MIG, Rogers, SaskTel, TELUS, and Xplornet proposed to include a burden of responsibility upon the aviation sector to modernise their radio altimeter. Bell and Xplornet proposed that the Government of Canada could consider using a portion of the proceeds from the 3500 MHz and/or 3800 MHz auction processes to create a fund to support the replacement of impacted altimeters.

30. CanWISP, Eastlink, ECOTEL, GSA, MIG, SaskTel and TELUS indicated the need of finalizing the mitigation measures prior to the auction in order to help potential bidders value the spectrum and to allow enough time to mobile system manufacturers to develop equipment for the 3800 MHz band.

31. CanWISP, Eastlink and SaskTel proposed delaying the 3800 MHz auction until the radio altimeters issue is fully resolved. Furthermore, SaskTel suggested that the millimetre wave auction could be run with no restrictions in place of the 3800 MHz auction and permit network providers the opportunity to provide more services to Canadians without uncertain deployment restrictions.

32. Iristel, Sogetel and TELUS commented that the flexible use licensees will need to work around incumbents of the 3800 MHz band, which will have until 2025 to transition from the band in certain areas. Given this timeline, they argued extending the 3500 MHz mitigation measures to the 3800 MHz band to protect altimeters is not required at this time.

Discussion

33. As mentioned in the Consultation, ISED will set new technical requirements to apply to flexible use licences in the 3800 MHz band. These requirements must take into account a number of factors including co-existence with users within and outside of the band.

34. In the 3800 MHz Repurposing Decision, ISED committed to continue to monitor ongoing developments internationally and to assess possible mitigation measures to limit the potential interference to radio altimeters from flexible use operating in the 3800 MHz band, as necessary.

35. Given the immediate need to address potential interference to radio altimeters from flexible use in the 3500 MHz band, ISED published the *Decision on Amendments to SRSP-520, Technical Requirement for Fixed and/or Mobile Systems, Including Flexible Use Broadband Systems, in the Band 3450-3650 MHz*, which included measures to protect radio altimeter operation from harmful interference from flexible use systems operating in the 3500 MHz band.

36. The mitigation measures for the 3500 MHz band are required while international and domestic studies are still underway to further assess the potential adjacent band interference to radio altimeters from flexible use operation. Depending on the outcomes of these studies, mitigation measures may also be needed to protect radio altimeters from flexible use operation in the 3800 MHz band. In the interim, ISED has decided to extend the mitigation measures applicable to the 3500 MHz band, as described in SRSP-520, to flexible use operations in 3650-3900 MHz. ISED will continue to monitor ongoing developments and will assess whether these

mitigation measures remain necessary. ISED will consider loosening or removing these measures only if and when it is certain that this can be done without compromising the safety of Canadians.

Decision

D1
ISED will extend the mitigation measures described in SRSP-520 to protect radio altimeters from flexible use operations in the 3500 MHz band to flexible use operations in the 3800 MHz band (3650-3900 MHz) in the relevant SRSP, which is expected to be available prior to the auction.

7. Consolidated sites for fixed satellite service gateway earth stations

37. Through the 3800 MHz Repurposing Decision, ISED decided that a maximum of four consolidated sites for fixed satellite service (FSS) gateway earth stations (also referred to as consolidated sites) could be identified. Although these sites are located in non-satellite-dependent areas, earth stations at these consolidated sites would be permitted to continue their operation in the full 3700-4200 MHz band, and be entitled to the same protections and notifications as earth stations in satellite-dependent areas to ensure continuity of service in satellite-dependent areas.

38. ISED further decided that two consolidated sites will be located at existing sites located in Weir, Quebec, and Allan Park, Ontario. Both facilities have operated as commercial teleports for decades, hosting earth stations of other licensees, and could host relocated telemetry, tracking and command (TT&C) and/or gateway earth stations from other licensees who currently have those types of earth stations operating in Canada.

39. Since no additional suitable consolidated sites were suggested during ISED's informal outreach with satellite operators prior to the Consultation, ISED had proposed to not identify any additional consolidated sites.

Summary of comments

40. Bell, CanWISP, ECOTEL, Iristel, Québecor, Rogers, TELUS and Xplornet have expressed that they support or that they do not oppose the proposal to identify Weir and Allan Park as consolidated sites, and expressed support on the proposal that no additional sites be identified as consolidated sites.

41. ECOTEL and Iristel noted the proximity of Weir to Montréal, and asked that ISED release the related SRSP and RSS prior to the auction in order for bidders to understand the limitations imposed in tiers impacted by consolidated sites. TELUS requested that no flexible use

stations in large or medium population centers be required to coordinate with the Weir site, indicating that natural shielding should be sufficient to ensure its protection.

42. SSi opposed ISED's proposal. It expressed disappointment that ISED did not consider its gateway locations in Ottawa or Montréal as consolidated sites. SSi expressed concerns on the costs, limited benefits and anti-competitive potential of selecting only two consolidated sites. SSi urged ISED to impose requirements of non-discriminatory, just and reasonable behaviour upon the operators of these consolidated sites, similar to conditions of licence for antenna towers and site sharing. It also indicated that gateway service contracts should also be available for public review.

43. In the reply comments, SES supported the identification of additional consolidated sites. SES argued that not identifying additional sites would likely raise the cost to deploy, leading to higher prices for customers in satellite-dependent areas, by limiting the competitive supply. SES expressed concern that the site identified in Allan Park is controlled by a C-band satellite operator that may have incentives to discriminate in favour of its own satellite capacity. SES proposed to address this issue by authorising additional, competitive consolidated sites not affiliated with a satellite operator, with at least one site in Western Canada. SES noted that a potential consolidated site located in Lake Cowichan, British Columbia, could be considered.

Discussion

44. The location of consolidated sites such as Ottawa and Montréal suggested by SSi would unreasonably restrict flexible use deployment in the surrounding urban areas. ISED considered the site located in Lake Cowichan, British Columbia as identified by SES. The site has been decommissioned for many years. As such, it cannot be considered as a suitable option for a third consolidated site. No other potential suitable sites were proposed or identified.

45. ISED will not identify additional consolidated sites to those already identified in the 3800 MHz Repurposing Decision.

46. As indicated in the 3800 MHz Repurposing Decision, the consolidated sites at Weir, Quebec, and Allan Park, Ontario, will be permitted to operate in the full 3700-4200 MHz band, although located in non-satellite dependent areas. As such, these sites will be entitled to the same protections and notifications as earth stations in satellite-dependent areas as described in D31 and D32 of the 3800 MHz Repurposing Decision. Existing gateway earth stations relocated to the consolidated sites as part of the transition will be allowed to continue operations in the 3700-4200 MHz range, including after the transition deadline, to support services in satellite-dependent areas. The TT&C station located in Weir, Quebec, used by Inmarsat will have to cease its operation after the end of life of the current satellites with which it is communicating, in the 3500-3650 MHz frequency band.

47. ISED notes these consolidated sites only apply to existing TT&C and gateway operations that need to continue to use the full 3700-4200 MHz band to support earth stations operating in

satellite-dependent areas. Consolidation of sites for gateway earth stations that operate only in the 4000-4200 MHz band is not necessary.

Decision

D2
No additional consolidated sites for FSS gateway earth stations will be identified. Allan Park, Ontario, and Weir, Quebec, will be the only consolidated sites.

8. Pro-competitive measures

48. The 3800 MHz band is internationally recognized as a key source of mid-band spectrum that is critical for the deployment of next-generation wireless networks. ISED views the licensing of the 3800 MHz band as an opportunity to further support investment by telecommunications service providers and to improve the quality, affordability, and availability of wireless services for Canadians. Building on the release of spectrum in the 3500 MHz band in 2021, the licensing of 3800 MHz spectrum will allow wireless service providers to acquire additional mid-band spectrum to support the rollout of 5G networks across the country. It also presents a key opportunity to support the ability of Canada's service providers to offer 5G services to consumers, the ability of regional mobile service providers (RMSPs) to compete with the national mobile service providers (NMSPs) in the provision of 5G services, and the ability of wireless Internet service providers (WISPs) to offer 5G fixed wireless services in rural and remote areas of the country. For the purpose of this Framework, NMSPs will be defined as "companies with 10% or more of national wireless subscriber market share." The subscriber market share will be determined in accordance with the Canadian Radio-television and Telecommunications Commission (CRTC) Communications Markets Reports and related open data.

49. Over the past 15 years, the federal government has taken steps to facilitate competition in the wireless market through the inclusion of pro-competitive measures in spectrum auctions. In that time, RMSPs have undertaken the substantial investments required to acquire spectrum and deploy wireless networks in many markets across Canada and to provide services to Canadians. As a result, competition in the market has increased, providing Canadians with greater choice and more affordable services.

50. As noted in the *Framework for Spectrum Auctions in Canada*, there are various measures available in an auction to promote a competitive marketplace, notably spectrum set-asides and spectrum aggregation limits, also known as spectrum caps.

51. A spectrum set-aside ensures that a minimum amount of spectrum is reserved for a certain sub-set of entities. ISED has previously used set-asides in a number of auctions, including

the AWS-1 band in 2008, the AWS-3 band in 2015, the 600 MHz band in 2019, and most recently, the 3500 MHz auction in 2021.

52. For its part, a spectrum cap limits the amount of spectrum that each licensee is allowed to obtain, thereby regulating the distribution of spectrum held across entities. Spectrum caps can be applied across one band (in-band) or multiple bands (cross-band). An in-band spectrum cap was applied in the 700 MHz auction in 2014 and the 2500 MHz auction in 2015. ISED has also applied cross-band caps to ensure that a competitive environment is maintained, notably for the introduction of Personal Communications Service (PCS) licences in 1995, where a 40 MHz cap was applied across the 2 GHz and 800 MHz bands.

53. In the Consultation, ISED sought comments on its proposal to adopt pro-competitive measures for the 3800 MHz licensing process and, if used, on the proposed implementation of a 50 MHz spectrum set-aside (Option 1), a 100 MHz cross-band spectrum cap (Option 2), or a combination of both (Option 3). ISED also sought comments on the amount of spectrum that should be reserved for a set-aside and/or the amount of spectrum that should be subject to a cross-band cap between the 3500 MHz and 3800 MHz bands. Additionally, ISED sought comments on alternative options for pro-competitive measures for the 3800 MHz licensing process.

Summary of comments

54. Xplornet, SaskTel and Comcentric each expressed a preference for the use of a set-aside alone (Option 1), with Xplornet and Comcentric proposing that the set-aside be increased from 50 MHz to 100 MHz to better meet the increasing spectrum needs of smaller operators, including WISPs servicing rural areas. Additionally, Xplornet and SaskTel disagreed with ISED's proposal to apply a cross-band cap, and SaskTel expressed concerns that it would set a precedent to impose retroactive rules to an auction after completion.

55. The Government of the Northwest Territories, the Edmonton Chamber of Commerce, and the Greater Vancouver Board of Trade supported ISED's proposal to adopt pro-competitive measures, and the latter two organizations expressed their preference for use of spectrum caps. The Greater Vancouver Board of Trade also advanced that a cap of 100 MHz to 120 MHz was most appropriate to support ISED's policy objectives.

56. The National Coalition of Chiefs and the Nisga'a Lisims Government also expressed support for implementation of pro-competitive measures and noted a preference for the use of caps to promote a competitive 5G market.

57. In a joint submission, individuals Kris Joseph and Michael B. McNally agreed with ISED's proposal to implement pro-competitive measures, and expressed a preference for the use of a 100 MHz cross-band cap (Option 2). TECHNATION disagreed with ISED's proposal to include pro-competitive measures and submitted that such mechanisms may act as a barrier to contiguity across the 3500 MHz and 3800 MHz bands. Of the three options proposed by ISED,

TECHNATION argued that the implementation of a 100 MHz cross-band cap (Option 2) would be preferable as it better aligns with the approach taken in other jurisdictions.

58. Cogeco, Eastlink, Québecor, Sogetel and TerreStar agreed with ISED's proposal to implement pro-competitive measures and expressed support for the use of a set-aside in conjunction with a cross-band cap (Option 3). Under this approach, each of the companies recommended the use of a larger set-aside, with Eastlink, Québecor, Sogetel and TerreStar specifically proposing an increase from 50 MHz to 100 MHz. Québecor noted that the implementation of a set-aside of 50 MHz alone (Option 1) would be insufficient as it would require multiple small operators to compete amongst each other for a relatively small amount of spectrum when compared to the size of the set-asides applied in past auctions. Québecor also submitted that the use of both an increased set-aside of 100 MHz and a cross-band cap together would be complementary, with the set-aside mitigating against the risk that RMSPs are foreclosed from the auction, and the cross-band cap ensuring more equitable distribution of mid-band spectrum among all operators. Eastlink expressed similar sentiments to Québecor, and suggested that increasing the size of the set-aside under Option 3 to 100 MHz would provide facilities-based competitors with access to additional mid-band spectrum in more urban tiers. For their parts, Sogetel and TerreStar submitted that the use of a larger set-aside under such an approach would provide smaller carriers with a better opportunity to compete with larger operators.

59. Similarly, ECOTEL, Exolink, CanWISP, the BCBA and Iristel agreed with ISED's proposal to use pro-competitive measures, and expressed their preference for the use of both a set-aside and a cross-band cap (Option 3), with modifications to their implementation in rural and remote service areas. Specifically, ECOTEL proposed increasing the set-aside to 60 MHz and reducing the size of the cross-band cap to 80 MHz in less populated regions, and increasing the set-aside to 80 MHz in urban areas. Exolink recommended setting aside an undetermined amount of spectrum specifically for WISPs in rural tiers. CanWISP suggested increasing the set-aside in rural and remote areas to 160 MHz, with 80 MHz of this reserved for small telecommunications service providers, and decreasing the cross-band cap to 80 MHz in the same regions to ensure a variety of competitors have access to spectrum. BCBA and Iristel both expressed support for CanWISP's proposed modifications to Option 3.

60. Several industry associations and other companies also submitted comments in support of the use of pro-competitive measures in the 3800 MHz auction. Of these, the BC Hotel Association, the BC Technology Industry Association, the Business Council of BC, Fertilizer Canada, the Tourism Industry Association of BC, and Tourism Jasper expressed a preference for the use of a cap. Other associations (the Canadian Aquaculture Industry Alliance, the Canadian Federation of Agriculture, Cariboo Chilcotin Coast Tourism, the Community Economic Development and Employability Corporation, Kootenay Rockies Tourism, and the Western Canadian Wheat Growers' Association) submitted their preference for the use of a cross-band cap (Option 2) specifically. Additionally, the Agricultural Producers Association of Saskatchewan noted it was in agreement with the use of both set-asides and caps. Pearson

Education supported the implementation of pro-competitive measures to ensure multiple network providers have access to spectrum.

61. The NTT Limited supported the use of pro-competitive measures, but expressed concerns that ISED's specific proposals do not go far enough to create a competitive wireless environment. Given this, NTT Limited proposed that an additional 50 MHz of spectrum (from 3650 to 3700 MHz) be set aside outside of the auction process for incumbent operators and a new class of general authorized access (GAA) users in support of specialized, private 5G networks.

62. Bell disagreed with ISED's proposal to implement pro-competitive measures, and advanced that such interventions increase the cost of spectrum, which it suggested operators must subsequently pass on to end consumers, and delay the build-out of networks in rural and remote areas. That said, Bell stated that if a pro-competitive measure were adopted, the least objectionable approach would be a 100 MHz cross-band cap (Option 2).

63. Rogers also disagreed with ISED's proposal to implement pro-competitive measures, and expressed similar views to Bell on impacts for the cost of spectrum. In addition, Rogers suggested that regionals do not require assistance at auction, and that a more comprehensive approach is required to address the issues facing competition in the Canadian wireless industry. Of the three options proposed by ISED, Rogers argued that the implementation of a minimal set-aside of no more than 50 MHz (Option 1) would be the least disruptive to the market. As an alternative approach, Rogers also proposed the use of a 150 MHz cross-band cap, to be applied on a per network basis.

64. TELUS expressed that while it generally disagreed with the use of pro-competitive measures, it supported the application of a cross-band cap in the 3800 MHz auction (Option 2) as a mechanism to facilitate greater parity in mid-band holdings between the national operators. In this context, TELUS proposed increasing the cross-band cap from 100 MHz to 110 MHz, and suggested that such an approach would provide network building operators with more spectrum while also establishing a de facto set-aside in most service areas. TELUS also expressed concerns that, should a cross-band cap not be implemented at auction, the cost of acquiring spectrum would increase, resulting in higher prices for consumers and less capital available to deploy in rural markets.

Discussion

65. The release of the 3800 MHz band presents a key opportunity to support the ability of Canada's telecommunications service providers to offer 5G services to consumers, the ability of RMSPs to compete with the NMSPs in the provision of 5G services, and the ability of WISPs to offer fixed wireless services in rural, remote and Northern areas of the country.

66. As stated in section 3, one of the ISED's objectives for the 3800 MHz auction is to foster competition in the wireless market to support competitive pricing and greater service offerings.

In the absence of pro-competitive measures, it is unlikely that the auction would support this objective. Notably, there is a risk that competition in the 5G mobile wireless market could suffer if RMSPs do not acquire sufficient spectrum. To illustrate, the Competition Bureau has repeatedly found that the NMSPs have market power in the provision of retail mobile wireless services, indicated by high concentration, high profitability, and high barriers to entry. This was most recently expressed in the Competition Bureau's 2019 intervention to the CRTC review of mobile wireless services. The intervention also included a commissioned study (the Matrix Study), which found that prices are 35%-40% lower across all carriers in areas where wireless disruptors (strong regional competitors) have achieved a market share above 5.5%. More recently, the *Price Comparisons of Wireline, Wireless and Internet Services in Canada and with Foreign Jurisdictions: 2021 Edition* document prepared for ISED found that prices for data plans offered by RMSPs such as Freedom and Videotron, are up to 28% and 20%, respectively, lower than the Canadian average.

67. The use of pro-competitive measures in spectrum auctions has contributed to the growth of regional service providers and their competitiveness in the market as they continue to invest in their networks and grow their subscribership. Moving forward, the continued use of such measures is likely to increase the opportunity for RMSPs providers to acquire sufficient spectrum to compete effectively against the NMSPs in the market for 5G services, particularly in urban areas.

68. WISPs provide fixed broadband services to rural and remote areas that are generally underserved compared to urban regions, with slower broadband speeds and less choice. Many WISPs have noted that access to spectrum continues to be a barrier for service providers in these areas.

69. In this context, both regional service providers and WISPs should have the opportunity to acquire sufficient mid-band spectrum to deploy 5G services. ISED is of the view that without the use of pro-competitive measures in the 3800 MHz auction, NMSPs have the incentive and means to acquire all the spectrum available, significantly hindering competition from regional service providers and WISPs.

70. **Cross-band cap:** While set-asides have been used in past auctions, most recently in the 3500 MHz auction in 2021, ISED is of the view that the application of such as a measure in the 3800 MHz auction would not support the policy objectives for this band. Specifically, given the variance in existing holdings among licensees in the 3500 MHz band and the bidding power of the NMSPs, a spectrum set-aside alone would be ineffective in facilitating access to spectrum for RMSPs and WISPs in many service areas. ISED is also of the view that the addition of a set-aside to a cross-band cap in the 3800 MHz auction is not needed for RMSPs and WISPs to acquire sufficient mid-band spectrum to compete with NMSPs given the 450 MHz of total spectrum available across the 3500 MHz and 3800 MHz bands. A cross-band cap provides a balanced approach to competition by limiting how much combined 3500 MHz and 3800 MHz spectrum the NSMPs can acquire (a maximum of 300 MHz) while still reserving spectrum for RMSPs and WISPs (a minimum of 150 MHz).

71. **Size of the cross-band cap:** In determining the size of the cross-band cap, ISED considered stakeholders' comments regarding how much mid-band spectrum is required by operators to provide 5G services. In general, stakeholders expressed that between 80 to 120 MHz of mid-band spectrum is required to support their business cases, and specifically their ability to offer a high-quality 5G service. ISED also considered the effects on spectrum allocation among operators when determining the size of the spectrum cap, including the variance in existing 3500 MHz holdings between operators.

72. When considering the discussion above, and in light of ISED's policy objectives stated in section 3, ISED views the implementation of a 100 MHz cross-band cap as the most appropriate pro-competitive measure for the 3800 MHz auction process. A 100 MHz cross-band cap represents the best opportunity to balance the launch of high-quality 5G services, foster competition in the market, and promote access to spectrum in rural, remote, and Northern areas. A cross-bad cap of 100 MHz effectively reserves 150 MHz of mid-band spectrum for RMSPs and WISPs. This option best achieves ISED's policy objectives for the 3800 MHz band.

Decision

D3
For the 3800 MHz auction, ISED will implement pro-competitive measures in the form of a 100 MHz cross-band cap across the 3500 MHz and 3800 MHz bands.

8.1 Application of the cross-band cap

73. In the Consultation, ISED proposed the following be applied if a cross-band cap is to be implemented:

- The cross-band cap would apply to the total of a licensee's 3500 MHz and 3800 MHz spectrum licences, starting from the end of the 3800 MHz auction, for a period of five years.

- In licence areas where a licensee already holds spectrum licences in the 3500 MHz band equal to or in excess of this spectrum cap, such a licensee would not be eligible to bid for additional licences in the 3800 MHz band auction in that service areas but would not be required to divest any holdings of spectrum licences in the 3500 MHz band in order to fall within the spectrum cap. For this measure, licences held by any affiliate of the licensee would count as part of the cross-band cap.

- The 3500 MHz conditions of licence would be amended to reflect the cross-band cap.

Summary of comments

74. Bell, Cogeco, Comcentric, Eastlink, Québecor, Sogetel and TerreStar supported ISED's proposal.

75. TELUS expressed support for limiting the cap for five years and suggested that the five years should begin from the date of issuance of the first 3500 MHz spectrum licences. It submitted that such an approach would prevent potential 3500 MHz licence transfers from being extended to a seven-year period. TELUS also agreed with ISED's proposal to not require licensees to divest existing spectrum holdings in the 3500 MHz band in order to fall within the spectrum cap.

76. CanWISP and the BCBA agreed with ISED's proposal that the cross-band cap be in place for five years, provided the deployment requirement timelines are shorter than what was proposed. They also agreed to the proposal to not require 3500 MHz licensees to divest their spectrum licences in excess of the cap.

77. ECOTEL proposed maintaining the cap beyond the five-year mark to mitigate the risk of speculation in rural and remote areas, which it suggested would prevent smaller operators from putting it to use.

78. Rogers suggested that, should ISED elect to apply a cross-band cap, the transferability rules should also be amended to apply to network sharing partners.

79. SaskTel disagreed with ISED's proposal and suggested that establishing new rules that affect previous auctions would be unfair to past auction participants.

80. Individuals Kris Joseph and Michael B. McNally supported ISED's proposals and suggested that ISED amend its proposal to increase the cross-band cap from five years to ten years instead.

81. While Iristel agreed with a 100 MHz cap, it specified that this should only apply to urban areas and it disagreed with 3500 MHz licensees not requiring to divest spectrum holdings in excess of the cap. It submitted that the same rules should apply to everyone, that the application of spectrum caps are justified in every part of the country, and even more so in rural areas, as such it indicated that licensees exceeding the cap should divest their excess licences.

Discussion

82. Limiting access to the amount of spectrum that each licensee can hold across the 3500 MHz and 3800 MHz bands through a cross-band cap is likely to result in more effective and sustained competition in the post-auction marketplace. ISED is of the view that maintaining the cross-band cap for five years from the initial licence issuance date of the 3800 MHz licences, will also deter speculation. As such, the cross-band cap put in place for the 3800 MHz auction

will be applied to 3500 MHz and 3800 MHz licences for five years following the issuance of 3800 MHz licences.

83. In regard to existing 3500 MHz spectrum holdings in excess of a 100 MHz cross-band cap, ISED recognizes that the auction rules for the 3500 MHz band did not have any such restriction and agrees with stakeholders that 3500 MHz licensees should not be required to divest any 3500 MHz band licences to fall within the cross-band cap. ISED notes there are only five out of 172 Tier 4 service areas where a single operator has more than 100 MHz of 3500 MHz spectrum (4-119 Estevan, 4-120 Weyburn, 4-093 Strathroy, 4-091 Wallaceburg and 4-016 St. Stephen) with none above 120 MHz of 3500 MHz spectrum. ISED also observes that each of these tiers are in rural and remote areas, and that the excess spectrum is held by an RMSP or WISP that functions as one of the primary operators in the region.

84. Given the decision to apply the cross-band cap to both the 3500 MHz and 3800 MHz bands, ISED will make changes to the 3500 MHz conditions of licence that were set in the *Policy and Licensing Framework for Spectrum in the 3500 MHz Band*. Specifically, in addition to the existing conditions for the existing 3500 MHz licences, ISED will amend the licence transferability, divisibility, and subordinate licensing condition of all 3500 MHz licences by adding the text related to the cross-band cap contained in D10 in section 11.2 of this Framework, with adjustments to reflect the specific end date of the five-year restriction. ISED will amend the 3500 MHz licences at the same time as the 3800 MHz licences are issued. Further, ISED will not approve licence transfers requested before the 3800 MHz licences are issued that will result in holdings that exceed the cross-band cap.

Decision

D4
The cross-band cap will apply to the total of a licensee's 3500 MHz and 3800 MHz spectrum licences for a period of five years starting from the initial licence issuance date of the 3800 MHz licences.

D5
In licence areas where a licensee already holds 3500 MHz spectrum licences equal to or in excess of the spectrum cap, such a licensee will not be eligible to bid for additional licences in the 3800 MHz band auction in those service areas but will not be required to divest any 3500 MHz licences in order to fall within the spectrum cap. For this measure, licences held by any affiliate of the licensee would count as part of the cross-band cap.

D6
The 3500 MHz conditions of licence related to licence transferability, divisibility, and subordinate licensing will be amended to reflect D4 and D5.

9. Contiguity between 3500 MHz and 3800 MHz bands

85. ISED sought comments on the proposal to permit, after the announcement of the provisional licence winners, an exchange through a transfer request, of equal amounts of 3500 MHz and 3800 MHz spectrum within the same licence area, including between a set-aside-eligible entity and a set-aside-ineligible entity across bands.

Summary of comments

86. Bell, BCBA, CanWISP, Cogeco, Comcentric, Eastlink, ECOTEL, Iristel, Québecor, Rogers, SaskTel, Sogetel, TECHNATION, TELUS, TerreStar, and Xplornet supported ISED's proposed process to allow exchanges of equal amounts of 3500 MHz and 3800 MHz spectrum within the same licence area.

87. Rogers proposed that ISED facilitate the process to limit opportunities for any anti-competitive behaviour.

88. TELUS proposed that ISED should allow any exchange of spectrum that does not change the total amount of spectrum in 3500 MHz and 3800 MHz for the parties involved. In its reply comments, it also indicated that ISED process this request without engaging the criteria and considerations in CPC-2-1-23, to decrease administrative burden for applicants.

89. Cogeco indicated that 60 days should be sufficient for this process, in which Rogers also supported. TECHNATION indicated that prior to the auction, ISED adopt policies within the auction and the following exchange process to ensure clarity.

Discussion

90. ISED recognizes that the 3500 MHz and 3800 MHz bands share similar propagation characteristics and could operate using the same equipment, through non-contiguous carrier aggregation, provided they fall within the technical and operational limits of the equipment.

91. Allowing licence winners to exchange spectrum in 3500 MHz and 3800 MHz bands in a streamlined way could improve the efficiency of spectrum utilization from 3450-3900 MHz by promoting contiguity. To support the efficient use of spectrum, ISED will permit, after the announcement of the provisional licence winners, an exchange through a transfer request, of licences representing equal amounts of 3500 MHz and 3800 MHz spectrum holdings in any combination within the same service area. This would include exchanges of set-aside 3500 MHz licences, such that the set-aside transfer restrictions set out in the *Policy and Licensing Framework for Spectrum in the 3500 MHz Band* applicable to those licences would continue to apply to the receiving licensee's holdings following the transfer. All transfers will also remain subject to the provisions of section 5.6 of *CPC-2-1-23, Licensing Procedures for Spectrum Licences for Terrestrial Services*. As indicated in the Consultation, the 3500 MHz conditions of licence will be amended to reflect this decision and to permit the transfer of set-aside licences as noted above.

92. As mentioned in section 8, 3500 MHz licensees who are currently exceeding the cross-band cap will not be required to divest any of their licences. Such licensees would still be allowed to participate in the streamlined process given that no transfer of licences will result in a licensee being authorized to use a greater amount of spectrum than their current 3500 MHz licence.

93. Note that licences in the 3500 MHz and 3800 MHz bands may be subject to different transition timelines, levels of encumbrances, deployment requirements, etc. In such cases, the transition timelines, encumbrances, deployment requirements and any other conditions of licence would remain attached to the licences themselves unless stated otherwise by ISED. Licensees are responsible for determining whether a given exchange of spectrum holdings is worthwhile given these differences, as well as negotiating any exchanges with other licensees.

94. ISED will publish a streamlined process for the exchange of 3500 MHz and 3800 MHz band licences before the auction to provide more detailed rules for the treatment of exchanges and the requirements to utilize the streamlined process including details on the eligibility, procedures and timelines. The information on the requirements for transfers that take place once the streamlined process is complete can be found in CPC-2-1-23, as amended from time to time. The requirements in CPC-2-1-23 are subject to revision and amendment for reasons including furtherance of the policy objectives related to the 3500 MHz and 3800 MHz bands.

Decision

D7
ISED will permit, after the announcement of the provisional licence winners, an exchange through a transfer request, of licences representing equal amounts of 3500 MHz and/or 3800 MHz spectrum holdings within the same service area. This would include exchanges of set-aside 3500 MHz licences, such that the transfer restrictions applicable to those licences would continue to apply to that licensee's received holdings following the transfer. All transfers will also remain subject to the provisions of section 5.6 of Client Procedure Circular CPC-2-1-23, *Licensing Procedures for Spectrum Licences for Terrestrial Services*.

For a limited time after the auction, ISED will institute a streamlined process for the exchange of 3500 MHz and 3800 MHz band licences which will be published before the auction to provide more detailed rules for the treatment of transfers of licences and the requirements to utilize the streamlined process.

ISED will allow 3500 MHz licensees who are currently exceeding the cross-band cap to participate in the streamlined exchange process where the transfer of licences do not result in a licensee being authorized to use a greater amount of spectrum than their current 3500 MHz licence.

10. Licence areas

95. ISED's Service areas for competitive licensing web page outlines the general service areas that are used for the purposes of issuing spectrum licences. The defined geographic areas have been categorized under "service area tiers" that are based on Statistics Canada's Census Divisions and Subdivisions.

96. As different wireless services and applications are best suited to different sizes of service areas, five tiers of service areas have been established.

- Tier 1 is a single national service area
- Tier 2 consists of 14 large service areas covering all of Canada
    - eight Tier 2 service areas that have provincial/territorial boundaries and
    - six that are sub-provincial within Ontario and Quebec
- Tier 3 contains 59 smaller regional service areas
- Tier 4 contains 172 localized service areas
- Tier 5 contains the smallest licensing areas and comprises 654 smaller localized service areas

97. Given the current licences in the 3500 MHz band and the overarching goal of providing services for flexible use in urban and rural areas, ISED sought comments on its proposal to use Tier 4 service areas for the 3800 MHz licensing process.

Summary of comments

98. Agricultural Producers Association of Saskatchewan, Eastlink, Iristel, Québecor, SaskTel, Sogetel, TerreStar, Xplornet, Rogers, Bell, and TELUS were supportive of ISED's proposal to use Tier 4 service areas in the 3800 MHz auction. Rogers, Bell and TELUS indicated that the Tier 4 service areas are appropriate to be consistent with the 3500 MHz band.

99. However, SaskTel and Rogers indicated that larger service areas such as Tier 2 or Tier 3 would generally be preferable to minimize interference challenges but remained supportive of Tier 4 to maintain administrative consistency, and efficiencies in deployment.

100. Cogeco proposed that Tier 4 service areas be used across Canada but the Tier 4 service areas covering the three large metropolitan cities, Vancouver, Toronto and Montréal, be divided into Tier 5 service areas that nest within them. TELUS, Bell, Rogers did not agree with Cogeco's proposal and recommended ISED reject the recommendation in order to preserve consistency between 3500 MHz and 3800 MHz licences.

101. BCBA, CanWISP, Comcentric and ECOTEL recommended the adoption of Tier 5 service areas in the 3800 MHz auction. CanWISP, supported by BCBA, indicated that using Tier 5 service areas would promote a wider variety of operators to obtain licences and that it would bring 5G and broadband connectivity speeds of 50 Mbps upload and 10 Mbps download (50/10) to more consumers. Comcentric indicated that the use of Tier 5 service areas is necessary to introduce smaller service providers to the market and increase competition. It also indicated that Tier 5 would facilitate access to spectrum in rural and remote areas as it would be better tailored to needs of rural service providers. ECOTEL stated that Tier 5 service areas would allow larger operators to add capacity on existing sites in the already served areas while introducing smaller entities to provide better services to rural and remote areas. Rogers stated the use of Tier 5 service areas should be restricted to frequencies above 6 GHz including millimetre wave bands until more coordination tools and advancements in technology are adopted to ensure interference mitigation and economic feasibility. This recommendation was supported by TELUS. Bell opposed the use of Tier 5 for the 3800 MHz auction.

Discussion

102. Licensing based on Tier 4 service areas rather than larger tier sizes provide more flexibility to licensees by allowing them to either concentrate on strategic geographic markets or to aggregate smaller service areas into larger regions that correspond to their business needs.

103. Although licensing based on even smaller tier sizes such as Tier 5 service areas might afford licensees additional flexibility as indicated by some stakeholders, given the propagation characteristics of mid-band spectrum, Tier 4 service areas will allow licensees to maximize the benefits of higher power deployments while also minimizing interference concerns between neighbouring licensees, particularly in urban areas. Furthermore, Tier 5 service areas could result in fragmentation and introduce additional exposure risk for licensees seeking to increase their mid-band spectrum holdings in the same areas across both 3500 MHz and 3800 MHz bands.

104. Given that the propagation characteristics, the equipment and potential use cases for the 3800 MHz band are similar to that of the 3500 MHz band, ISED maintains that they should be licensed using the same tier size. Thus, all spectrum blocks available for auction in the 3800 MHz band will be licensed on a Tier 4 basis.

Decision

D8
All 3800 MHz licences issued through this competitive licensing process will be based on Tier 4 service areas.

11. Conditions of licence for flexible use spectrum licences in the 3800 MHz band

105. ISED sought comments on its proposed conditions of licence that would apply to flexible use licences issued through the auction of spectrum in the 3800 MHz band.

11.1 Licence term

106. ISED proposed that all flexible use licences be valid for a 20-year term from the date that the first licences are issued following the auction, shortly after the final payment deadline. As such, all licences would terminate on the same date, 20 years after the initial licence issuance date. At the end of this term, the licensee would have a high expectation that a new licence will be issued for a subsequent term through a renewal process 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.

Summary of comments

107. The majority of respondents supported ISED's proposal for a 20-year licence term.

108. CanWISP and BCBA were supportive of the proposed term but further commented that should the access licensing framework be implemented as proposed in the *Consultation on New Access Licensing Framework, Changes to Subordinate Licensing and White Space to Support Rural and Remote Deployment* the licences should be available for access licensing after five years.

109. CWTA, TELUS, Québecor, Cogeco, Sogetel, Xplornet and Eastlink agreed with the 20-year licence term but expressed that the period should be measured from the time the band has been cleared of all existing operations and the spectrum is available for flexible use. Although Bell was supportive of the 20-year licence term, given the potential for initial encumbrances in some tiers as a result of the transition period for fixed satellite service licensees, it stated that it believes ISED should make it clear to bidders that the effective term is actually less than 20 years.

Discussion

110. In the *Framework for Spectrum Auctions in Canada*, ISED has adopted a flexible approach in determining licence terms (up to 20 years) based on the specific spectrum being offered and subject to a public consultation preceding the specific auction or renewal process.

111. This policy was based on the recognition that licence terms in excess of 10 years would create greater incentive for financial institutions to invest in the telecommunications industry and for the industry itself to further invest in the development of network infrastructure, technologies and innovation.

112. The 3800 MHz band has the potential to facilitate the offering of 5G mobile broadband and fixed broadband services to Canadians. Given that the use of this band for 5G technologies is being adopted globally, there is little risk that there will be any usage changes to this spectrum in the foreseeable future. ISED recognizes that wireless technology is ever evolving and developments, such as cognitive radio and dynamic spectrum access, are expected to provide opportunities for increased efficiency for spectrum access. As a result, it is expected that although long-term spectrum licences will continue to provide priority access to spectrum, future consultations may explore the possibility of providing for opportunistic access to licensed spectrum.

113. ISED adopted a 20-year licence term for the adjacent 3500 MHz band. In light of this and the fact that both bands will be permitted to provide commercial mobile or fixed wireless services, ISED will also establish a licence term of 20 years for auctioned spectrum licences in the 3800 MHz band.

Decision

D9
The condition of licence relating to the licence term is as follows:

> **The term of this licence is 20 years from the date that the first licences are issued immediately following the auction process, shortly after the final payment deadline set out in the Framework (the "initial licence issuance date"). All licences will terminate on the same date, 20 years after the initial licence issuance date.**
>
> **At the end of the term, the licensee will have a high expectation that a new licence will be issued for a subsequent term through a renewal process 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.**
>
> **The process for issuing licences after this term and any issues relating to renewal, including the conditions of the new licence, will be determined by the Minister following a public consultation.**

11.2 Licence transferability, divisibility, and subordinate licensing

114. In the Consultation, ISED proposed that the 3800 MHz flexible use licences be treated like all other commercial mobile spectrum licences regarding transferability, divisibility and subordination, and may be transferred or subordinated in accordance with Client Procedures Circular, CPC-2-1-23, *Licensing Procedure for Spectrum Licences for Terrestrial Services* (including section 5.6.4). ISED further proposed to impose a five year limit on certain transfers if a set-aside or a cross-band cap was applied.

Summary of comments

115. The majority of respondents, including the BCBA, Bell, CanWISP, Cogeco, Comcentric, ECOTEL, Iristel, Québecor, Rogers, Sogetel, TELUS, TerreStar, and Xplornet were generally supportive of ISED's proposal on the conditions of licence related to transferability, divisibility and subordinate licensing.

116. TELUS and Cogeco expressed concern that if the 3800 MHz licence term did not coincide with the term for 3500 MHz licences, this could be an issue with a proposed cross-band spectrum cap. TELUS suggested that ISED modify the conditions of licence so the 3800 MHz auction spectrum cap would continue for five years from the date when auctioned 3500 MHz flexible use licences were first issued resulting in greater clarity for licensees with spectrum in the two bands. Cogeco encouraged ISED to harmonize the licence term and deployment conditions for 3800 MHz licences with 3500 MHz, such that carriers subject to the cap would not be penalized by a shorter deployment period for their most recently acquired licences. However, Rogers opposed Cogeco's proposal, stating the proposed harmonization was unnecessarily complex.

117. Rogers asserted that ISED must evaluate any transfer or subordination application against any spectrum cap and count any subordinated spectrum towards an operator's individual cap to prevent, in its view, anti-competitive spectrum pooling arrangements. SaskTel echoed this sentiment by stating licensees should not be able to exceed or circumvent their spectrum cap through transferring licences.

118. ECOTEL argued that new licences should come with mandated subordination requirements when spectrum remains unused to enforce spectrum usage. In its reply comments, Rogers argued that mandatory subordination is unjust as spectrum buyers would be charged for an exclusive licence but then later be required to give the same spectrum to another party.

Discussion

119. As commercial mobile services will be permitted in the 3800 MHz band, all flexible use licences within the band will be treated as commercial mobile for the purpose of assessing spectrum holdings and concentration. As such, the provisions outlined in section 5.6 of CPC-2-1-23 will apply to requests for transfers or subordinations in this band.

120. Licensees are strongly encouraged to make use of all of their spectrum holdings in all areas, including rural ones, either by putting the spectrum to use as the primary licensee or through subordinate licensing or other types of arrangements, such as the transfer or division of licences that would see the spectrum used for the benefit of Canadians. However, ISED also notes that this encouragement should not be interpreted to condone speculating on licences in order to hold them for later financial arrangements that meet deployment requirements solely through the use of subordination arrangements and subordinate deployments. ISED does not

encourage licensees to hold their licences for the sole purpose of later transferring or subordinating to others.

121. **Provisions applicable to a cap:** As discussed in section 8, ISED is adopting a 100 MHz cross-band flexible use cap in the 3500 MHz and 3800 MHz bands. ISED is of the view that the application of the cross-band cap for five years with respect to transfers will help to ensure that auction participants are not speculating on licences in order to hold them for later financial arrangements without providing service to Canadians. As such, the cap will continue to be in place for five years following 3800 MHz band licence issuance. With the exception of a few situations noted below, no transfer of licences or issuance of new licences will be authorized that allows a licensee to exceed the cross-band spectrum cap during this period.

122. ISED is of the view that a limitation on transfers that is tied to the initial deployment requirement will support the provision of services to Canadians. As such, within the first five years of the licence term a licensee may only be eligible to transfer a licence once it has demonstrated that it has met its first deployment requirement and provided that the transfer does not result in a licensee exceeding the spectrum cap.

123. As described in section 11.3, some tiers have a first deployment milestone at five years and some at seven years. As such, a licence with a seven-year initial deployment milestone may be transferred to an entity exceeding the cross-band spectrum cap after the five-year transfer restriction has elapsed, provided that the licensee demonstrates to ISED's satisfaction that it has met the seven-year deployment requirement and subject to the provisions of section 5.6 of CPC-2-1-23.

124. Despite the above-mentioned general restriction on transfers, licensees may apply, in writing, under CPC 2-1-23 to use a subordinate licensing process. Subordinate licences will not count towards the subordinate licensee's cross-band spectrum cap provided the primary licensee and the subordinate licensee demonstrate to the satisfaction of ISED that they will be separately and actively providing services to customers in the applicable licence area using the licensed spectrum. Where such approval is granted and for at least the duration of the spectrum cap being in place, licensees must implement their plans to ISED's satisfaction. Any modifications to these plans must be submitted to ISED for approval.

125. Spectrum services Canadians when it is put to use, while arbitrage activities do not advance ISED's policy objectives. In order to ensure the effectiveness of the cross-band cap, to deter speculation, and to ensure spectrum is put to use for the benefit of Canadians, any request for a licence subordination is contingent on ISED's review as set out in the *Framework Relating to Transfers, Divisions and Subordinate Licensing of Spectrum Licences for Commercial Mobile Spectrum* (Transfer Policy Framework). Licence holders should not assume that a subordination will be approved without evidence that the spectrum licence is being put to use by the primary licensee and that subordination provides additional public benefits rather than simply a monetary benefit to the primary licensee. The Transfer Policy Framework takes the social and economic benefits for Canadians as a primary objective, and specifically includes among its consideration

criteria "the degree to which the Applicants and their Affiliates have deployed networks and the capacity of those networks." As such, ISED may also require that the primary licensee meets the initial deployment requirement milestone or otherwise demonstrates that it is providing or has plans to provide services in the licence areas covered by a subordination request.

126. **Exchange of spectrum licences:** As discussed in more detail in section 9, ISED will permit the exchange through a transfer request, of licences for equal amounts in any combination of 3500 MHz and 3800 MHz spectrum provided they are within the same service area, subject to the provisions of section 5.6 of CPC-2-1-23.

Decision

D10
The condition of licence on transferability and divisibility and subordinate licensing is as follows (see annex C):

> **This licence is transferable in whole or in part (divisibility), in both bandwidth and geographic dimensions, subject to the Minister's approval. A Subordinate Licence may also be issued in regard to this licence. The Minister's approval is required for each proposed Subordinate Licence.**
>
> **The licensee must make the Transfer Request in writing to the Minister. The Transfer Request will be treated as set out in Client Procedures Circular CPC-2-1-23, *Licensing Procedure for Spectrum Licences for Terrestrial Services* as amended from time to time. In all cases, the licensee must follow the procedures as outlined in CPC-2-1-23.**
>
> **The licensee must apply in writing to the Minister for approval prior to implementing any Deemed Transfer, which will be treated as set out in CPC-2-1-23. The implementation of a Deemed Transfer without the prior approval of the Minister will be considered a breach of this condition of licence.**
>
> **Should the licensee enter into any Agreement that provides for a Prospective Transfer with another holder of a Licence for commercial mobile spectrum (including any Affiliate, agent or representative of the other licence holder), the licensee must apply in writing to the Minister for review of the Prospective Transfer within 15 days of entering into the Agreement, which will be treated as set out in CPC-2-1-23. Should the Minister issue a decision indicating that the Prospective Transfer is not approved, it will be a breach of this condition of licence for a licensee to remain in an Agreement that provides for the Prospective Transfer for a period of more than 90 days from the date of the decision.**
>
> **Cross-band spectrum cap: Licensees are subject to the following additional provisions under the 100 MHz cross-band spectrum cap established under the Framework:**

- The cross-band cap is applicable to a licensee's total 3500 MHz and 3800 MHz spectrum holdings immediately following the issuance of 3800 MHz licences and extends for a period of five years.

- No transfer of licences or issuance of new licences will be authorized if it would result in a licensee exceeding the 100 MHz cross-band spectrum cap during this period or cause a licensee whose prior holdings already exceed the spectrum cap to further exceed the spectrum cap.

- A spectrum licence may only be transferred during the five-year period set out above once the licensee has satisfied the first mid-term deployment requirement.

- Subordinate licences will not count towards the subordinate licensee's spectrum cap if the primary licensee and the subordinate licensee demonstrate to the satisfaction of ISED that they will be separately and actively providing services to customers in the applicable licence area. Where such approval is granted and for at least the duration of the spectrum cap being in place, licensees must implement their plans to the satisfaction of ISED. Any modifications to these plans must be submitted to ISED for approval.

- An expedited exchange of licences involving equal amounts of 3500 MHz and/or 3800 MHz spectrum may be permitted provided they are within the same service area, and meet certain conditions as set forth by ISED using a streamlined process set out in a document to be published by ISED addressing post-auction considerations for a period immediately following the 3800 MHz auction, subject to the provisions of section 5.6 of CPC-2-1-23.

All capitalized terms have the meaning ascribed to them in CPC-2-1-23.

11.3 Deployment requirements

127. In the Consultation, ISED proposed to use two deployment requirements for the 3800 MHz band, similar to the 3500 MHz band. The first is a general deployment requirement for each licence area based on a percentage of the population and would apply at year 5, 10 and 20 after the initial issuance date for Tier 4 service areas, which include a large population centre. In recognition of the longer transition periods in areas without a large population centre, ISED proposed that the deployment requirements for those licence areas would apply at years 7, 10 and 20.

128. The second was an additional requirement for licensees that currently operate a mobile LTE network. To provide timely 5G coverage, ISED proposed that licensees that acquire 3800 MHz flexible use licences and currently provide mobile LTE services to the general public (general public includes residential and retail business customers, in the relevant service area of

interest) will be required to meet the following deployment requirements regardless of the service that they plan to deploy using the licence(s):

- In the Tier 4 services areas of Montréal, Toronto and Vancouver:
    - provide service coverage to 90% of the population within its mid-band mobile LTE footprint, coverage in effect as of the publication date of the *Policy and Licensing Framework for Spectrum in the 3800 MHz Band*, within five years of the initial licence issuance date
    - provide service coverage to 97% of the population within its mid-band mobile LTE footprint, coverage in effect as of the publication date of the *Policy and Licensing Framework for Spectrum in the 3800 MHz Band*, within seven years of the initial licence issuance date
    - provide service coverage to 95% of the population outside the large population centre within ten years of the initial issuance date
- In the 21 Tier 4 service areas, which contain at least one large population centre as defined by the 2016 Census of Population from Statistics Canada, excluding Montréal, Toronto and Vancouver:
    - provide service coverage to 90% of the population within its mid-band mobile LTE footprint, coverage in effect as of the publication date of the *Policy and Licensing Framework for Spectrum in the 3800 MHz Band*, within seven years of the initial licence issuance date
    - provide service coverage to 97% of the population within its mid-band mobile LTE footprint, coverage in effect as of the publication date of the *Policy and Licensing Framework for Spectrum in the 3800 MHz Band* within ten years of the initial licence issuance date
    - Outside the large population centres (but within the Tier 4):
        - provide service coverage to 95% of the population outside the large population centre within ten years of the initial licence issuance date
- In the Tier 4 service areas, which do not contain a large population centre:
    - provide service coverage to 90% of the population of its mid-band mobile LTE footprint, coverage in effect as of the publication date of the *Policy and Licensing Framework for Spectrum in the 3800 MHz Band* within seven years of the initial licence issuance date
    - provide service coverage to 97% of the population of its mid-band mobile LTE footprint, coverage in effect as of the publication date of the *Policy and Licensing Framework for Spectrum in the 3800 MHz Band*, within ten years of the initial licence issuance date

129. ISED also sought comments on whether to accelerate the above-mentioned proposed timelines for deployment requirements. In addition, ISED sought comments on whether blocks of spectrum in the 3700-3900 MHz range in certain Tier 4 service areas with a potential encumbered population of 30% or more as a result of protected FSS earth station operations as identified in the Consultation should have lower population coverage percentage requirements.

Summary of comments

130. **General deployment requirement:** The BCBA, Eastlink, Sogetel, TerreStar, Xplornet and individuals Michael B. McNally and Kris Joseph were generally supportive of the proposed deployment condition of licence as well as the proposed levels of deployment. The BC Tech Association, CanWISP and TELUS were supportive of more stringent deployment requirements. TELUS further submitted its own proposed deployment condition timelines, which would begin to put spectrum in all Tier 4 services areas to use within a 5-7 year period.

131. CanWISP also recommended that deployment requirements be based on coverage at the Tier 5 service area level within each Tier 4 service area, stating that increased granularity would support investments in rural areas. The Canadian Federation of Agriculture similarly advocated for geographically based deployment conditions based on smaller licensing areas.

132. Bell stated that the proposed general deployment requirements are sufficient to ensure that deployment occurs in rural and remote areas of the country, acknowledging the consistency with the requirements previously adopted for the 3500 MHz band.

133. Québecor recommended that deployment requirements should begin only once FSS has transitioned out of the band. Cogeco also stated that licences should be issued with a start date of March 31, 2025. Further to this, Cogeco stated that the first deployment requirement should align with the timelines included in the CRTC's mobile virtual network operator (MVNO) framework. TerreStar and Québecor were also of the opinion the requirements should align with the CRTC's MVNO framework.

134. Although Rogers acknowledged that the general deployment requirements are achievable, it recommended that the initial and mid-term requirements only begin once revised radio altimeter standards have been published. Similarly, SaskTel stated that populations that are unable to be served due to restrictions resulting from the presence of radio altimeters should either be counted toward meeting the deployment requirements or excluded entirely from ISED's coverage calculations. Iristel added that in areas affected by the presence of radio altimeters, specifically Tier 4 service area 4-171 (Nunavut), deployment requirements should apply seven years following the removal of restrictions. The Agricultural Producers Association of Saskatchewan (APAS) and the Canadian Federation of Agriculture both expressed concerns that timelines and percentages associated with the general deployment conditions are insufficient to ensure the provision of services in rural areas and should be more expedient.

135. **Additional deployment requirements for mobile LTE network operators:** Bell, Rogers, SaskTel, Comcentric, Sogetel, TerreStar, Québecor and Eastlink opposed the additional LTE deployment requirements for licensees that operate a mobile LTE network, stating that they are unfair and punitive to operators who have invested in their LTE networks.

136. As part of its opposition to the additional deployment requirements, Bell also stated that the timelines proposed by ISED were too aggressive and in some instances licensees would not be afforded sufficient time to meet the requirements. Further to this, Eastlink stated that factors outside of a licensee's control such as equipment availability and access to infrastructure could negatively impact its ability to deploy within the proposed timelines.

137. SaskTel recommended that the timelines be based on the transition periods and also that the LTE requirements be allowed to be met using either 3500 MHz or 3800 MHz spectrum.

138. Sogetel expressed concern that the availability of a mobile operator's LTE network coverage is not made public, making it difficult to track, which would result in a lack of transparency vis-à-vis compliance.

139. In its opposition to the additional deployment requirements, Rogers stated that, at the very least, additional LTE requirements should not apply in FSS encumbered areas.

140. APAS, BCBA and Xplornet were supportive of the expanded LTE requirements.

141. **Acceleration of deployment requirements:** APAS, the BC Tech Association, CanWISP, ECOTEL and TELUS submitted comments, which were generally supportive of accelerating the proposed timelines for general deployments. Individuals Kris Joseph and Michael McNally were also supportive. TELUS further submitted its own proposed deployment requirement timelines for consideration, which would implement deployment obligations in all Tier 4 services areas, within a 5-7 year period.

142. Community Economic Development and Employability Corporation, Kootenay Rockies Tourism, Nisga'a Lisims Government, Pearson, TELUS World of Science Edmonton, Tourism Jasper and the National Coalition of Chiefs were supportive of deployment requirements that put spectrum to use within five years. The Cariboo Chilcotin Coast Tourism Association advocated that spectrum be deployed within three years.

143. ECOTEL suggested that deployment milestones should not go beyond 10 years in rural and remote areas, stating that deployment conditions beyond 10 years would create the opposite effect as a justification to not provide service in a timely manner. Iristel favours mandated subordination in place of accelerated deployment timelines.

144. The BCBA, Bell, Comcentric, Eastlink, Québecor, Rogers, SaskTel, Sogetel, and TerreStar all agreed that ISED should not accelerate the proposed timelines for the deployment of spectrum. Similarly Cogeco stated that, given the initiatives ISED has in development as mentioned in the *Consultation on New Access Licensing Framework, Changes to Subordinate*

Licensing and White Space to Support Rural and Remote Deployment, it is of the opinion that additional accelerated timelines are not required.

145. Bell, Eastlink, and Rogers encouraged ISED to push back the general deployment timeline until after incumbent licensees vacate the spectrum and new licence holders gain full access to begin deployment. Rogers stressed the significant uncertainty of 3800 MHz spectrum being usable before March 2025 because previous operators from the band need to be cleared out. Bell expressed that, if deployment timelines were to begin at the issuance date instead of the date on which licensees have access to the spectrum following the transition deadline, the effective length of term would be shorter than advertised and deployment obligations should be recalibrated to reflect this.

146. **Deployment requirements for encumbered service areas:** CanWISP, BCBA, SSi and TerreStar expressed support for the reduction of population coverage requirements in service areas where more than 30% of the population is encumbered. SSi also expressed concerns that if deployment requirements are not relaxed in encumbered areas, FSS earth station licensees will face mounting pressure to scale back their use of the band to accommodate flexible use licensees' deployment targets.

147. Bell was supportive of lower population coverage requirements in the case of the proposed general deployment requirements but was opposed to the adoption of any additional LTE requirements in encumbered tiers.

148. Rogers was of the opinion that any reduction of the population coverage requirement should be weighted to the potentially encumbered population, an opinion also shared by Comcentric and Iristel.

149. ECOTEL was opposed to lowering the population coverage requirement, stating that doing so would likely allow the status quo to prevail in terms of level service offered in rural and remote tiers.

150. SaskTel recommended that the deployment requirements not come into effect in satellite-dependent areas until satellite providers have transitioned.

151. TELUS recommended that for the majority of licences that ISED considers encumbered (i.e. greater than 10% encumbrance), ISED should enforce the deployment requirements using the percentages and timelines it proposed. Further, TELUS also stated that for the time being service areas that are identified as more than 90% encumbered should not be subject to deployment requirements.

Discussion

152. ISED uses deployment requirements to encourage licensees to put spectrum to use to provide wireless service in Canada in a given service area at specific times throughout the licence term. ISED maintains the view that graduated deployment requirements support the objective of facilitating deployment and timely availability of services across the country, including rural areas, so that all Canadians can have high-quality services at affordable prices.

153. **General requirement:** The general deployment requirements proposed in the Consultation are similar to the requirements applied to the previously auctioned 3500 MHz spectrum band.

154. ISED understands the concerns raised regarding the potential delays to a new licensee's deployment plans given the length of the transition periods for existing wireless broadband service (WBS) licensees in urban and rural service areas as well as FSS licensees in certain areas. However, ISED notes that the transition deadline for the existing users are static, as specified in the 3800 MHz Repurposing Decision. Additionally, unlike the 3500 MHz band, flexible use licensees are free to begin deploying services immediately following the issuance of their new 3800 MHz licences provided they adhere to the specified transition and protection requirements vis-a-vis existing operations in the band, including satellite and terrestrial operations. In addition, ISED notes that given the auction date will be towards the end of 2023, this will reduce the time period between the initial licence issuance and the transition timelines.

155. Additionally, licensees have the ability to coordinate, and are free to negotiate mutually beneficial commercial agreements with existing earth station or WBS operators.

156. The arguments in favour of softening the general deployment requirements were carefully considered, however, the general deployment requirements proposed in the Consultation are more appropriate to meet the relevant policy objectives and therefore will be maintained in this Framework. The general deployment requirements are listed in annex A.

157. **Mobile LTE requirement:** Similar to the 3500 MHz band, ISED proposed that licensees that acquire 3800 MHz flexible use licences and currently provide mobile LTE network services would be obligated to meet additional deployment requirements. This additional set of deployment requirements recognizes that these existing network operators are in the best position to deliver 5G services to Canadians in an expedited fashion, and scales the requirement accordingly.

158. ISED notes that a number of stakeholders raised concerns with the additional deployment requirements proposed for mobile LTE network operators. However, ISED took proactive steps to address possible concerns regarding potential delays to protect current users, and to enhance the predictability of the deployment requirement schedule when developing the LTE deployment requirements. To account for potential delays created by the later transition deadline, ISED extended the first mid-term LTE deployment milestone from five to seven years in the 21 Tier 4

service areas with large population centres compared to the timelines in the 3500 MHz band, since these tiers also have rural or remote Tier 5 service areas within them. This will provide stakeholders with additional time to meet deployment requirements in areas that are subject to longer protection periods. In addition, ISED expects that licence holders will have deployed their 3500 MHz spectrum well before the 3800 MHz deployment milestones. As such, licence holders may be able to leverage the same equipment infrastructure in the 3800 MHz band as in the 3500 MHz band, potentially reducing the time needed to deploy in the 3800 MHz band.

159. ISED also considers that the LTE deployment requirements as proposed in the Consultation better meet the relevant policy objectives. The LTE deployment requirements are listed in annex B.

160. **Acceleration of deployment requirements and Canada's Connectivity Strategy:** In the Consultation ISED also sought comments on whether to accelerate the timelines for the general deployment requirements, and on measures to support Canada's Connectivity Strategy. Of those that provided comments relating to the measures to support Canada's Connectivity Strategy, most indicated that ISED has implemented a number of initiatives designed to accelerate the deployment of broadband services in rural, remote and underserved areas of Canada. Such measures include improved access to unused spectrum through the Access Licensing Framework, and the various deployment requirements of the recently auctioned 600 MHz and 3500 MHz bands. Respondents also indicated the importance of local service providers in rural and remote areas to achieve the Canada's Connectivity Strategy target.

161. A number of respondents were in favour of accelerated deployment; however, ISED recognizes the concerns raised by others with regards to the presence of existing licensees in certain areas and the potential challenges expediting the requirements might create. As such, ISED will not accelerate the deployment requirements beyond what it originally proposed in the Consultation.

162. **Deployment requirements for encumbered service areas:** In the Consultation, ISED also sought feedback from stakeholders related to the deployment requirements in some Tier 4 service areas that may be encumbered due to FSS earth station operations that are allowed to operate full-band (3700-4200 MHz) after the FSS transition deadline. Although ISED recognizes the potential constraints in deploying flexible use services in these areas where the encumbrance could impact more than 30% of the population, ISED expects that some of these FSS earth station operations will eventually move to 4000-4200 MHz over the long term. Furthermore, flexible use licensees will have the ability to coordinate, and negotiate mutually beneficial commercial agreements with existing earth station operators to reduce the level of encumbrance. As such, ISED is opting not to reduce the deployment requirement for these areas but instead will monitor the situation and may consider future changes if necessary.

163. ISED continues to seek to implement strong deployment requirements that support the Government of Canada's "use-it or lose-it" policy. As such, ISED is maintaining the proposed deployment requirements and the timelines associated with them. With these 3800 MHz

deployment requirements, ISED is further building on those already in place for the 3500 MHz band. The 3800 MHz requirements are more ambitious than previous processes to ensure that this spectrum is put to use in rural areas as soon as possible, while ensuring deployment targets are reasonable for all providers, not just national incumbents.

Decision

D11
The condition of licence on deployment conditions is as follows:

Deployment requirements

The licensee will be required to demonstrate to the Minister that the spectrum has been put to use, as specified below. In all cases, the licensee is required to meet the relevant conditions and to continuously provide services throughout the term of the licence in accordance with these requirements. For services to be considered "continuously provided," the service provider must maintain an active service offering throughout the term of their licence.

General deployment requirements

In Tier 4 areas that include a large population centre (as listed in annex A), all licensees will be required to demonstrate to the Minister that the spectrum has been put to use to actively provide service to a minimum percentage of the population as specified in table A1 of annex A, within 5, 10, and 20 years of the initial licence issuance date. In all other Tier 4 areas, licensees will be required to demonstrate to the Minister that the spectrum has been put to use to actively provide service to a minimum percentage of the population as specified in table A2 of annex A, within 7, 10, and 20 years of the initial licence issuance date.

Additional deployment requirements for mobile LTE service providers

In addition to the general deployment requirements, a licensee offering mobile LTE services will be required to demonstrate to the Minister that the spectrum has been put to use to cover the following deployment requirements within its mid-band mobile LTE network footprint (coverage in effect as of the publication date of the *Policy and Licensing Framework for Spectrum in the 3800 MHz Band*), using the 3800 MHz band.

In the Tier 4 service areas of Montréal, Toronto and Vancouver:

- 90% of the population within its mid-band mobile LTE network footprint within five years and
- 97% within seven years of the initial licence issuance date

- 95% of the population outside the large metropolitan population centres within 10 years of the initial licence issuance date

In tiers that contain a large population centre, excluding Montréal, Toronto and Vancouver, as listed in annex B:

- 90% of the population within its mid-band mobile LTE network footprint within seven years, and
- 97% within 10 years of the initial licence issuance date
- 95% of the population outside the large urban population centres within 10 years of the initial licence issuance date

In tiers that do not contain a large population centre, as listed in annex B:

- 90% of the population within its mid-band mobile LTE network footprint within seven years
- 97% within 10 years of the initial licence issuance date

The general deployment requirements continue to apply to all licences by default, and must be satisfied in all cases where the requirements for mobile operators listed above may be lower than the general requirements.

Licensees will be required to provide their mid-band mobile LTE network footprint to ISED as of the publication date of the *Policy and Licensing Framework for Spectrum in the 3800 MHz Band*, as defined by the service provider's AWS-1, AWS-3, AWS- 4, BRS, PCS, WCS and 3500 MHz band deployments, when requested by ISED.

The licensee is required to meet these conditions at all relevant times during the licence term and to continuously provide services throughout the term of the licence in accordance with these requirements.

Where a licence is transferred, the requirement for the new licensee to deploy will continue to be based on the initial licence issuance date.

The licensee must provide the Minister with any documentation or information related to spectrum access or LTE network footprints at the Minister's request.

Six months prior to the end of the 20-year licence term, all licensees wishing to undergo the future licence renewal process must provide proof to ISED that they meet or will meet the 20-year deployment requirements for their licence.

ISED will review licensees' compliance with their deployment conditions at the dates noted above. Where, at any point in the licence term, the licensee is not in compliance with its deployment conditions, ISED may invoke various compliance and enforcement measures. These measures may include warnings, administrative monetary penalties,

legal action, licence amendments, suspensions, or other measures. In certain cases of non-compliance, ISED may determine that the most appropriate course of action is to revoke the licence.

11.4 Other conditions of licence

164. Additional conditions of licence based on existing policies and procedures apply to licences issued through this licensing process for spectrum in the 3800 MHz band. The full wording of these conditions of licence are available in annex C.

Decision

D12
The conditions of licence outlined in annex C will be applied to licences in the 3800 MHz band issued through this licensing process.

12. Auction format and rules

165. As proposed in the Consultation, ISED will use the clock auction format with generic licences and intra-round bidding for the 3800 MHz auction. This section outlines stakeholder views, along with ISED's responses and rationale for decisions related to using the clock auction format.

12.1 Generic licences

166. As discussed in sections 5 and 10, ISED will auction the 3800 MHz band as 25 unpaired blocks of 10 MHz in 172 Tier 4 service areas. In the Consultation, ISED proposed that these blocks be offered as generic licences in each service area.

167. Generic licences are blocks of spectrum that are sufficiently similar and comparable in value to one another so that they can be offered as a single category in each service area. In determining whether licences should be regarded as generic, ISED considered the frequency location in the band, the block size, the encumbrances, the transition timelines, and the possible technology and interference constraints.

168. As noted in the Consultation, there are three distinct types of incumbent users in the 3800 MHz band: WBS and FSS users, which will be displaced in many areas, and a small number of fixed operations, which have been grandfathered. Given the treatment of existing licensees in the 3800 MHz band, ISED proposed that only blocks in the 3700-3900 MHz frequency range be considered encumbered in satellite-dependent areas and in non-satellite-dependent service areas where 10% or more of the population is affected by the operations of

FSS earth stations in satellite-dependent areas, consolidated sites and the Government of Canada sites located in North Bay. As such, ISED sought comments on:

- using generic licences and offering licences in two separate categories of generic licences in service areas that are deemed to contain encumbered blocks
- using a 10% threshold of affected population to determine whether the 3700-3900 MHz blocks in a service area that is adjacent to a satellite-dependent area should be categorized as encumbered

Summary of comments

169. The BCBA, Bell, CanWISP, Cogeco, Comcentric, Eastlink, ECOTEL, Iristel, Québecor, Rogers, SaskTel, Sogetel, TELUS, TerreStar and Xplornet generally supported offering licences in the 3800 MHz auction as generic licences, as well as using a 10% threshold for population encumbrance to determine whether the 3700-3900 MHz blocks within a given service area should be considered encumbered.

170. TELUS added that it did not agree with the categorization of service areas as encumbered as published in the Consultation, and requested that ISED publish the relevant data for bidders to assess the impact of spectrum encumbrances including maps and calculated encumbered population figures following the development of the SRSP and RSS standards for the 3800 MHz band. ECOTEL and Iristel requested ISED provide details on how population encumbrances would be calculated, to provide the percentage of potential population encumbrance for all encumbered service areas, and access to a definitive list of all protected earth stations and the rules related to their protection.

Discussion

171. As noted, ISED will be making 25 blocks of 10 MHz in 172 service areas available in the 3800 MHz auction. The use of generic licences significantly simplifies the bidding process by enabling bidders to indicate the quantities of licences desired in each area instead of identifying specific licences. Bidding on the number of licences, rather than specific licences, thus greatly reduces the number of possible combinations of licences that bidders have to consider in placing their bids. Furthermore, using generic licences in the 3800 MHz auction will facilitate the assignment of contiguous blocks of spectrum to the extent possible.

172. ISED notes that there was widespread support from stakeholders to offer licences as generic licences, and to establish two categories of licences in service areas where 3700-3900 MHz is considered encumbered. Having separate unencumbered and encumbered categories would allow bidders to express precise values for each category of licence during the allocation stage, enabling greater price discovery.

173. Stakeholders also broadly supported using a 10% threshold of population encumbrance to determine whether the 3700-3900 MHz blocks within a given service area should be considered

encumbered. Many stakeholders noted that blocks with a population encumbrance of less than 10% would likely be sufficiently similar in value to unencumbered blocks in the same service area, allowing all blocks within that service area to be offered as a single category.

174. As such, blocks in the 3700-3900 MHz frequency range will be considered encumbered in satellite-dependent areas and in non-satellite-dependent service areas where 10% or more of the population is affected by the operations of FSS earth stations in satellite-dependent areas, consolidated sites and the Government of Canada sites located in North Bay. These encumbered Tier 4 service areas are identified in annex D. For the purposes of this Framework, a pair consisting of a service area and a category (unencumbered or encumbered) is referred to as a "product."

175. ISED recognizes that to understand the categorization of service areas and to properly assess the value of the licences, potential bidders will require further information about the encumbered service areas, and the percentage of the population that is encumbered. Licensed earth stations and interim authorized earth stations can be found at ISED's Spectrum Management System. The technical rules to protect FSS earth stations will be detailed in the relevant SRSP, which is anticipated to be published before the 3800 MHz auction such that bidders have enough time to assess encumbrances. ISED will continue to review the extent of the encumbrances shown in annex D and will publish an updated list of Tier 4 service areas where more than 10% of the population is encumbered and the percentage of the encumbered population six months prior to the start of the auction.

Decision

D13
ISED will use generic licences in the auction, offering 25 blocks of 10 MHz as generic licences in all Tier 4 service areas.

D14
ISED will consider blocks in the 3700-3900 MHz frequency range encumbered in satellite-dependent areas and in non-satellite-dependent service areas where 10% or more of the population is affected by the operations of FSS earth stations in satellite-dependent areas, consolidated sites and the Government of Canada sites located in North Bay.

In the service areas listed in annex D, blocks in the 3650-3700 MHz frequency range will be offered in the unencumbered category, and blocks in the 3700-3900 MHz frequency range will be offered in the encumbered category. In all other service areas, the entire frequency range (3650-3900 MHz) will be offered in the unencumbered category.

12.2 Anonymous bidding

176. In the Consultation, ISED sought comments on the proposal to use anonymous bidding during the 3800 MHz auction.

Summary of comments

177. The BCBA, Bell, CanWISP, Cogeco, Comcentric, ECOTEL, Iristel, Québecor, Rogers, SaskTel, Sogetel, TELUS, TerreStar, and Xplornet all agreed with the proposal of using anonymous bidding during the auction. Sogetel and Comcentric emphasized that anonymous bidding minimizes retaliation and speculation while ensuring that bidders are focused on the spectrum they seek, rather than on what rival bidders are doing.

Discussion

178. ISED is of the view that anonymous bidding minimizes retaliation and speculation while ensuring that bidders are focused on the spectrum they need to support the services they intend to provide to Canadians, rather than on what rival bidders are doing during the auction. For these reasons, ISED notes that in recent years, auctions around the world have utilized anonymous bidding, regardless of the format used.

179. ISED remains of the view that the level of information disclosure would provide bidders with enough information to permit price discovery and would help bidders focus on their valuations for the licences, thereby allowing bidders to make informed decisions regarding their bidding strategies.

Decision

D15
ISED will use anonymous bidding for all stages of the auction.

Following every clock round, bidders will be provided with information on their own bidding activity from previous rounds and their eligibility for the next round, as well as the aggregate demand for each product from the previous round and the prices of each product for the next round. Bidders will not be informed about the individual bids submitted by other bidders or about the remaining eligibility of other bidders.

At the end of the allocation (clock) stage, each bidder will be informed of the number of blocks it won in each product, along with the price for these blocks.

Following each assignment round, after the results have been verified, participating bidders will be notified of the specific frequencies they have been assigned and the assignment price.

Once the assignment stage has concluded, the auction system will inform provisional winning bidders of the specific licences that they have won and the final prices to be paid (the sum of

their allocation stage and assignment prices), regardless of whether they actively participated in the assignment stage or not.

12.3 Clock auction format

180. In the Consultation, ISED sought comments on its proposal to use the clock auction format for the 3800 MHz spectrum auction. This is a two-stage auction format that provides a simultaneous multiple-round allocation (clock) stage to determine the quantity of generic blocks won in each product, followed by an assignment stage to determine the specific frequency assignment for each winner. Detailed descriptions of the clock stage and the assignment stage are provided in annex F and annex G, respectively.

Summary of comments

181. The BCBA, Bell, CanWISP, Comcentric, ECOTEL, Iristel, Québecor, Rogers, SaskTel, Sogetel, TELUS, TerreStar and Xplornet supported the use of a clock auction format. SaskTel noted that participants would already be familiar with the proposed format as it is the same format that was used for the 3500 MHz auction. Rogers added that, while there is no single best auction format, a combinatorial auction with package bids would be impractical given the large number of spectrum blocks available.

Discussion

182. ISED maintains its view that the clock auction format is well suited for auctioning licences in the 3800 MHz band. The multi-round allocation stage with intra-round bidding facilitates price discovery and allows for an efficient progression of the auction. Information released to bidders after each clock round helps them to mitigate their exposure risk. The allocation stage pricing provides bidders with high price certainty.

183. The structure of the assignment stage will promote the assignment of contiguous licences where possible, and the second-price rule will allow bidders to bid their full values on their preferred assignments, while ensuring that they do not pay more than necessary for their preferred frequencies.

184. ISED agrees that the number of blocks available in the auction, namely 25 blocks in each of 172 service areas, would make a combinatorial auction with package bidding impractical for the 3800 MHz auction. In addition, ISED is of the view that the structure of the clock auction format, as used in the 3500 MHz auction, would give bidders greater certainty of the licences they may win and the prices they will have to pay by processing demand on a round-to-round basis.

Decision

D16
ISED will use the clock auction format for the 3800 MHz auction. Further details are provided in annexes F and G.

12.4 Structure of the allocation (clock) stage

185. The allocation stage is a simultaneous multiple-round auction process where all licences are offered at the same time as generic blocks. Before the start of the auction, ISED will specify the initial supply of blocks in each product and the opening bid price (reserve price) of each product. An activity rule is used to improve price discovery and maintain auction progress.

186. The allocation stage consists of a number of rounds in which bidders identify the number of blocks demanded of each product at the prices specified by ISED for that round (the clock price). As the allocation stage progresses, the clock prices of products with excess demand increase.

187. In the Consultation, ISED proposed to use intra-round bidding in the allocation stage. In Round 1, each bidder indicates the number of blocks it demands for each product at the opening bid price. With intra-round bidding, all rounds that take place after Round 1 have a range of prices associated with them. The start-of-round price is the lowest price in this range and the clock price is the highest price in this range. In each round after Round 1, a bidder can either maintain its demand for a product at the round's clock price or request to change its demand by submitting a bid at a price that is between the start-of-round price and the clock price (inclusively). The ability to express demand at any price between the start-of-round price and the clock price (rather than simply at the clock price) is referred to as intra-round bidding.

188. A bidder can submit a bid that expresses its demand for a product at a price between the start-of-round price and the clock price, including either bound price. As it would be unnecessary, the auction system does not allow a bidder to submit multiple bids for a given product at a single price. For example, if a bidder wants to reduce its demand for a given product from four blocks to three blocks and from three blocks to two blocks at a single price, the bidder should place a single bid requesting a reduction from four to two blocks at the chosen price. This bid may then be processed in whole, in part, or not at all, depending on the state of supply and demand for this product.

189. In a simultaneous auction with intra-round bidding, a bidder's ability to increase its demand for one product may depend on whether it can reduce its demand for another product. In order to treat bids for different products in a consistent manner, the price intervals between the start-of-round price and the clock price are expressed in relative (percentage) terms. Bids for a change in demand are processed in ascending order of "price point." The price point is defined

by how much the bid price exceeds the start-of-round price in percentage terms relative to the distance between the start-of-round price and the clock price for the product.

190. After the end of each round, bids are processed to determine the number of blocks held by each bidder for each product (the processed demand). A bid to maintain demand for a product from the previous round is always applied during bid processing. A bid to increase demand for a product is applied only if the increase will not cause the bidder's processed activity (i.e. the activity associated with the bidder's processed demands) to exceed the bidder's eligibility for the round and if the increase would not cause the bidder to exceed the spectrum cap. A bid to decrease demand for a product is applied only if the reduction will not cause aggregate demand to fall below supply for that product (or to fall further below supply, if it is already below supply). This guarantees that once a product has aggregate demand greater than or equal to supply, there will never be any unsold blocks for the product. If a bid to change demand cannot be applied in full, it will be applied to the extent possible. For a detailed description of how bids are processed, see section F8 of annex F.

191. After determining processed demands, the auction system will calculate the posted price of every product for the round as follows. A product's posted price would be equal to the clock price of the same round if aggregate demand exceeds supply at the clock price. If aggregate demand for a product is equal to supply due to an intra-round bid for a reduction in demand that was applied, the posted price would be the price of that intra-round bid. Therefore, the price for the round would not need to increase to the level of the clock price if aggregate demand and supply are balanced at some price that is below the clock price, as expressed using intra-round bidding. If aggregate demand for a product is less than or equal to supply and no bid for a reduction in demand was applied, the posted price would be equal to the start-of-round price. The round's posted price becomes the start-of-round price for the next round. For a detailed description of how posted prices are determined, see section F9 of annex F.

Summary of comments

192. BCBA, Bell, CanWISP, Eastlink, ECOTEL, Québecor, Rogers, SaskTel and Xplornet supported the proposed structure of the allocation stage.

193. SaskTel noted that the clock auction format, structure of the clock stage, price increments, and activity rules proposed for the 3800 MHz auction are substantively the same as those used for the 3500 MHz auction, and the absence of issues during that auction suggests no reason to change the format. In their reply comments, both SaskTel and TELUS noted participants' familiarity with these rules, with TELUS adding that it would allow prospective bidders to reuse existing tools.

194. Iristel opposed the use of intra-round bidding, suggesting that it is a complex mechanism to predict due to linkages with other aspects of the auction, such as processed demand and eligibility points. Iristel further suggested that reducing the maximum percentage increment would compensate for the removal of intra-round bidding. In its reply comments, Rogers added

that more modest absolute bid increments are required during the auction even if intra-round bidding is included.

195. Cogeco proposed that ISED consider the use of "all-or-nothing" bids for the 3800 MHz auction. All-or-nothing bidding allows bidders to specify a bid on a combination of licences at a certain price point that is either processed in its entirety or not at all. Bell proposed a variation that includes optional all-or-nothing bidding that would allow bidders to indicate for each product whether a bid to change its demand is all-or-nothing, adding that this approach would eliminate the scenario of bidders being forced to bid on an undesired package of licences to ensure that it can increase its processed activity to avoid reduction in eligibility. CanWISP supported this proposal adding that this would reduce exposure risk by eliminating the possibility that a bidder could win a single, unusable 10 MHz block in a service area.

196. Rogers opposed Cogeco's proposal, arguing that it would allow bidders to walk away from low demand, which is not desirable as it may encourage gaming. TELUS noted that both Cogeco and Bell proposed variations of all-or-nothing bids that would allow bidders to represent a desired increase or decrease in block quantity in a given product. TELUS did not object to the notion of all-or-nothing bidding, but strongly opposed Cogeco's proposed implementation, noting that, unlike simple bids, all-or-nothing bids would not allow a bidder to have a processed demand in between the two endpoints of their current processed bid and their desired bid quantity.

Discussion

197. ISED remains of the view that the structure of the allocation stage, with generic licences and intra-round bidding, will promote an efficient allocation of the 3800 MHz band. The use of generic licences will simplify bidding in the auction, allow the allocation stage to proceed at an appropriate pace, and facilitate the contiguity of spectrum assigned during the allocation stage to the extent feasible.

198. The use of intra-round bidding provides an optional feature that allows bidders to better express demand, makes it less likely that there will be ties resulting from multiple bidders changing demand at the same price, and allows for larger bid increments that could potentially reduce the number of rounds in the auction without causing inefficiencies. Nonetheless, ISED will consider the overall auction dynamics when determining the appropriate bidding increments.

199. As noted in comments, the clock auction format, structure of the allocation stage, price incrementing rules, and activity rules for the 3800 MHz auction are substantively the same as those used for the 3500 MHz auction. As such, ISED anticipates that many participants in the 3800 MHz auction will already be familiar with the auction format and associated rules. Concerns about the auction format's complexity will additionally be addressed through bidder training, including information sessions and participation in mock auctions. This will provide qualified bidders with the opportunity to familiarize themselves with the auction format and software. Annex F provides further details of the auction rules.

200. ISED is of the view that the implementation of all-or-nothing bids could significantly and unnecessarily complicate the auction rules, software, and bidding process. In previous cases where other jurisdictions implemented these or similar bid types, actual use during the auctions was very limited. As such, as was the case for the 3500 MHz auction, ISED is of the view that there is not a sufficient benefit to allow using other bid types in this auction.

Decision

D17
ISED will use the structure of the allocation (clock) stage, including the methodology for calculating processed demands and posted prices after each round, as described in annex F. The method for calculating a bidder's eligibility will be as outlined in section 12.10 and annex F.

12.5 Price increments in the clock rounds

201. In the Consultation, ISED sought comments on its proposal that a round's clock price be in the range of 1%-20% higher than the start-of-round price (or, equivalently, the posted price from the previous round), rounded up to the nearest thousand for clock prices greater than $10,000 or nearest hundred for clock prices less than $10,000.

Summary of comments

202. BCBA, CanWISP, Québecor, SaskTel, Xplornet, and TerreStar supported the proposed range of percentage increments. TELUS did not oppose the proposed range but argued that increments in the upper half of this range (i.e. 10%-20%) would create an accelerated cadence at the start of the auction that may prove contrary to the desired intention of promoting price discovery, especially for products in the more populated service areas.

203. Rogers opposed the proposal, stating that the auction rules do not foreclose the possibility of very large absolute bid increments, which may unduly and unnecessarily accelerate the auction (thus subverting price discovery) and raise governance issues for bidders. Rogers suggested that this led to challenges for bidders during the 3500 MHz auction. As a solution, Rogers proposed applying minimum floors and maximum caps on absolute bid increments set by service area proportionally to reserve prices, and that a default bid increment of 10% could still be used. TELUS supported the proposal to cap absolute bid increments to a percentage of the reserve price, but recommended starting the auction at 5% increments and increasing the percentage only if the auction is taking too long to progress.

204. Iristel recommended using smaller price increments during the allocation stage, and that the maximum percentage should not be more than 10%.

Discussion

205. Bid increments are established so that the auction progresses in a timely manner. ISED maintains the view that increments in the range of 1%-20% of prices from the previous clock round provide flexibility during the auction to factor the actual demand for different products. Additionally, intra-round bidding provides bidders with the additional flexibility needed to express their preferences at prices between the start-of-round and clock prices. As such, ISED reserves the right to apply round-to-round price increases within this range during the auction to facilitate the progress of an efficient and timely auction.

206. Placing restrictions on the absolute value of the bid increments could unnecessarily limit the efficient progression of the auction. Adding minimum increments could result in higher percentage increases for service areas with lower opening bid prices, while maximum increments could result in smaller percentage increases for service areas with higher opening bid prices. This could result in uneven price discovery and unnecessarily extend the length of the auction.

Decision

D18
ISED will apply price increments based on the aggregate demand for each product in that service area, in accordance with the incrementing methodology specified in annex F. Price increases will be in the range of 1%-20% of prices from the previous clock round. During the auction, ISED reserves the right to adjust the amount of round-to-round price increases within this range to facilitate the progress of an efficient and timely auction. ISED will round clock prices greater than $10,000 up to the nearest thousand dollars and clock prices less than $10,000 up to the nearest hundred dollars.

12.6 Activity rules in the clock rounds

207. In the Consultation, ISED sought comments on its proposed activity rule for the allocation stage of the auction. The activity rule, including mathematical formulas for the calculation of eligibility, is detailed in annex F.

208. Each block available in the auction has been assigned a specific number of eligibility points (“points”) that is approximately proportionate to the opening bid price of the licence. One point has been assigned for each $3,000 of the opening bid price. Annex E lists the opening bid prices, eligibility points and population for the licences in each service area.

209. In its application, each applicant must indicate the maximum number of points it wishes to be able to bid for and win in the auction. This number defines the bidder's initial eligibility and is also used to determine the financial deposit that must be submitted with the application. Bidders will not be able to increase their eligibility points after the application deadline to participate in the auction.

210. In any round, a bidder will not be allowed to submit bids that exceed its eligibility for the round. The term “submitted activity” for a given round refers to the total eligibility points of its submitted bids in that round (i.e. the total eligibility associated with the bidder’s demands if all of its bids submitted for the round are applied during bid processing). The term “processed activity” refers to the eligibility points associated with the bidder’s actual processed demands.

211. A bidder maintains its eligibility from the previous round if its processed activity corresponds to a certain percentage of its eligibility for that round. This percentage is called the "activity requirement." ISED will set the activity requirement between 90% and 100% in all clock rounds, and will retain the discretion to change the activity requirement within that range as the auction progresses. The precise initial activity requirement will be communicated to all qualified bidders before the auction begins.

Summary of comments

212. BCBA, Bell, CanWISP, Comcentric, ECOTEL, Québecor, SaskTel, Sogetel, TELUS, TerreStar and Xplornet generally supported the activity rules as proposed in the Consultation.

213. Québecor added that ISED could have increased the activity rule percentage more quickly in the 3500 MHz auction to improve the pace of the auction. TELUS disagreed in its reply comments, suggesting that the progression of activity requirements in the 3500 MHz auction was appropriately timed.

214. Bell suggested the activity rule could be improved by implementing “all-or-nothing” bids, which would eliminate the possibility that a bidder would be forced to bid for an undesired package of licences to ensure that it can increase its processed activity to avoid a reduction in eligibility. This proposal was supported by Cogeco and Eastlink in their reply comments; however, Rogers argued that the potential benefits would not justify adding the required complexity to the auction rules.

215. Rogers did not oppose the proposed activity rule but stated that the flexibility of the activity requirement may not be enough to ensure individual bidders can always switch between substitutable categories within service areas due to differences in the eligibility point values of the licences.

Discussion

216. ISED remains of the view that the adopted activity rule is an effective way to encourage bidders to bid on the licences they are interested in, based on their valuations, while providing sufficient flexibility to ensure that bidders would be able to update their demands as more demand and price information is revealed throughout the allocation stage. In addition, the activity requirement provides ISED with sufficient flexibility to ensure that the auction progresses in an efficient manner. ISED notes concerns that increases to the activity requirement later in the auction could reduce or eliminate bidder flexibility, potentially distorting the 3800

MHz auction, and will carefully consider the auction dynamics during the allocation stage when adjusting activity requirements.

Decision

D19
ISED will adopt the activity rules, as detailed in annex F.

12.7 Conclusion of the clock stage

217. The clock stage will conclude for all products in all service areas after the first round in which, after the bids have been processed, there is no excess demand for any product in any service area. This round is referred to as the final clock round.

218. Bidders that hold processed demand for a product in a service area after the final clock round become winning bidders of the demanded quantity of the product. The price to be paid for one generic block of a product will be the product's posted price for the final clock round. Winners will be assigned frequency-specific blocks during the assignment stage.

12.8 Structure of the assignment stage

219. Whenever generic licences are used, the auction format must include an assignment stage to determine the assignment of specific blocks. Recognizing that using contiguous spectrum is generally more efficient, ISED proposed that winners of multiple blocks within a single product in a given service area receive contiguous licences.

220. In the Consultation, ISED sought comments on:

- the proposed structure of the assignment stage, including the conditions under which service areas are combined into assignment areas, the order of the assignment rounds, and the approach to guarantee contiguity for one bidder across unencumbered and encumbered blocks when applicable

- the proposal to apply bidder-optimal core pricing and use the nearest Vickrey approach in determining assignment prices

- whether winning bidders in the 3800 MHz auction that also hold the 3640-3650 MHz licence in the same service area should automatically be assigned its licences starting at 3650 MHz in service areas where only unencumbered blocks are available

Summary of comments

221. Comcentric, Québecor, SaskTel, Sogetel, TELUS and TerreStar supported the proposed structure of the assignment stage, noting its similarity to the assignment stage of the 3500 MHz auction. Bell and Rogers supported the general structure of the assignment stage, but opposed ISED's proposal to hold assignment sessions for six areas at a time after the completion of the first eight assignment rounds. Bell instead recommended a separate assignment round for each service area (subject to the creation of assignment areas) while Rogers recommended changes to the structure that would divide service areas into smaller groups. ECOTEL also generally supported the proposal, provided ISED integrate its recommendation to assign set-aside blocks from 3650-3710 MHz in rural and remote service areas where at least one WISP operates as the sole terrestrial service provider. Québecor added that ISED should hold more rounds per day to accelerate the pace of the assignment stage.

222. Iristel did not oppose the proposed structure of the assignment stage, but noted that the added complexity may be unnecessary since the situations where areas can be combined may be limited and allowing for post-auction swaps between licensees may achieve the same objective.

223. Rogers opposed the proposed mechanism for assigning contiguity between unencumbered and encumbered blocks in service areas where both categories are available stating that it could unintentionally force some bidders into a contiguous assignment even if they do not want it, and that it does not expose bidders to the true opportunity cost of a contiguous assignment.

224. Bell, Comcentric, ECOTEL, Iristel, Québecor, Rogers, Sogetel, TELUS, and TerreStar supported the use of bidder-optimal core pricing and use of the nearest Vickrey approach in determining assignment prices.

225. Bell, Comcentric, Iristel, Québecor, TECHNATION, and TELUS supported automatically assigning licences starting at 3650 MHz of the 3800 MHz band to the licensee of 3640-3650 MHz in service areas where only unencumbered blocks are available. ECOTEL supported the proposal only if the former WBS block was reserved for set-aside-eligible bidders in satellite-affected service areas. TELUS added that this should apply to all service areas, not just service areas where only unencumbered spectrum is available. Cogeco and Rogers opposed the proposed automatic assignment, stating that this potential benefit was not clear at the time of the 3500 MHz auction, and could have had an impact on bidding behaviour. Cogeco added that it could unfairly penalize other 3500 MHz licensees who may be forced to deploy a new set of radio equipment for 3800 MHz.

226. CanWISP also opposed automatic assignment for licensees holding 3640-3650 MHz, stating that current WBS users should be assigned blocks in 3650-3700 MHz if they win licences in the 3800 MHz auction. TELUS opposed this proposal stating that it would be counter to ISED's 3800 MHz displacement decision.

Discussion

227. All bidders that win licences during the allocation stage will have an opportunity to express their preferences for specific frequency blocks in the assignment stage. Each bidder will be provided with all contiguous bidding options that are consistent with its allocation stage winnings for a given category (unencumbered or encumbered) in a given service area, regardless of what other bidders have won. Providing bidders with all bidding options including those which are not feasible is important to maintain the anonymity of bidding and thereby reduce the potential for gaming behaviours in the assignment stage.

228. **Conditions for combining service areas into a single assignment area:** The geographic unit for bidding in the assignment stage will be the "assignment area." ISED remains of the view that combining Tier 4 service areas into assignment areas would simplify the assignment stage and facilitate the assignment of contiguous spectrum across service areas. To be considered an assignment area, Tier 4 service areas must form a contiguous geographic region, must be located within the same Tier 2 service area, and must have the same number of unencumbered and encumbered blocks. In addition, the winning bidders and the number of blocks they have won in each service area being considered must be the same in each category.

229. **Structure of assignment rounds:** ISED will conduct a separate assignment round for each of the eight most populated assignment areas, sequentially, in descending order of population. Once these eight areas have been assigned, bidding for the remaining assignment areas will be conducted in parallel. All remaining assignment areas will be ranked by population from highest to lowest, and then will be divided into six sessions per assignment round, subject to the constraint that each assignment round will not include more than one assignment area from within the same Tier 2 service area. ISED remains of the view that a maximum of six sessions per assignment round provides a balance between the need for a timely conclusion of the assignment stage and the ability of bidders to handle bidding in different assignment areas that are assigned in different sessions of the same round. ISED maintains the right to make adjustments to this order and to change the number of sessions per round, and will inform qualified bidders of any change prior to its implementation.

230. ISED maintains its view that this structure of the assignment rounds will promote an efficient assignment of contiguous blocks of spectrum across service areas. This structure will enable bidders to know which specific frequencies they have won in more populated assignment areas prior to participating in subsequent assignment rounds for less populated areas. ISED notes that once the most populous assignment areas have been assigned, bidders typically bid for similar frequencies in subsequent assignment rounds. As such, dividing the remaining service areas into fewer sessions or holding a separate assignment round for each assignment area may unnecessarily increase the duration of the assignment stage.

231. **Assignment of contiguous licences:** Contiguity for all winners can only be guaranteed within a single generic category. The decision to separate blocks into two categories of generic licences in service areas with encumbrances could create a scenario that prevents assigning contiguous licences for all winning bidders when multiple bidders win blocks in both categories of licences (unencumbered and encumbered) in those service areas. In the Consultation, ISED

proposed a mechanism whereby each cross-category winner (i.e. a bidder with winnings in both categories) would submit bids for specific assignments in each category separately, and the auction software would then use these bids to determine which cross-category winner would be awarded contiguity between unencumbered and encumbered blocks.

232. ISED notes Rogers' concern that this approach could unintentionally force some bidders into a contiguous assignment even if they do not want it. Therefore, ISED will adjust the approach proposed in the Consultation and allow each cross-category winner to either "opt in" or "opt out" of contiguity across the two categories. In particular, in addition to the bids it can submit for its bidding options in each category, a cross-category winner will be given the opportunity to submit a "contiguity bid" representing its bonus value for receiving both the highest frequency unencumbered bidding option and the lowest frequency encumbered bidding option. If the contiguity bid is any positive number, then the bidder is treated as "opting in"; and if the contiguity bid is zero, then the bidder is treated as "opting out". If one or more cross-category winners have "opted in", the auction software will ensure that one of those bidders is assigned contiguous spectrum across the two categories. Specifically, the software will consider the sum of each such bidder's contiguity bid, its bid for its highest frequency unencumbered bidding option and its bid for its lowest frequency encumbered bidding option. The bidder with the highest such bid sum will be assigned licences that are contiguous across the categories and its assignment price will be the second-highest bid sum. If only one cross-category winner has opted in for contiguity, then its assignment price will be zero. The software will then determine the assignment for the remaining blocks (excluding the licences that have already been assigned) by selecting the assignment that maximizes the sum of bid amounts, separately for each category (and making no further reference to "contiguity bids"). A detailed explanation of this process is contained in annex G.

233. **Assignment price:** Winning bidders do not have to place bids in the assignment stage if they do not have a preference for a specific assignment as they are guaranteed to be allocated the number of generic licences that they have already won during the allocation stage. Assignment prices will be determined from the set of assignment bids for the assignment area. A bidder's assignment price is attributable to the entire package of licences assigned to the bidder in a given assignment area, and not to any individual licence in that package.

234. With the exception of a cross-category winner that has opted for contiguity and was assigned contiguous spectrum, the auction software will use bidder-optimal core prices and the "nearest Vickrey" approach to determine assignment prices. Given the pricing rules, the assignment price of each winning assignment package will be equal to or less than the corresponding winning bid amount, and could even be zero. In some cases, the Vickrey price may not be high enough to ensure that there is no other bidder or group of bidders prepared to pay more for the licences in question and an additional payment above Vickrey prices may be required. If such a payment is required, the additional payment to be paid by a given bidder will be weighted based on the number of blocks being assigned to that bidder in the given assignment area and category. The structure of the assignment stage and the rules for determining assignment prices are explained in detail in annex G.

235. **Contiguity for licensee of 3640-3650 MHz:** Stakeholder feedback on whether to automatically assign 3800 MHz licences starting at 3650 MHz to a winning bidder that also holds the 3640-3650 MHz licence was mixed. ISED recognizes concerns that, while this would facilitate contiguity between the 3500 MHz and 3800 MHz bands, this type of measure should have been explained in advance of the 3500 MHz auction. ISED agrees that the potential benefit of guaranteed contiguity may have affected bidding behaviour during the 3500 MHz auction. Noting that there may be advantages to obtaining lower frequencies in the 3800 MHz band to facilitate deployment for all 3500 MHz licensees, ISED also agrees that it could be unfair to assign such frequencies automatically to those who hold the licences for 3640-3650 MHz. As such, ISED will not implement any measure to guarantee contiguity between the 3500 MHz and 3800 MHz bands.

Decision

D20
Assignment area: The geographic unit for bidding in the assignment stage will be the "assignment area". In order to simplify the assignment stage and to facilitate the assignment of contiguous licences across regions, two or more contiguous Tier 4 service areas will be combined into an assignment area when the service areas are located within the same Tier 2 service area, the Tier 4 service areas have the same number of unencumbered and encumbered blocks, and the winning bidders and the number of blocks they have won in each of those service areas is the same in each category.

D21
Structure of the assignment stage: ISED will conduct a separate assignment round for each of the eight most populated assignment areas sequentially, in descending order of population. All remaining assignment areas will be ranked by population from highest to lowest and then will be divided into six sessions per assignment round. Bidding for the remaining areas will be conducted in parallel.

Assignment of contiguous licences: Each bidder will be assigned contiguous licences within a category. In assignment areas with two categories, it may not be possible to assign contiguous spectrum across categories to all winners when multiple bidders win licences in both categories. Each cross-category winner will be given the choice of whether to opt in or opt out of contiguity across categories. The auction software will ensure that one of the cross-category winners that opted in (if any) is assigned contiguous spectrum across the two categories. The auction system will then determine the assignment of the remaining licences to the remaining bidders, separately for each category. This process is described in more detail in annex G.

Assignment price: For a cross-category winner that has opted for contiguity and is assigned contiguous spectrum across the two categories, the assignment price will be determined based on a second-price approach. In all other cases, assignment prices will be determined using bidder-optimal core pricing and the "nearest Vickrey" approach. The final price a winning

bidder will have to pay is the sum of the posted price(s) of the final clock round for the licences it won and the associated assignment price(s).

12.9 Opening bids

236. Opening bids are the prices for the spectrum licences at the start of the auction, and the minimum that will be accepted for each licence.

237. In the Consultation, ISED proposed that opening bid prices for the 3800 MHz auction be determined using the same approach that was used for the 3500 MHz auction. This approach would categorize each Tier 4 service area into one of four price levels based on the population of the service area and whether it contains a Census Metropolitan Area (CMA). ISED proposed four price levels, in $/MHz/pop:

- Service areas with population over 2 million: $0.232/MHz/pop
- Service areas with population over 1 million but less than 2 million: $0.10/MHz/pop
- Service areas with population under 1 million that contain one or more CMAs: $0.065/MHz/pop
- All other service areas: $0.051/MHz/pop

238. For each service area, the opening bid price was determined by multiplying the price level for the area by its population and 10 MHz, and then rounding to the nearest thousand.

239. The total amount of opening bids for one unencumbered block of 10 MHz across Canada would be $46,830,000.

240. In addition, ISED sought stakeholder comments on whether its proposal to offer licences in two categories of generic licences (unencumbered and encumbered) warranted a reduction in the opening bid prices of encumbered licences, and if so, the best approach to do so.

Summary of comments

241. BCBA, CanWISP, Eastlink, Québecor, Rogers, SaskTel, Sogetel, TerreStar and Xplornet generally supported the proposal to use the same approach used for the 3500 MHz band to determine the opening bid prices for the 3800 MHz band. Comcentric, Sogetel and TerreStar added that ISED should not conclude that the values of the 3500 MHz licences are indicative of the values that the 3800 MHz licences will command.

242. Bell, Iristel and TELUS did not support the proposed opening bid prices. Bell noted that opening bid prices could be lower when there are no set-aside licences, proposing that opening bid prices for service areas with a population over 2 million be reduced to the prices used in the

2500 MHz auction if there were no set-aside. However, Bell also noted that opening bid prices should remain at proposed levels if a set-aside was adopted.

243. Iristel noted that opening bid prices should be set as low as possible with final prices set by market conditions. Iristel also suggested that unsold licences after the 600 MHz and 3500 MHz auction, particularly in remote areas, meant that the opening bid prices were set too high and prevented additional small players from acquiring the licences.

244. TELUS argued that opening bid prices should be reduced across the board, arguing that high opening bid prices played a major role in the final price outcomes of the 3500 MHz auction. In its reply comments, Rogers strongly rejected this argument, noting that while the proposed opening bid prices are at the high end of international benchmarks for C-band reserve prices, they are well below average international market prices and only a small fraction of the 3500 MHz auction price. Rogers added that this makes it impossible to make a case that the proposed opening bid prices are too high.

245. Comcentric, Eastlink, Sogetel and TerreStar supported reducing opening bid prices for encumbered blocks using a methodology similar to what was used for the 3500 MHz auction to adjust the opening bid prices of encumbered blocks as a function of their encumbrance level compared to unencumbered blocks in the same area. TELUS supported a similar methodology, but added that ISED should consider reducing the unit price of the blocks (its price level) depending on the category it would fall in based on its remaining unencumbered population. Iristel added that opening bid prices for encumbered blocks should not be the same as unencumbered blocks.

246. Rogers argued that opening bid prices should not be reduced for any service area where less than 30% of the population is encumbered, but noted that they would support a modest reduction in areas where the encumbrance is greater than 30% of the population.

247. SaskTel noted that lower opening bid prices would be welcome, but that it does not seem necessary to lower the starting prices given the outcome of the 3500 MHz auction where the final price of encumbered blocks was significant in many areas.

Discussion

248. Opening bid prices are generally determined by taking into consideration the market value of similar spectrum bands, the propagation characteristics, the availability of an equipment ecosystem, and pro-competitive policy objectives. These prices reflect the minimum amount that ISED would accept for the licences, and should enable NMSPs, RMSPs, WISPs and new entrants to expand and enhance connectivity in underserved areas, while supporting continued competition in the market for consumers and businesses.

249. In addition to the similarities between the 3800 MHz and 3500 MHz bands, in particular the propagation characteristics and that it will be similarly used to provide commercial mobile and fixed services, ISED notes that opening bid prices in the 3500 MHz auction were set at a

small fraction of the final market value determined by the auction, which resulted in prices more than 15 times higher than the opening bid prices. As such, ISED maintains its view that the approach used for the 3500 MHz band remains appropriate for determining the opening bid prices for the 3800 MHz band.

250. In response to whether offering licences in two categories of generic licences (unencumbered and encumbered) warranted a reduction in the opening bid prices of encumbered blocks, stakeholders broadly supported reducing prices based on the affected population within a service area. As such, ISED will reduce the opening bid prices of encumbered blocks proportionately to the percentage of the affected population in service areas where more than 10% of the population is encumbered, to a minimum opening bid price of $1,000. The same price levels and rounding rules, outlined above, will be applied based on the total population within the service area.

251. As the nature of the encumbrances in the 3800 MHz band is different from the 3500 MHz band, ISED encourages prospective bidders to carefully review the potential for interference with existing operators and the implications of the technical rules on the potential value of the spectrum.

252. Opening bid prices listed in this Framework are based on the current list of service areas with encumbered blocks and their estimated encumbered populations. ISED will continue to review the extent of the encumbrances and will publish an updated list of encumbered service areas and the corresponding opening bid prices six months prior to the start of the auction.

Decision

D22
ISED will apply opening bids for the licences available through this licensing process as shown in annex E. Opening bid prices for encumbered blocks in service areas where more than 10% of the population is encumbered will be reduced proportionately to the affected population, to a minimum opening bid price of $1,000.

12.10 Eligibility points

253. In the Consultation, ISED sought comments on its proposal to determine eligibility points relative to the lowest opening bid price in the auction. Specifically, for each block, ISED assigned one eligibility point for each $3,000 of the opening bid price. In service areas with opening bid prices below $30,000, the number of eligibility points was rounded to the nearest point. For service areas with opening bid prices above $30,000, the number of eligibility points was rounded to the nearest ten points.

Summary of comments

254. BCBA, CanWISP, Comcentric, Eastlink, Iristel, Rogers, SaskTel, Sogetel, and TELUS supported the proposed methodology of determining eligibility points based on opening bid prices. However, some stakeholders proposed modifications or different values per eligibility point.

255. SaskTel noted that in the 3500 MHz auction, each eligibility point was worth $5,000 and that there seemed to be no reason to reduce the deposit amount by reducing the cost of eligibility points and suggested that ISED use the same relative prices used in the 3500 MHz auction.

256. TELUS proposed scaling the price per point to approximately one point per $500 of opening bid price, which is consistent with its recommendation to reduce opening bids and pro-rate prices for encumbered blocks. Rogers opposed this proposal, stating that reduced points and costs simply makes it easier for speculative bidders to create chaos in additional rounds, confusing legitimate price discovery and competitive dynamics.

257. Iristel recommended that eligibility points for encumbered spectrum should be adjusted to reflect the unencumbered population within the service area in accordance with proportional reductions in opening bid prices. Rogers proposed assigning the same eligibility points to any product with a potential encumbrance of less than 30% and 60% of the eligibility points to any product with population encumbrance of more than 30% to allow for easier switching between substitute products within service areas.

Discussion

258. The eligibility points were established to enhance price discovery and support substitution between licences that are anticipated to be similar in value during the allocation stage (clock rounds) of the auction. As such, this approach takes into consideration the population of each service area, bandwidth per block, and the relative value of the spectrum as expressed by opening bid prices. In accordance with the decision to reduce opening bid prices for encumbered blocks detailed in section 12.9, ISED will assign eligibility points for encumbered blocks based on the reduced opening bid prices for these blocks. Licences with opening bid prices less than $3,000 will be assigned one eligibility point.

259. ISED notes that the price of each eligibility point and the number of eligibility points assigned to each service area are not determined independently of the opening bid prices. For example, consider the case of a licence that has an opening bid price of $10,000. Whether ISED assigns 1 point per $500, per $1,000, or per $5,000 also affects the number of points assigned to the licence (20 points, 10 points, or 2 points respectively). As such, the actual value of each point does not have a significant impact on auction dynamics or the pre-auction deposit, as bidders still would need to account for the number of points required to bid on that licence (20 x 500 = 10 x 1,000 = 2 x 5,000 = 10,000).

260. ISED is of the view that rounding eligibility points as proposed in the Consultation maintains the right balance between substitutability between similar licences while

differentiating between licences with different values. This should allow bidders to change their bids between licences of similar value without losing eligibility.

261. Based on opening bid prices, the equivalent of a national licence comprised of one 10 MHz block of unencumbered spectrum in all 172 service areas covering the country would be associated with 15,584 eligibility points. Eligibility points listed in this Framework are based on the current list of encumbered service areas and their estimated encumbered populations. ISED will publish an updated list of encumbered service areas and the corresponding eligibility points six months prior to the start of the auction.

Decision

D23
Eligibility points have been determined based on the opening bid prices of the licences, assigning one eligibility point for each $3,000 of opening bid prices. One eligibility point has been assigned to encumbered blocks with opening bid prices less than $3,000.

In service areas with opening bid prices between $3,000 and $30,000, the number of eligibility points is rounded to the nearest point. For service areas with opening bids above $30,000, the number of eligibility points is rounded to the nearest ten points. Annex E lists the eligibility points per service area.

13. Bidder participation: Affiliated and associated entities

262. In order to maintain auction integrity, as in past auctions, ISED proposes that there be rules relating to the participation of affiliated and associated entities in order to ensure that each bidder is an independent bidder. As was the case in previous auctions, it is proposed that affiliated entities not be allowed to participate separately in the auction. It is also proposed that associated entities only be allowed to participate separately if, following a review of their application, ISED is satisfied that their participation would not have an adverse impact on auction integrity. As in previous auctions, applicants will be required to disclose information about their company or business structures, including affiliations and associations.

263. In the Consultation, ISED sought comments on its proposed rules and definitions regarding affiliated and associated entities and their participation in the auction.

Summary of comments

264. BCBA, Bell, CanWISP, Comcentric, Iristel, Québecor, SaskTel, Sogetel, TELUS, TerreStar and Xplornet agreed with the proposed rules regarding affiliated and associated entities.

265. Cogeco proposed that "competition" be defined as the ability to offer both retail and wholesale services, and that "services" be clarified to be inclusive of both retail and wholesale telecommunications services. Cogeco argued that such a clarification would make it clear that any associated entities wishing to participate in the auction must compete in both the retail and wholesale telecommunications markets in order to participate in the auction as separate entities.

266. ECOTEL claimed that there would be an inequity arising from the network sharing agreement between Bell and TELUS if they were granted the right to bid individually. ECOTEL suggested that any C-Band spectrum subordination between these two entities in rural and remote tiers be subject to a moratorium on subordination or transfer.

267. Rogers recommended that the associated entity rules be amended to recognize existing relationships between carriers in joint networks, citing the Bell and TELUS network partnership, and take into account how the spectrum will be used in post-auction mobile sharing partnerships. Rogers suggested that the associated entity and collusion rules be designed in conjunction with one another and not in isolation.

268. Bell disagreed with Rogers stating that TELUS and Bell are not associated entities for the purposes of the 3800 MHz auction. Bell recommended that ISED reject proposals requesting changes to the proposed rules regarding the associated entities.

269. TELUS refuted Cogeco, ECOTEL and Rogers' claims regarding TELUS and Bell's network sharing agreements and noted that the proposed rules are sufficient to maintain auction integrity.

270. Iristel expressed concerns regarding the compatibility of the current Bell and TELUS network sharing arrangement with the spirit of ISED's proposed rules on affiliated and associated entities. Iristel added that these concerns are about the inherent freedom given to the two entities to synchronize their bidding strategy to optimize their spectrum assets before the auction. Iristel recommended imposing a moratorium on spectrum subordination or transfer between both entities.

271. Comcentric noted that the considerations around an application of spectrum caps separately for associated entities, which were consulted on the *Consultation on a Policy and Licensing Framework for Spectrum in the 3500 MHz Band*, were absent from the Consultation. Comcentric believes that the adoption of a cross-band spectrum cap for the 3800 MHz licensing process, the question of how the spectrum cap is applied in the context of RAN sharing agreement should be subject to the consultation for 3800 MHz.

Discussion

272. A major concern identified by respondents was the potential of companies attempting to use spectrum sharing agreements in such a manner that would reduce overall competition in the marketplace. ISED is of the view that associated entities, which are competitors in the market, should be able to bid separately without negatively affecting the auction, given that the public disclosure requirements and rules prohibiting collusion are in place to protect the integrity of the auction. ISED will assess any such agreement or arrangement between applicant entities based on the facts at time of the application. However, ISED cannot pre-judge agreements that licensees may enter into post-auction.

273. ISED has implemented robust measures to assess and qualify prospective bidders to participate in an auction and to ensure that the auction rules are satisfied. As with previous auctions, ISED is requiring information relating to the business structure and beneficial ownership of each bidder. The application process also requires bidders to list any associated entities and provide a narrative indicating the nature of the association. Further information is required should associated entities wish to bid separately from their associated entity. ISED requires that providers disclose any explicit or implicit arrangements or agreements where financing, security or guarantees have been, or may be, provided to the applicant or any of its affiliates, by another applicant or its affiliates, relating to the acquisition or use of any spectrum licences being auctioned. If an applicant is involved in such an arrangement or agreement, ISED will request a brief description explaining the nature of their agreement or arrangement. ISED is unaware of any such existing agreements and is of the view that such a scenario is unlikely. However, it will request this information in order to further safeguard the integrity of the auction.

274. In response to the suggestion of integrating policies pertaining to collusion, affiliated and associated entities into a single framework, ISED notes that the licensing framework associated with a specific auction currently reflects an integrated set of rules, based on the conditions at the time of the licensing process.

275. Requests for transfers of spectrum licences that are meant to help implement a sharing arrangement are subject to the approval of the Minister and will be reviewed under CPC-2-1-23 and the Transfer Policy Framework.

276. The rules and definitions will be adopted as noted in this section.

Decision

D24
ISED is adopting the rules and definitions of affiliated and associated entities outlined in sections 13.1 and 13.2.

13.1 Affiliated entities

277. **Definition of affiliated entities:** As proposed in the Consultation, the definition of affiliated entities will be adopted as follows:

> **Any entity will be deemed to be affiliated with a bidder if it controls the bidder, is controlled by the bidder, or is controlled by any other entity that controls the bidder. "Control" means the ongoing power or ability, whether exercised or not, to determine or decide the strategic decision-making activities of an entity, or to manage or run its day-to-day operations.**

278. **Presumption of affiliate status:** If a person owns, directly or indirectly, at least 20% of the entity's voting shares (or where the entity is not a corporation, at least 20% of the beneficial ownership in such entity), ISED will generally presume that the person can exercise a degree of control over the entity to establish a relation of affiliation. The ability to exercise control may also be demonstrated by other evidence. Under this rule, ISED may, at any time, ask a prospective bidder for information in order to satisfy any question of affiliation.

279. Applicants may provide information to ISED to rebut the presumption of affiliate status. Applicants must notify ISED in writing if they are rebutting the presumption and must file material that will enable ISED to review the question and make that determination. It is the responsibility of the applicant to file the appropriate material. Such material may include:

- copies of the relevant corporate documentation relating to both entities
- a description of their relationship
- copies of any agreements and arrangements between the entities and affidavits or declarations, signed by officers from the two entities, dealing with the control as outlined in the definition of "affiliate" above

280. Upon receipt of this material, ISED will either make a ruling based on the materials submitted or ask the applicant for further information (and provide a timeline within which to do so).

281. Should the applicant entities fail to provide the relevant information in a timely fashion in order to allow ISED to complete its determination, ISED may make a ruling on eligibility that the applicants in question are affiliated.

282. **Eligibility to participate in the auction:** Only one member of an affiliate relationship be permitted to become a qualified bidder in the auction or the affiliated entities may apply to participate jointly as a single bidder. Affiliated entities must decide prior to the application deadline which entity will apply to participate in the auction. All affiliations must be disclosed at the time of the application.

13.2 Associated entities

283. **Definition of associated entities:** As proposed in the Consultation, as a basis for participating in the 3800 MHz spectrum auction, associated entities will be defined as follows:

> **Any entities that enter into any partnerships, joint ventures, agreements to merge, consortia or any arrangements, agreements or understandings of any kind, either explicit or implicit, relating to the acquisition or use of any of the spectrum licences being auctioned in this process will be treated as associated entities. Typical roaming and tower sharing agreements would not cause entities to be deemed associated.**

284. As in past auctions, the rules would allow prospective bidders to form a bidding consortium and to participate in the auction as a single bidder if they wish to coordinate their bids through a single bidder. In such a case, the eligibility rules would apply jointly in each licence area. Rules regarding communication between prospective bidders who are seeking to form a consortium are discussed further in section 13.4.1 below.

285. Depending on the nature of the association, it may not preclude the ability of the entities to participate separately in the auction. It should be noted that under the proposed definition above, entities are only deemed to be associated with respect to arrangements that relate to the acquisition or use of spectrum licences being auctioned in this process. For example, agreements related to joint equipment purchases or joint backhaul networks would not be captured under the definition unless they relate to the licences being auctioned.

286. **Eligibility to participate separately in the auction:** Associated entities may apply to participate separately in the 3800 MHz spectrum auction. ISED is of the view that allowing associated entities, which demonstrate that they are competitors in the market to bid separately would not have an adverse impact on the integrity of the auction, provided that auction participants comply with the information disclosure and anti-collusion rules as indicated in section 13.3 and section 13.4.

287. To obtain approval to participate separately in the auction, associated entities will be required to demonstrate to ISED's satisfaction that they intend to separately and actively provide services in the applicable licence area. Associated entities wishing to participate in the auction separately would be required to submit their application at least two weeks in advance of the final application deadline. This requirement would provide ISED with the additional time necessary to assess the nature of the association between the entities. Should the request be denied, only one of the associated entities will be eligible to apply to participate in the auction.

288. Bidders are reminded that the provisions of the *Competition Act* apply independently of, and in addition to, the Framework.

289. ISED notes that all entities participating in the auction will be subject to the same prohibition of collusion rules, as stated in section 13.4.

290. ISED's review would not extend to an overall assessment of the effects of the agreement between associated entities on competition in the marketplace.

291. **Assessment factors:** ISED would consider a broad range of criteria so as to determine the associated entities' intent and actions to actively and independently provide wireless services. Assessment criteria may include, but would not be limited to:

- the associated entities' intent and actions to provide services (coverage) in the area in which the sharing occurs
- the level of investment, including in distribution, marketing and customer service, in order to acquire and serve customers
- the associated entities' demonstration of separate presences in the marketplace

292. **Documentation:** Associated entities would be invited to provide all relevant documentation to ISED in regard to the above-noted assessment factors. These may include, but would not be limited to:

- all agreements relating to the transfer of, use of and access to the 3800 MHz spectrum
- business plans for the area in which the agreement(s) will provide access to spectrum
- business and financial results, including investments and customer acquisition
- a narrative as described in section 13.3 below

293. ISED may request additional documentation to complete its assessment and may require that documents be certified by an officer of the company. Where associated entities are competing, each associated entity may provide its documentation separately on a confidential basis. The material related to the request, except for the narrative described in section 13.3 below, will remain confidential.

13.3 Auction integrity and transparency (information disclosure pre-auction)

294. In order to ensure auction integrity and transparency, all entities wishing to participate in the auction process will be required to disclose in writing, as part of their application, the names of affiliated and associated entities. A narrative must also be submitted, describing all key elements and the nature of the affiliation or association in relation to the acquisition of the spectrum licences being auctioned and the post-auction relationships of said entities. The narrative must include arrangements with other potential bidders that relate in any way to the future use of the licences being auctioned directly or indirectly.

295. Some examples of arrangements that would require disclosure include, but are not limited to, agreements to establish a joint network using spectrum licences in this auction that may be

acquired by each of the entities and agreements regarding a joint backhaul network if they relate to the use of the licences being auctioned. Typical roaming and tower sharing agreements and other agreements, such as the purchase of backhaul capacity, would not cause entities to be deemed associated entities and hence need not be disclosed. Where a prospective bidder has previously attempted to form or has dissolved a consortium, that bidder must disclose this fact and indicate the other entities that were part of the consortium or negotiations thereto.

296. The submitted narrative will be made available to other bidders and to the public on ISED's website prior to the auction in order to ensure transparency of the licensing process.

13.4 Prohibition of collusion and other communication rules

297. As in previous auctions, in order to ensure the integrity of the bidding process, all applicants are prohibited from cooperating, collaborating, discussing or negotiating agreements with other bidders regarding the licences being auctioned or the post-auction market structure. As a general rule, any such discussions occurring at any time prior to the public announcement of provisional licence winners by ISED are prohibited.

298. In order to maintain the integrity of the auction, bidders are prohibited from signaling, either publicly or privately, their bidding intentions or post-auction market structure related to spectrum in the 3800 MHz band. This includes for example, comments or any communication with or via the media, other government departments, or government officials that do not have a mandated or delegated authority to the auction process, including at the municipal, provincial, territorial and federal levels. An example of prohibited communications would be making a public announcement regarding which licences the company intends to bid on or its rollout intentions.

299. Given that ISED is allowing the participation of some associated entities as separate bidders in this auction process, the prohibition of collusion rules are as follows:

> **All applicants, including affiliated and associated entities, are prohibited from cooperating, collaborating, discussing or negotiating agreements with competitors, relating to the licences being auctioned or relating to the post-auction market structure, including frequency selection, bidding strategy and post-auction market strategy, until after the public announcement of provisional licence winners by ISED.**
>
> **Prospective bidders will note that the auction application forms contain a declaration that the applicant will be required to sign certifying that the applicant has not entered into and will not enter into any agreements or arrangements of any kind with any competitor regarding the amount to be bid, bidding strategies or the particular licence(s) on which the applicant or competitors will or will not bid. For the purposes of this certification, "competitor" means any entity, other than the**

applicant or its affiliates, which could potentially be a bidder in this auction based on its qualifications, abilities or experience.

Prospective bidders should note that the definition of "affiliate" for the purposes of this licensing process (defined by reference to "control in fact") differs from "affiliate" for the purposes of the *Competition Act*. The provisions of the *Competition Act* apply independent of, and in addition to, the policies contained in this Framework.

13.4.1 Communication during the auction process

300. In order to preserve the integrity of the auction process, any communications from an applicant, its affiliates, associates or beneficial owners or their representatives that disclose or comment on bidding strategies, including but not limited to, the intent of bidding and post-auction market structures, the progress of the auction, such as the status of auction rounds and stages, and/or potential auction revenues, shall be considered contrary to the licensing framework, and may result in disqualification and/or forfeiture penalties. Statements that indicate national or particular licence areas of interest will generally be found to be in contravention of the rules on prohibition of collusion. This will include communications with or via the media. This prohibition of communication applies until the public announcement of provisional licence winners by ISED.

301. Prior to the auction, an applicant who wishes to participate separately in the licensing process but has approached another potential bidder to discuss a joint infrastructure build, a joint equipment purchasing agreement or a potential spectrum sharing agreement related to the spectrum being auctioned such that communications that fall within the definition of associated entities have taken place, must disclose the nature of this association. Entities applying to participate separately are required to make a declaration that they have not entered into and will not enter into any agreements or arrangements of any kind with any competitor regarding the amount to be bid, bidding strategies or the particular licence(s) on which the applicant or competitor will or will not bid. In the case where discussions that contravene the prohibition of collusion rules have occurred, the entities would only be permitted to participate in the auction as one single bidder, or only one of the entities could participate.

302. **Forming a consortium:** If a consortium has been established, any entity involved in the discussions related to the formation of the consortium would no longer be eligible to participate separately in the auction. However, the entity participating in the auction would not be deemed to have contravened the collusion rules. In this case, the entities forming the consortium would no longer be deemed competitors for the purpose of the auction, and discussions regarding issues that would otherwise contravene the anti-collusion rules, such as bidding strategies, may then take place. However, each entity in the consortium would continue to be subject to the prohibition of collusion rules outside of the consortium itself.

303. Where potential bidders enter into negotiations toward forming a consortium, those communications may breach collusion rules and will also fall within the definition of making the entities associated. As noted in section 13.3, this association must be disclosed. In a case where consortium discussions are not successful, entities involved in these discussions will not be allowed to participate as separate bidders in the auction; only one of the entities could participate and that entity must disclose the existence and nature of the consortium discussions.

13.4.2 Discussion regarding beneficial ownership

304. Information regarding the beneficial ownership of each applicant will be made publicly available so that all bidders have knowledge of the identity of other bidders. Any discussions involving two bidders or any of their affiliates or associates regarding an addition or a significant change of beneficial ownership of a bidder, including matters such as mergers and acquisitions, from the receipt deadline for applications until the public announcement of provisional licence winners by ISED, would fall into the area of prohibited discussions and would be considered contrary to the auction rules.

305. However, an applicant may discuss changes in beneficial ownership with parties who are completely unrelated to other applicants, as long as:

- any change to the beneficial ownership of the applicant that provides an unrelated party with a beneficial interest or which significantly alters the beneficial ownership structure is effected at least 10 days before the commencement of bidding

- the applicant informs the Minister immediately in writing of any change in beneficial ownership, which will be reflected in its published qualified bidder information on ISED's Spectrum Management and Telecommunications website

306. Bidders must cease all such negotiations at least 10 days before the commencement of bidding until the public announcement of provisional licence winners by ISED.

13.4.3 Other communication rules

307. **Discussions on tower sharing:** The prohibition of communication includes discussions about tower and site sharing regarding the licences that are the subject of this auction until after the public announcement of provisional licence winners by ISED. Discussions concerning new arrangements or the expansion of existing sharing arrangements that relate to spectrum outside of licences being offered in this auction process are not prohibited.

308. **Communication with local exchange carriers:** The prohibition of communication includes discussions regarding interconnection services with a local exchange carrier (LEC) that is a qualified bidder (or one of its affiliates/associates) in this auction, where the services relate to spectrum in the bands offered in this auction process.

309. **Consulting services, legal and regulatory advice:** Separate bidders may not receive consulting advice from the same auction consulting company. Separate bidders may receive legal and regulatory advice from the same law firm provided that the law firm complies with the conflict of interest and confidential information requirements of the applicable law society and that the applicants otherwise comply with the provisions set forth in the licensing framework.

310. ISED sought comments on the proposed rules prohibiting collusion and other communication rules, which would apply to bidders in the 3800 MHz auction, as outlined below.

Summary of comments

311. BCBA, Bell, CanWISP, Comcentric, Eastlink, ECOTEL, Iristel, Québecor, SaskTel, Sogetel, TELUS, TerreStar and Xplornet supported ISED's proposed rules prohibiting collusion and other communication.

312. Cogeco recommended that ISED should clarify for all auction participants when the prohibition on communications is to be applied, specifically the publication date of ISED's final spectrum licensing framework, or, the date applications are due to ISED by all potential auction participants or some other date. Cogeco also suggested that the rules associated with "post-market structure" be further clarified so that parties are able to discuss forming a consortium for participation in the 3800 MHz auction.

313. Québecor agreed with Cogeco's proposed changes to the communication rules, especially on the removal of the term "post-market structure" in order to better focus on prohibiting discussions related to 3800 MHz spectrum acquisition or use. These proposed changes would also include clarifications on when the prohibition on communications starts, for example providing the publication date of the licensing framework decision or bidder application deadline or any other date.

314. ECOTEL claimed that there would be an appearance of pre-auction collusion if Bell and TELUS were granted the right to bid individually due to their network sharing agreement.

315. Rogers recommended that ISED integrate its policies and auction rules regarding collusion and affiliated and associated entities within a single framework, including spectrum aggregation limits, to ensure that unintended consequences do not benefit one or more bidders in auctions.

316. Bell refuted ECOTEL and Rogers' claims, citing that there is no evidence to support such claims or how the network reciprocity agreement between Bell and TELUS negatively impacts competition or the Canadian public. Bell stressed that Bell and TELUS actively compete against each other across Canada in every market for both retail and wholesale services.

Discussion

317. In previous auctions, in order to ensure the integrity of the bidding process, all applicants were prohibited from cooperating, collaborating, discussing or negotiating agreements with other bidders regarding the licences being auctioned or the post-auction market structure. This includes divulging information about the progress of the auction process, such as the status of auction rounds and stages. Any such discussions occurring at any time prior to the public announcement of provisional licence winners by ISED are prohibited. In addition, if any prospective applicants or their representatives contravene any of these rules, they will not qualify to participate in the auction.

318. ISED maintains the view that the proposed rules maintain the integrity of the auction and notes that the proposed rules are consistent with other auction processes.

Decision

D25
ISED is adopting the rules regarding prohibiting collusion and other communication rules as set out in section 13.4 above.

14. Auction process

319. The following section outlines the general process for submitting an application to participate in the 3800 MHz auction, as well as the general requirements and rules that will apply prior to, during and after the auction.

320. The schedule for the auction process, referred to as the Table of Key Dates, is available on ISED's Spectrum Management and Telecommunications website. Items and time frames included in the schedule may be updated from time to time. Interested parties are advised to check the website regularly for any updates to the schedule of events.

14.1 Application to participate

321. To participate in an auction, all applicants must submit:

- completed application forms
- a financial deposit
- details of their beneficial ownership
- information on any affiliations and associations as discussed in section 13 of this document

- other corporate documentation as required

ISED will publish the list of applicants on its website soon after the application deadline.

322. The application forms for participating in the auction will be available on request by email to spectrumauctions-encheresduspectre@ised-isde.gc.ca. Additional documentation may be required in support of the application forms.

14.2 Submissions

323. In the interest of providing ISED and other bidders with adequate information on the identity of all bidders, each applicant is required to fully disclose the beneficial ownership for every entity of which it owns, directly or indirectly, 10% or more of the applicant's voting shares, non-voting shares, partnership interests or any other beneficial interests, as the case may be. Applicants are required to disclose any explicit or implicit arrangements or agreements where financing, security or guarantees have been, or may be, provided to the applicant or any of its affiliates, by another likely applicant or its affiliates, relating to the acquisition or use of any spectrum licences being auctioned in processes. Associated entities wishing to participate separately in the 3800 MHz auction are required to disclose the names of their associated entities within their application, and to provide narratives describing all key elements and the nature of the association regarding the acquisition of the spectrum licences being auctioned, and the post-auction relationships of the said entities. A list of applicants, their beneficial ownership information and the narrative on any associated entity relationships will be made available on ISED's Spectrum Management and Telecommunications website, prior to the auction, so that all bidders have knowledge of the identity of the other bidders. Applicants are not permitted to change their beneficial ownership during the period beginning 10 days prior to the start of the auction and ending once the provisional results have been announced by ISED.

324. Entities are encouraged to approach ISED at least two weeks prior to the application date if seeking guidance or a predetermination as to whether their arrangement or proposed arrangement would be considered to give rise to a finding of association under this Framework. Any guidance or predetermination will not constitute a binding decision; however, potential applicants may benefit from an early opportunity to approach ISED with their proposed arrangements.

325. Applicants must also provide a certificate of incorporation or other applicable documentation to demonstrate that they are eligible to hold a licence under section 9 of the *Radiocommunication Regulations.* For example, corporate applicants must provide a copy of their certificate of incorporation or similar documentation, partnerships must provide an up-to-date partnership agreement, and individuals must provide a copy of their passport or other applicable documentation as described in section 9 of the *Radiocommunication Regulations.*

14.3 Pre-auction deposits

326. In the Consultation, ISED sought comments on its proposal to determine the value of the pre-auction deposit based on the licences on which the applicant wishes to be eligible to bid on. Each licence has been assigned a specific number of eligibility points that are approximately proportionate to the opening bid prices, as shown in annex E. For the 3800 MHz auction, ISED proposed that the financial deposit be equal to $3,000 per eligibility point.

Summary of comments

327. BCBA, CanWISP, Comcentric, Eastlink, Iristel, Rogers, SaskTel, Sogetel, TerreStar, TELUS and Xplornet support ISED's proposed approach for determining the pre-auction financial deposits.

328. Iristel added that ISED should avoid deposit deadlines that occur immediately prior to financial year ends (December 31 or March 31), and that the deadline not be earlier than May as they place a significant financial burden on smaller players trying to secure funds. TELUS added that pre-auction deposits should be $500 per point for consistency with its proposals for determining opening bid prices and eligibility points. Rogers added that ISED should publish the identities of all bidders, the licences they are eligible to bid on, and their initial eligibility prior to the start of bidding, stating that this would aid price discovery and allow bidders to interpret competitive dynamics and refine valuations.

Discussion

329. The value of pre-auction financial deposit is based on the licences and associated eligibility points on which the applicant intends to bid. Applicants will not be able to increase their eligibility points after the application deadline.

330. Pre-auction financial deposits enhance the integrity of the auction by ensuring that auction participants have access to funds that will generally cover the opening bid amounts. This reduces the probability that bidders will bid for spectrum that they cannot afford, which could result in defaulting on their winning bids at the end of the auction. Considering that prices are expected to increase from opening prices during the auction, the amount of the financial deposit does not appear to be excessive, and lowering this requirement would run contrary to its purpose.

Decision

D26
For the 3800 MHz auction, the pre-auction financial deposit will be equal to $3,000 per eligibility point. The eligibility points per service area are listed in tables E1 and E2 of annex E. As part of its application, a bidder will be required to submit its total pre-auction financial deposit in the form described in section 14.4.

An individual bidder requesting to be eligible to bid on the equivalent of one national 10 MHz block would have to submit a deposit covering 15,584 points, which would equate to $46,752,000 (i.e. $3,000 x 15,584). Financial deposits will be returned to any applicant that is found not to be a qualified bidder and to any applicant that provides written notification to ISED of its withdrawal from the process prior to the auction's commencement. Financial deposits will be returned to unsuccessful bidders once the auction has closed.

Table E1 of annex E lists the opening bid prices and eligibility points for encumbered blocks.

The detailed instructions on determining pre-auction deposits will be provided with the application form for participation in the auction.

Consistent with previous auctions, ISED reserves the right to request additional financial deposits during the auction. This will be determined by considering factors such as the bids' value and the bidding activity. The additional financial deposit will be based on a percentage, not exceeding 50%, of the value of the bidder's total amount of bids for licences in a specified round. Bidders will be provided three business days to submit their additional financial deposits to ISED in the form described in section 14.4.

14.4 Process to submit the applications and financial deposit

331. The application forms, the associated documents (as per the instructions provided on the application forms), and the total pre-auction financial deposit are to be delivered to the Manager, Auction Operations (address provided in section 17 of this Framework), by the date specified in the Table of Key Dates. ISED reserves the right, under exceptional circumstances, to accept additional documentation after the deadline, but prior to the publication of the list of applicants. Applications that are received without the total financial pre-auction deposit will be rejected.

332. For previous auction processes, in an effort to streamline the submission of the application forms and associated documents, ISED used Canada Post epost Connect service. As Canada Post is discontinuing this service in late 2022, ISED will select a new secure service to send confidential messages and documents over the Internet for the 3800 MHz auction process. Information regarding this service will be provided to potential applicants upon request of application forms.

333. Upon receipt of the application and the associated documentation, ISED will send a notification to the applicant, stating that the application materials have been received. This notice will in no way mean that the application materials or the deposit have been approved.

334. The financial deposit must be in the form of a certified cheque, bank draft, money order, wire transfer, or an irrevocable standby letter of credit, payable to the Receiver General for Canada, drawn on a financial institution that is a member of the Canadian Payments Association. The elements required in a letter of credit, as well as a sample letter of credit acceptable to ISED, will be provided as part of the application forms. Multiple letters of credit (or other forms of

payment) from one or more financial institutions will be permitted within reason. ISED will treat the financial deposit for an applicant as being the sum of the amounts of each accepted letter of credit, certified cheque, bank draft, money order or wire transfer. Each letter of credit must comply with the conditions laid out herein concerning letters of credit. No letter of credit shall have any conditions requiring ISED to draw on the letters in any particular order of priority, or requiring any letter to be drawn upon completely before drawing upon any other letter. If a qualified bidder is unsuccessful in the auction, the financial deposits that were submitted in the form of a letter of credit will be returned. Refunds of deposits submitted in the form of a certified cheque, bank draft, money order or wire transfer will likely take longer (perhaps several weeks longer) than a refund submitted by way of a letter of credit, since a cheque or wire transfer from the Receiver General for Canada will need to be processed.

335. If, prior to the application deadline, an applicant wishes for any reason to amend any of the forms that it has submitted and/or its financial deposit, it may submit one or more amended forms and/or financial deposit with an accompanying letter explaining that the enclosed form(s) and/or financial deposit are to replace the one(s) previously submitted. Any such amendments are to be received by the Manager, Auction Operations, by the receipt deadline for applications to participate in the auction.

336. Upon receipt of an amended form(s) and/or financial deposit, ISED will send a notification to the applicant that the amended form(s) and/or deposit have been received. The notification will state the amount of the new deposit that has been submitted. Where the financial deposit is in the form of an irrevocable standby letter of credit, the initial irrevocable standby letter of credit will also be returned to the applicant where applicable. Where the financial deposit is in a form other than an irrevocable standby letter of credit, any partial reimbursement of the financial deposit may take several weeks.

337. A list of all applications will be made public on the Auctions section of ISED's Spectrum Management and Telecommunications website. The publication of this list in no way means that the applicants have been approved as qualified bidders.

14.5 Bidder qualification

338. ISED will review the application forms, any associated documents, and the accompanying financial deposit after the closing date for the submission of applications. In this initial review, ISED will identify any errors in the application forms or financial deposit. It will also determine whether any additional information related to any affiliate or associated entity of the applicant is required. ISED may request further information.

339. Applications that are received without the appropriate deposit by the application deadline will be rejected.

340. Following the initial review period, ISED will provide applicants with an opportunity to correct any errors or inconsistencies in their application and will request any additional

information related to affiliated or associated entities if required. A copy of the original applications may be returned to the applicant with a brief statement outlining any discrepancies and/or omissions or requesting additional information. The applicant will be invited, in writing, to resubmit the corrected form and/or the additional information, by the date specified in the written statement.

341. Applicants that do not comply with ISED's written requests will have their application to participate in the auction rejected. Applications that are rejected, including those for which an opportunity has been provided to correct errors or inconsistencies identified by ISED but that are still found to be deficient, may be returned to the applicant outlining the deficiencies, along with the applicant's deposit.

342. Applicants that have submitted acceptable application materials, including the accompanying total pre-auction deposit, will be informed that they have qualified to participate in the auction. Qualified bidders will receive additional information related to their participation in the auction through separate mail-outs at a later date. This information may include, among other items, a bidder information document, a user manual and the schedule for the information session and mock auctions.

343. A list of all qualified bidders, along with information related to their beneficial ownership, affiliates and associated entities, will be made public via ISED's website in accordance with the timelines stated in the Table of Key Dates. All other application material and other material requested by ISED will be kept confidential. This confidential information includes the number of eligibility points, financial deposit amounts and information on agreements and any determinations related to associates.

14.6 Withdrawal of application forms

344. Applicants wishing to withdraw their application materials and have their financial deposit returned may do so, without penalty, by sending a written request to the Manager, Auction Operations, at the address provided in section 17. This request is to be received before 12:00 p.m. noon (EST) on the business day preceding the start of bidding in the auction.

14.7 Change of information

345. An Auction Authorized Representative is an individual authorized by the bidding company, for the 3800 MHz auction, to sign, submit information and make any changes on behalf of the applicant. Only the Auction Authorized Representative of the bidding company may notify the Manager, Auction Operations, of any material changes in the information submitted in the application documents. Material changes include any changes to the names and contact information of qualified bidders and designated bidders.

346. Written notification must be sent by the Auction Authorized Representative to the address provided in section 17 within 5 business days of any such material changes.

14.8 Backup procedures

347. Bidders are strongly advised to prepare contingency plans and backup facilities and locations, including multiple means of accessing the Internet, in the event of technical difficulties at their primary bidding locations. The final detailed provisions concerning backup procedures will be made available to qualified bidders prior to the start of the auction. However, ISED reserves the right to extend the length of a round at its discretion, or to alter the bidding schedule, for example, if notified that a bidder(s) is experiencing technical difficulties at its primary and backup bidding locations, which prevents the bidder(s) from submitting a bid.

348. In the application forms, applicants must designate up to three individuals who will have the authority to place bids on their behalf. Each designated bidder will receive individual codes to participate in the auction. Having more than one individual designated as a bidder will strengthen backup contingency plans for applicants in the case of unforeseen problems. ISED cannot guarantee any specific turnaround time for changes or additions to designated bidders information submitted after the application date.

349. As a last resort, provisions will be made for ISED staff to submit bids on a bidder's behalf. This is intended to serve as a limited contingency plan for bidders who experience technical difficulties that prevent them from accessing the auction system. Only the individuals listed as designated bidders will be able to use this option. Details of these provisions will be provided to qualified bidders prior to the start of the auction.

14.9 Bidder payment

350. Within 30 business days following the announcement of provisional winners, each provisional licence winner will be required to submit 20% of its final payment. Financial deposits may not be applied to the initial payment, unless the financial deposit was sufficient to cover both the initial and the final payments.

351. The remaining portion, 80% of the final payment, will be due within 120 business days of the announcement of the provisional auction results. Failure by the provisional winning bidder to make this final payment in a timely fashion will result in the licence not being issued, and the bidder will be subject to the applicable forfeiture penalty (see section 14.10). These final payments will be non-refundable. If any of the provisional winners fail to make the final payment within the specified period, then the provisional winner's irrevocable standby letter of credit will be drawn upon.

352. All payments must be made by certified cheque, bank draft or wire transfer, payable to the Receiver General for Canada, drawn on a financial institution that is a member of the Canadian Payments Association.

353. These payments for the initial term of licences won through the auction process are in lieu of any fees that will be fixed for radio authorization under the *Radiocommunication Act* or any other act.

14.10 Forfeiture penalties

354. Following the conclusion of the auction, provisional winning bidders that fail to comply with the specified payment schedule or with the eligibility requirements of the *Radiocommunication Regulations* will be considered disqualified and will forfeit their ability to obtain licences through this process until all applicable penalties are paid. Furthermore, non-compliant provisional winning bidders of auctioned licences will be subject to a forfeiture penalty in the amount of the difference between the forfeited bid and the ultimate price of the licence, to be determined by a subsequent licensing process, and may be subject to administrative monetary penalties.

355. In the event of forfeiture, the bidder's irrevocable standby letter of credit will be drawn upon for the full amount of the interim proxy forfeiture penalty, which will be the full winning bid amount. If the interim proxy forfeiture penalty is greater than the full amount of the bidder's irrevocable standby letter of credit, combined with any partial payment, or if the letter of credit has been returned or has expired, then the difference will be owing and payable to the Receiver General for Canada.

14.11 Enforcement of the auction rules

356. Applicants and/or their representatives who fail to comply with the requirements or rules set out in any section of this Framework may be subject to one or more of the following outcomes depending on the circumstances:

a. the applicant may be disqualified from bidding or continuing to bid

b. the applicant's bids may be deemed invalid

c. any and all licences issued to the applicant under this Framework may be revoked

d. the applicant may be subject to the appropriate forfeiture penalties as outlined in section 14.10

e. the applicant may be subject to administrative monetary penalties or prosecution under the *Radiocommunication Act*

357. Applicants should note that in the case where an administrative monetary penalty is applied, the effect of the auction rules on the licensing process and on all of the other bidders may be considered in assessing the nature and scope of the violation for the purposes of determining the amount of the penalty.

14.12 Issuance of licences

358. ISED will issue spectrum licences to all provisional licence winners who have paid the sum of their bids and the sum of their penalties (if applicable) in full by the required payment date. All licences will be issued on the initial licence issuance date as set out in the Table of Key Dates.

14.13 Bidder training and support

359. Qualified bidders will receive the necessary information to participate in the auction several weeks prior to the start of the auction. Resources will include, but will not be limited to, an information session, a user manual for the auction system, instructions and passwords to access the secure auction system, along with the schedule for training, mock auctions, and the start of the bidding process.

360. Mock auction(s) will be held, likely during the weeks prior to the start of the auction, in order to allow qualified bidders to better familiarize themselves with the auction system.

361. The full schedule for the auction process is included in the Table of Key Dates on ISED's Spectrum Management and Telecommunications website.

15. Post-auction licensing process for unassigned licences

362. ISED will consider making unassigned licences available for licensing through an alternative process, which could include a subsequent auction at a later date following the close of the initial auction. The timing and form of such a process will depend on the demand for the available licences. ISED has streamlined the process for auctioning residual licences to expedite the availability of unallocated and returned licences (see *Decision on a Streamlined Framework for Auctioning Residual Spectrum Licences*). If necessary, ISED may conduct a public consultation.

16. Licence renewal process

363. ISED sought comments on the proposed renewal process for spectrum licences in the 3800 MHz band.

Summary of comments

364. Bell, BCBA, CanWISP, Comcentric, Eastlink, ECOTEL, Québecor, Rogers, SaskTel, Sogetel, TELUS, TerreStar and Xplornet supported the proposed renewal process. TELUS indicated that based on its proposal to end the initial licence term in 2045, a simplified renewal process should start in 2043.

Discussion

365. Following the end of the initial licence term, licensees will have a high expectation that a new licence will be issued for a subsequent term through a renewal process unless a breach of licence condition has occurred, a fundamental reallocation of the spectrum to a new service is required, or an overriding policy need arises.

366. As part of the licence renewal process, the Minister retains the power to fix and amend the terms and conditions of spectrum licences during the term of the licence and at the end of the term in accordance with subsection 5(1) of the *Radiocommunication Act*. As noted in the FSAC, licence fees that reflect some measure of market value will apply to licences issued through a renewal process. Accordingly, the renewal process will serve to determine whether new licences will be issued, the terms and conditions that will apply to the new licences.

367. Generally, approximately two years prior to the end of the licence term, ISED will review whether there is a need for a fundamental reallocation of the spectrum to a new service, or whether an overriding policy need has arisen. A review of the licensee's continued compliance with the conditions of licence will also begin. ISED will launch a public consultation to discuss whether or not, in light of the above-noted issues, new licences should be issued for a subsequent term. The consultation paper will also propose, and invite comments on, licence conditions that would apply during the subsequent licence term.

Decision

D27
Approximately two years prior to the end of the licence term, ISED may launch a public consultation to discuss whether or not, in light of the above-noted issues, new licences should be issued for a subsequent term. The consultation paper will also propose, and invite comments on, licence conditions and fees that would apply during the subsequent licence term.

17. Clarification questions process

368. ISED will accept written questions seeking clarification of the rules and policies set out in this Framework until the deadline specified in the Table of Key Dates. Every effort will be made to post the questions received, along with ISED's written responses, in the shortest time frame possible. Questions that are of a similar nature and subject matter may be grouped and summarized. Questions regarding bidding procedures will be addressed in mail-out packages intended for qualified bidders and will not be included in this clarification process unless they are deemed to be critical information for potential bidders requiring an immediate response. These answers will be considered as clarification of the policies set out in this Framework. Applicants are encouraged to submit questions as soon as possible.

369. Questions regarding the 3800 MHz policy and licensing framework may be sent to the Manager, Auction Operations, by email to spectrumauctions-encheresduspectre@ised-isde.gc.ca.

370. All questions should cite the *Canada Gazette*, Part I, the publication date, the title and the notice reference number (SPB-002-22). Questions and responses will be posted on ISED's Spectrum Management and Telecommunications website.

18. Obtaining copies

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

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

Innovation, Science and Economic Development Canada
Spectrum Policy Branch
Senior Director, Regulatory Policy
6th Floor, East Tower
235 Queen St
Ottawa ON K1A 0H5

Telephone: 613-219-5436
TTY: 1-866-694-8389

Annex A: General deployment requirements

Population in table A1 is based on 2016 Census data. The deployment requirements will be based on the most recent census information available at the time of the assessment.

Table A1: General deployment requirements for Tier 4 service areas with large population centres

Tier 4	Service area name	Population	Minimum population coverage (5 year)	Minimum population coverage (10 year)	Minimum population coverage (20 year)
4-001	St. John's	255 012	30%	50%	70%
4-010	Halifax	435 820	30%	50%	70%
4-018	Moncton	178 500	25%	40%	60%
4-028	Chicoutimi-Jonquière	218 377	30%	50%	70%
4-030	Québec	904 330	30%	50%	70%
4-037	Trois-Rivières	265 152	30%	50%	70%
4-042	Sherbrooke	250 227	30%	50%	70%
4-051	Montréal	4 352 037	30%	50%	70%
4-055	Ottawa	1 452 852	30%	50%	70%
4-070	Kingston	177 314	30%	50%	70%
4-077	Toronto	7 030 750	30%	50%	70%
4-079	Guelph/Kitchener	707 534	30%	50%	70%
4-084	Niagara/St. Catharines	349 283	30%	50%	70%
4-086	London/Woodstock/St. Thomas	678 149	30%	50%	70%
4-090	Windsor/Leamington	401 719	30%	50%	70%
4-094	Barrie	352 290	25%	40%	60%
4-111	Winnipeg	830 151	30%	50%	70%

4-124	Regina	260 382	30%	50%	70%
4-125	Saskatoon	306 824	30%	50%	70%
4-136	Calgary	1 416 856	30%	50%	70%
4-141	Edmonton	1 325 857	30%	50%	70%
4-151	Kelowna	362 815	25%	40%	60%
4-152	Vancouver	2 731 567	30%	50%	70%
4-154	Victoria	458 861	30%	50%	70%

Population in table A2 is based on 2016 Census data. The deployment requirements will be based on the most recent census information available at the time of the assessment.

Table A2: General deployment requirements for Tier 4 service areas without a large population centre

Tier 4	Service area name	Population	Minimum population coverage (7 year)	Minimum population coverage (10 year)	Minimum population coverage (20 year)
4-002	Placentia	15 304	10%	20%	30%
4-003	Gander/Grand Falls/Windsor	144 229	5%	10%	20%
4-004	Corner Brook/Stephenville	77 974	10%	20%	30%
4-005	Labrador	27 656	10%	20%	30%
4-006	Charlottetown	95 350	25%	40%	60%
4-007	Summerside	47 557	15%	30%	40%
4-008	Yarmouth	55 609	20%	35%	50%
4-009	Bridgewater/Kentville	139 289	20%	35%	50%
4-011	Truro	56 649	15%	30%	40%
4-012	Amherst	33 373	10%	20%	30%
4-013	Antigonish/New Glasgow	71 445	15%	30%	40%

4-014	Sydney	131 379	30%	50%	70%
4-015	Saint John	142 898	30%	50%	70%
4-016	St. Stephen	25 087	5%	15%	25%
4-017	Fredericton	164 871	25%	40%	60%
4-019	Miramichi/Bathurst	156 025	15%	30%	40%
4-020	Grand Falls	24 936	10%	20%	30%
4-021	Edmundston	26 504	25%	40%	60%
4-022	Campbellton	26 776	10%	20%	30%
4-023	Matane	112 039	15%	30%	40%
4-024	Mont-Joli	37 788	5%	15%	25%
4-025	Rimouski	56 619	25%	40%	60%
4-026	Rivière-du-Loup	82 869	20%	35%	50%
4-027	La Malbaie	28 193	15%	30%	40%
4-029	Montmagny	56 808	20%	35%	50%
4-031	Sainte-Marie	53 258	25%	40%	60%
4-032	Saint-Georges	71 425	20%	35%	50%
4-033	Lac-Mégantic	24 223	20%	35%	50%
4-034	Thetford Mines	42 019	30%	50%	70%
4-035	Plessisville	22 772	10%	20%	30%
4-036	La Tuque	16 219	20%	35%	50%
4-038	Louiseville	21 708	15%	30%	40%
4-039	Asbestos	29 744	15%	30%	40%
4-040	Victoriaville	56 684	30%	50%	70%
4-041	Coaticook	12 981	15%	30%	40%
4-043	Windsor	16 777	20%	35%	50%
4-044	Drummondville	112 390	30%	50%	70%

4-045	Cowansville	29 083	30%	50%	70%
4-046	Farnham	29 593	5%	15%	25%
4-047	Granby	105 440	30%	50%	70%
4-048	St-Hyacinthe	92 092	30%	50%	70%
4-049	Sorel	58 740	25%	40%	60%
4-050	Joliette	161 106	15%	30%	40%
4-052	Sainte-Agathe-des-Monts	77 087	10%	20%	30%
4-053	Hawkesbury	64 131	20%	35%	50%
4-054	Mont-Laurier/Maniwaki	48 488	15%	30%	40%
4-056	Pembroke	82 200	20%	35%	50%
4-057	Arnprior/Renfrew	31 367	20%	35%	50%
4-058	Rouyn-Noranda	43 108	20%	35%	50%
4-059	Notre-Dame-du-Nord	16 023	15%	30%	40%
4-060	La Sarre	19 349	15%	30%	40%
4-061	Amos	25 096	15%	30%	40%
4-062	Val-d'Or	44 619	20%	35%	50%
4-063	Roberval/Saint-Félicien	58 438	10%	20%	30%
4-064	Baie-Comeau	43 675	20%	35%	50%
4-065	Port-Cartier/Sept-Îles	46 983	20%	35%	50%
4-066	Chibougamau	45 730	5%	10%	20%
4-067	Cornwall	69 729	30%	50%	70%
4-068	Brockville	70 563	20%	35%	50%
4-069	Gananoque	13 150	20%	35%	50%
4-071	Napanee	42 993	5%	15%	25%
4-072	Belleville	154 982	15%	30%	40%
4-073	Cobourg	65 180	10%	20%	30%

4-074	Peterborough	165 516	25%	40%	60%
4-075	Lindsay	45 902	25%	40%	60%
4-076	Minden	20 813	15%	30%	40%
4-078	Alliston	129 279	20%	35%	50%
4-080	Fergus	30 010	20%	35%	50%
4-081	Kincardine	185 818	20%	35%	50%
4-082	Listowel/Goderich	84 257	10%	20%	30%
4-083	Fort Erie	31 072	30%	50%	70%
4-085	Haldimand/Dunnville	37 398	15%	30%	40%
4-087	Brantford	138 535	30%	50%	70%
4-088	Stratford	51 339	25%	40%	60%
4-089	Chatham	68 885	30%	50%	70%
4-091	Wallaceburg	30 983	15%	30%	40%
4-092	Sarnia	123 953	30%	50%	70%
4-093	Strathroy	46 727	25%	40%	60%
4-095	Midland	49 059	20%	35%	50%
4-096	Gravenhurst/Bracebridge	61 892	20%	35%	50%
4-097	North Bay	104 524	25%	40%	60%
4-098	Parry Sound	21 123	15%	30%	40%
4-099	Elliot Lake	29 520	20%	35%	50%
4-100	Sudbury	178 872	25%	40%	60%
4-101	Kirkland Lake	32 402	20%	35%	50%
4-102	Timmins	42 086	20%	35%	50%
4-103	Kapuskasing	38 024	10%	20%	30%
4-104	Kenora/Sioux Lookout	64 826	10%	20%	30%
4-105	Iron Bridge	20 162	10%	20%	30%

4-106	Sault Ste. Marie	80 833	25%	40%	60%
4-107	Marathon	24 923	10%	20%	30%
4-108	Thunder Bay	121 061	30%	50%	70%
4-109	Fort Frances	20 095	15%	30%	40%
4-110	Steinbach	64 764	10%	20%	30%
4-112	Lac du Bonnet	58 076	5%	10%	20%
4-113	Morden/Winkler	51 609	15%	30%	40%
4-114	Brandon	103 743	25%	40%	60%
4-115	Portage la Prairie	21 273	20%	35%	50%
4-116	Dauphin	75 508	5%	10%	20%
4-117	Creighton/Flin Flon	22 228	10%	20%	30%
4-118	Thompson	50 665	10%	20%	30%
4-119	Estevan	46 006	5%	10%	20%
4-120	Weyburn	22 877	20%	35%	50%
4-121	Moose Jaw	55 141	25%	40%	60%
4-122	Swift Current	46 219	15%	30%	40%
4-123	Yorkton	63 024	10%	20%	30%
4-126	Watrous	27 288	5%	10%	20%
4-127	Battleford	99 433	5%	15%	25%
4-128	Prince Albert	130 446	20%	35%	50%
4-129	Lloydminster	37 539	20%	35%	50%
4-130	Northern Saskatchewan | Saskatchewan-Nord	37 064	5%	10%	20%
4-131	Medicine Hat/Brooks	107 233	30%	50%	70%
4-132	Lethbridge	189 709	20%	35%	50%
4-133	Stettler/Oyen/Wainwright	51 420	10%	20%	30%
4-134	High River	120 208	15%	30%	40%

4-135	Strathmore	45 478	15%	30%	40%
4-137	Red Deer	206 387	25%	40%	60%
4-138	Wetaskiwin/Ponoka	54 340	15%	30%	40%
4-139	Camrose	40 145	20%	35%	50%
4-140	Vegreville	15 396	15%	30%	40%
4-142	Edson/Hinton	49 814	15%	30%	40%
4-143	Bonnyville	83 631	5%	10%	20%
4-144	Whitecourt	32 669	15%	30%	40%
4-145	Barrhead	23 437	15%	30%	40%
4-146	Fort McMurray	73 953	30%	50%	70%
4-147	Peace River	86 745	5%	15%	25%
4-148	Grande Prairie	110 027	20%	35%	50%
4-149	East Kootenay | Kootenay-Est	60 371	10%	20%	30%
4-150	West Kootenay | Kootenay-Ouest	78 941	5%	15%	25%
4-153	Hope	26 093	5%	15%	25%
4-155	Nanaimo	194 922	25%	40%	60%
4-156	Courtenay	118 732	25%	40%	60%
4-157	Powell River	26 865	20%	35%	50%
4-158	Squamish/Whistler	74 365	20%	35%	50%
4-159	Merritt	15 649	20%	35%	50%
4-160	Kamloops	106 972	15%	30%	40%
4-161	Ashcroft	15 070	5%	10%	20%
4-162	Salmon Arm	51 024	20%	35%	50%
4-163	Golden	6 854	20%	35%	50%
4-164	Williams Lake	38 440	15%	30%	40%
4-165	Quesnel/Red Bluff	23 558	15%	30%	40%

4-166	Skeena	56 234	10%	20%	30%
4-167	Prince George	94 607	30%	50%	70%
4-168	Smithers	37 646	5%	10%	20%
4-169	Dawson Creek	68 387	15%	30%	40%
4-170	Yukon	35 928	25%	40%	60%
4-171	Nunavut	35 975	5%	15%	25%
4-172	Northwest Territories | Territoires du Nord-Ouest	41 668	20%	35%	50%

Annex B: Additional deployment requirements for Long Term Evolution mobile network operators

The additional deployment requirements for Long Term Evolution (LTE) mobile network operators outlined in table B1, will be based on the most recent census information available at the time of the assessment.

Table B1: Additional deployment requirements for LTE mobile network operators

Tier area	Within 5 years*	Within 7 years*	Within 10 years*	In rural areas outside urban centres within 10 years
Tier areas of Montréal (4-054), Toronto (4-077) & Vancouver (4-152)	90%	97%	n/a	95%
Tiers with a large population centre (excluding Montréal, Toronto & Vancouver)	n/a	90%	97%	95%
Tiers without a large population centre	n/a	90%	97%	n/a

* For deployment within the existing mid-band mobile LTE network footprint as of the publication date of ISED's *Policy and Licensing Framework for Spectrum in the 3800 MHz Band*.

Annex C: Conditions of licence for flexible use licences in the 3800 MHz band

The following conditions will apply to licences in the 3800 MHz band as defined in the *Policy and Licensing Framework for Spectrum in the 3800 MHz Ban*d (the Framework).

It should be noted that the licences are subject to the relevant provisions in the *Radiocommunication Act* and the *Radiocommunication Regulations*, as amended from time to time. For example, the Minister of Innovation, Science and Industry (the Minister) continues to have the power to amend the terms and conditions of spectrum licences, under paragraph 5(1)(b) of the *Radiocommunication Act*. The Minister may do so for a variety of reasons, including furtherance of the policy objectives related to the band. Such action would normally only be undertaken after consultation.

C1. Licence term

The term of this licence is 20 years from the date that the first licences are issued immediately following the auction process, shortly after the final payment deadline set out in the Framework (the "initial licence issuance date"). All licences will terminate on the same date, 20 years after the initial licence issuance date.

At the end of the term, the licensee will have a high expectation that a new licence will be issued for a subsequent term through a renewal process 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.

The process for issuing licences after this term and any issues relating to renewal, including the conditions of the new licence, will be determined by the Minister following a public consultation.

C2. Eligibility

The licensee must comply on an ongoing basis with the applicable eligibility criteria in subsection 9(1) of the *Radiocommunication Regulations* and, where applicable, with the eligibility criteria for set-aside licences as defined under the Framework. The licensee must notify the Minister of any change that would have a material effect on either type of eligibility. Such notification must be made in advance for any proposed transactions within its knowledge.

C3. Licence transferability, divisibility and subordinate licensing

This licence is transferable in whole or in part (divisibility), in both bandwidth and geographic dimensions, subject to the Minister's approval. A Subordinate Licence may also be issued in regard to this licence. The Minister's approval is required for each proposed Subordinate Licence.

The licensee must make the Transfer Request in writing to the Minister. The Transfer Request will be treated as set out in Client Procedures Circular CPC-2-1-23, *Licensing Procedure for Spectrum Licences for Terrestrial Services*, as amended from time to time. In all cases, the licensee must follow the procedures as outlined in CPC-2-1-23.

The licensee must apply in writing to the Minister for approval prior to implementing any Deemed Transfer, which will be treated as set out in CPC-2-1-23. The implementation of a Deemed Transfer without the prior approval of the Minister will be considered a breach of this condition of licence.

Should the licensee enter into any Agreement that provides for a Prospective Transfer with another holder of a Licence for commercial mobile spectrum (including any Affiliate, agent or representative of the other licence holder), the licensee must apply in writing to the Minister for review of the Prospective Transfer within 15 days of entering into the Agreement, which will be treated as set out in CPC-2-1-23. Should the Minister issue a decision indicating that the Prospective Transfer is not approved, it will be a breach of this condition of licence for a licensee to remain in an Agreement that provides for the Prospective Transfer for a period of more than 90 days from the date of the decision.

Cross-band spectrum cap: Licensees are subject to the following additional provisions under the 100 MHz cross-band spectrum cap established under the Framework:

The cross-band cap is applicable to a licensee's total 3500 MHz and 3800 MHz spectrum holdings immediately following the issuance 3800 MHz licences and extends for a period of five years.

Therefore, no transfer of licences or issuance of new licences will be authorized if it would result in a licensee exceeding the 100 MHz cross-band spectrum cap during this period or cause a licensee whose prior holdings already exceed the spectrum cap to further exceed the spectrum cap. Any change in ownership or control granting a right or interest to another licensee in this band may be considered as a deemed licence transfer for the purpose of this condition of licence whether or not the licensee name is changed as a result. The licensee must request approval by the Minister for any change that would have a material effect on its compliance with this spectrum cap. Such a request must be made in advance of any proposed transactions within its knowledge.

A spectrum licence may only be transferred after the five-year period set out above and once the licensee has satisfied the first mid-term deployment requirement.

The licensees may also apply, in writing, to use a subordinate licensing process. ISED approval is required for each proposed subordinate licence. Subordinate licences will not count towards the subordinate licensee's spectrum cap if the primary licensee and the subordinate licensee demonstrate to the satisfaction of ISED that they will be separately and actively providing services to customers in the applicable licence area. Where such approval is granted and for at

least the duration of the spectrum cap being in place, licensees must implement their plans to the satisfaction of ISED. Any modifications to these plans must be submitted to ISED for approval.

All capitalized terms have the meaning ascribed to them in CPC-2-1-23.

C4. Treatment of existing spectrum users

As set out in the *Decision on the Technical and Policy Framework for the 3650-4200 MHz Band and Changes to the Frequency Allocation of the 3500-3650 MHz Band* (the 3800 MHz Repurposing Decision), existing WBS licensees are permitted to continue to operate in in the 3650-3700 MHz portion of the 3800 MHz band, subject to the transition plan and moratorium established in sections 10.1.2 and 10.1.3 of the 3800 MHz Repurposing Decision.

Similarly, with the exception of the consolidated gateway sites in Weir, Quebec, and Allan Park, Ontario, the Government of Canada site in North Bay, and satellite-dependent areas where authorized earth station operations may remain and are protected from interference from flexible use licensees, fixed satellite service (FSS) earth stations are permitted to continue to operate in the band until their transition deadline of March 31, 2025, as established in sections 10.2 to 10.4 of the 3800 MHz Repurposing Decision.

C5. Radio station installations

The licensee must comply with Client Procedures Circular CPC-2-0-03, *Radiocommunication and Broadcasting Antenna Systems*, as amended from time to time.

Provision of technical information: The licensee must provide and maintain up-to-date technical information on a particular station or network in accordance with the definitions, criteria, frequency and timelines specified in CPC-2-1-23, as amended from time to time.

Compliance with legislation, regulation and other obligations: The licensee is subject to and must comply with the *Radiocommunication Act* and the *Radiocommunication Regulations*, as amended from time to time. The licensee must use the assigned spectrum in accordance with the *Canadian Table of Frequency Allocations* and the spectrum policies applicable to this band, as amended from time to time. The licence is issued on condition that all representations made in relation to obtaining this licence are all true and complete in every respect.

C6. Technical considerations, and international and domestic coordination

The licensee must comply on an ongoing basis with the technical aspects of the appropriate Radio Standards Specifications (RSS) and Standard Radio System Plans (SRSP), as amended from time to time. Where applicable, the licensee must use its best efforts to enter into mutually acceptable agreements with other parties for facilitating the reasonable and timely development of their respective systems, and to coordinate with other licensed users in Canada and internationally.

The licensee must comply with the obligations arising from current and future frequency coordination agreements established between Canada and other countries and shall be required to provide information or take actions to implement these obligations as indicated in the applicable SRSP. Although frequency assignments are not subject to site licensing, the licensee may be required through the appropriate SRSP to furnish all necessary technical data for each relevant site.

C7. Lawful interception

A licensee operating as a telecommunication common carrier using the spectrum for voice telephony systems must, from the inception of service, provide for and maintain lawful interception capabilities as authorized by law. The requirements for lawful interception capabilities are provided in the Solicitor General's Enforcement Standards for *Lawful Interception of Telecommunications* (Rev. Nov. 95). These standards may be amended from time to time.

The licensee may request the Minister to forbear from enforcing certain assistance capability requirements for a limited period of time. The Minister, following consultation with Public Safety Canada, may exercise the power to forbear from enforcing a requirement or requirements where, in the opinion of the Minister, the requirement is not reasonably achievable. Requests for forbearance must include specific details and dates indicating when compliance with the requirement can be expected.

C8. Research and development

The licensee must invest, at a minimum, 2% of its adjusted gross revenues resulting from the use of this licence, averaged over the term of the licence, in eligible research and development (R&D) activities related to telecommunications. Eligible R&D activities are those which meet the definition of scientific research and experimental development adopted in the *Income Tax Act*, as amended from time to time. Adjusted gross revenues are defined as total service revenues less inter-carrier payments, bad debts, third party commissions, and provincial goods and services taxes collected. The licensee is exempt from R&D expenditure requirements if it, together with all affiliated licensees that are subject to the R&D condition of licence, has less than $1 billion in annual gross operating revenues from the provision of wireless services in Canada, averaged over the term of the licence. For this condition of licence, an affiliate is defined as a person who controls the carrier, or who is controlled by the carrier or by any person who controls the carrier, as per subsection 35(3) of the *Telecommunications Act*.

C9. Deployment requirements

The licensee will be required to demonstrate to the Minister that the spectrum has been put to use, as specified below. In all cases, the licensee is required to meet the relevant conditions and to continuously provide services throughout the term of the licence in accordance with these

requirements. For services to be considered "continuously provided", the service provider must maintain an active service offering throughout the term of their licence.

General deployment requirements

In Tier 4 areas that include a large population centre (as listed in annex A), all licensees will be required to demonstrate to the Minister that the spectrum has been put to use to actively provide service to a minimum percentage of the population as specified in table A1 of annex A, within 5, 10, and 20 years of the initial licence issuance date. In all other Tier 4 areas, licensees will be required to demonstrate to the Minister that the spectrum has been put to use to actively provide service to a minimum percentage of the population as specified in table A2 of annex A, within 7, 10, and 20 years of the initial licence issuance date.

Additional deployment requirements for mobile LTE service providers

In addition to the general deployment requirements, a licensee offering mobile LTE services will be required to demonstrate to the Minister that the spectrum has been put to use to cover the following deployment requirements within its mid-band mobile LTE network footprint (coverage in effect as of the publication date of the *Policy and Licensing Framework for Spectrum in the 3800 MHz Band*), using the 3800 MHz band.

In the Tier 4 service areas of Montréal, Toronto and Vancouver:

- 90% of the population within its mid-band mobile LTE network footprint within five years
- 97% within seven years of the initial licence issuance date
- 95% of the population outside the large urban population centres within 10 years of the initial licence issuance date

In tiers that contain a large population centre, excluding Montréal, Toronto and Vancouver, as listed in annex B:

- 90% of the population within its mid-band mobile LTE network footprint within seven years
- 97% within 10 years of the initial licence issuance date
- 95% of the population outside the large urban population centres within 10 years of the initial licence issuance date

In tiers that do not contain a large population centre, as listed in annex B:

- 90% of the population within its mid-band mobile LTE network footprint within seven years
- 97% within 10 years of the initial licence issuance date

The general deployment requirements continue to apply to all licences by default, and must be satisfied in all cases where the requirements for mobile operators listed above may be lower than the general requirements.

Licensees will be required to provide to ISED, their mid-band mobile LTE network footprint as the publication date of the Framework, as defined by the service provider's AWS-1, AWS-3, AWS-4, BRS, PCS, WCS and 3500 MHz band deployments, when requested by ISED.

The licensee is required to meet these conditions at all relevant times during the licence term and to continuously provide services throughout the term of the licence in accordance with these requirements.

Where a licence is transferred, the requirement for the new licensee to deploy will continue to be based on the initial licence issuance date.

The licensee must provide the Minister with any documentation or information related to spectrum access or LTE network footprints at the Minister's request.

Six months prior to the end of the 20-year licence term, all licensees wishing to undergo the future licence renewal process must provide proof to ISED that they meet or will meet the 20-year deployment requirements for their licence.

ISED will review licensees' compliance with their deployment conditions at the dates noted above. Where, at any point in the licence term, the licensee is not in compliance with its deployment conditions, ISED may invoke various compliance and enforcement measures. These measures may include warnings, administrative monetary penalties, legal action, licence amendments, suspensions, or other measures. In certain cases of non-compliance, ISED may determine that the most appropriate course of action is to revoke the licence.

C10. Mandatory antenna tower and site sharing

The licensee must comply with the mandatory antenna tower and site sharing requirements set out in Client Procedures Circular CPC-2-0-17, *Conditions of Licence for Mandatory Roaming and Antenna Tower and Site Sharing and to Prohibit Exclusive Site Arrangements*, as amended from time to time.

C11. Mandatory roaming

The licensee must comply with the roaming requirements set out in CPC-2-0-17 as amended from time to time.

C12. Annual reporting

In addition to any reporting requirements required by any CPC, Technical Standard, SRSP or RP the licensee must submit an annual report for each year of the licence term, which includes the following information:

- a statement indicating continued compliance with all conditions of licence
- an update on the implementation and spectrum usage within the area covered by the licence
- existing audited financial statements with an accompanying auditor's report
- a statement indicating the annual gross operating revenues from the provision of wireless services in Canada and, where applicable, the annual adjusted gross revenues resulting from the use of this licence, as defined in these conditions of licence
- a report of the R&D expenditures as set out in these conditions of licence (the Minister may request, at its discretion, an audited statement of R&D expenditures with an accompanying auditor's report)
- supporting financial statements where a licensee is claiming an exemption based on, together with all affiliated licensees that are subject to the R&D condition of licence, it having less than $1 billion in annual gross operating revenues from the provision of wireless services in Canada, averaged over the term of the licence
- a copy of any existing corporate annual report for the licensee's fiscal year with respect to the authorization
- other information related to the licence as specified in any notice updating the reporting requirements as issued by the Minister

All reports and statements are to be certified by an officer of the company and submitted, in writing, within 120 days of the licensee's fiscal year-end. Confidential information provided will be treated in accordance with subsection 20(1) of the *Access to Information Act*.

Reports are to be submitted to the Minister at the following address:

Innovation, Science and Economic Development Canada
Spectrum Management Operations Branch
Manager, Operational Policy
6th Floor, East Tower
235 Queen St
Ottawa ON K1A 0H5

Where a licensee holds multiple licences, spectrum implementation reports should be broken down by licence area. This information, including the extent of implementation and spectrum usage, is important for analyzing each licensee's individual performance against its conditions of licence. In addition, it allows the Minister to monitor the effectiveness of these conditions in meeting the policy objectives regarding the band and the Minister's intent that the spectrum be deployed in a timely manner for the benefit of Canadians.

C13. Amendments

The Minister retains the discretion to amend these terms and conditions of licence at any time.

Annex D: Tier 4 service areas categorized as encumbered

Table D1 lists the Tier 4 service areas categorized as encumbered as part of the auction process. The potential encumbered population in all of these service areas is 10% or more, as of February 9, 2023. The population counts are approximate and are based on the 2016 Census data.

The levels of encumbrance provided are intended as an initial evaluation for potential bidders and do not guarantee the population that licensees will be able to serve. The levels of encumbrance were determined using assumptions to generally protect fixed satellite service (FSS) earth stations from interference from flexible use stations under worst-case sharing scenarios.

Given the large number of licensed earth stations operating in satellite-dependent areas, the earth station encumbrances were derived with the following assumptions to help ease computation:

- FSS earth station receiver noise temperature: 70 K
- Earth station antenna height: 5 m
- Antenna gain: **$G(\theta) = 32 - 25 \log(\theta)$**, where **$\theta$** is the earth station elevation angle

In addition, ISED assumed a co-channel (in-band) interference-to-noise (I/N) protection threshold of -10 dB for the earth station receiver, and used the worst-case assumption that the flexible use base station was pointing in the direction of the earth station.

The effects of clutter loss were considered, but in the majority of cases, the effects of terrain were not included in these calculations. Terrain impact was only considered for stations within 120 km of the satellite-dependent areas identified in interim guideline GL-10, with the possibility to create encumbrances in non-satellite-dependent tiers.

In practice, mitigation measures such as the antenna orientation of flexible use base stations and transmitter power adjustment could also lower the level of encumbrance. Flexible use licensees will have the ability to coordinate and negotiate mutually beneficial commercial agreements with existing FSS earth station operators to reduce levels of encumbrance. ISED also notes that some of these FSS earth station operations could eventually transition to 4000-4200 MHz. Consequently, the actual levels of encumbrance in many service areas could be lower than the estimated levels. The levels provided to illustrate encumbrance do not serve as protection contours for earth stations. The coexistence measures between flexible use and earth station operations are defined in Standard Radio System Plan SRSP-520, *Technical Requirements for Fixed and/or Mobile Systems, Including Flexible Use Broadband Systems, in the Band 3450-3650 MHz*.

Table D1: Tier 4 service areas categorized as encumbered

Tier 4	Service Area Name	Tier 4 Population	Estimated Encumbered Population (%)
4-005	Labrador	27 656	83
4-061	Amos	25 096	71
4-062	Val-d'Or	44 619	95
4-066	Chibougamau	45 730	91
4-081	Kincardine	185 818	42
4-097	North Bay	104 524	86
4-098	Parry Sound	21 123	20
4-103	Kapuskasing	38 024	29
4-104	Kenora/Sioux Lookout	64 826	87
4-105	Iron Bridge	20 162	43
4-107	Marathon	24 923	77
4-108	Thunder Bay	121 061	97
4-109	Fort Frances	20 095	95
4-112	Lac du Bonnet	58 076	30
4-117	Creighton/Flin Flon	22 228	93
4-118	Thompson	50 665	79
4-130	Northern Saskatchewan | Saskatechewan-Nord	37 064	80
4-147	Peace River	86 745	36
4-156	Courtenay	118 732	80
4-157	Powell River	26 865	86
4-161	Ashcroft	15 070	36
4-164	Williams Lake	38 440	70
4-165	Quesnel/Red Bluff	23 558	92
4-166	Skeena	56 234	81
4-168	Smithers	37 646	86
4-169	Dawson Creek	68 387	41
4-170	Yukon	35 928	96
4-171	Nunavut	35 975	99.98
4-172	Northwest Territories | Territoires du Nord-Ouest	41 668	98

Annex E: Opening bids and eligibility points

The tables below outline the opening bid prices and eligibility points for encumbered and unencumbered products based on the population and $/MHz/pop for each Tier 4 service area. The population counts are approximate and are based on the 2016 Census data.

Table E1: Opening bids and eligibility points of encumbered blocks

Tier number and encumbrance level	Service area name	Population	Price ($/MHz/pop)	Opening bid price ($)	Eligibility points (per block)
4-005-1	Labrador	4 679	0.051	2 000	1
4-061-1	Amos	7 218	0.051	4 000	1
4-062-1	Val-d'Or	2 190	0.051	1 000	1
4-066-1	Chibougamau	4 295	0.051	2 000	1
4-081-1	Kincardine	108 528	0.051	55 000	20
4-097-1	North Bay	14 664	0.051	7 000	2
4-098-1	Parry Sound	16 814	0.051	9 000	3
4-103-1	Kapuskasing	26 972	0.051	14 000	5
4-104-1	Kenora/Sioux Lookout	8 355	0.051	4 000	1
4-105-1	Iron Bridge	11 395	0.051	6 000	2
4-107-1	Marathon	5 726	0.051	3 000	1
4-108-1	Thunder Bay	3 230	0.065	2 000	1
4-109-1	Fort Frances	995	0.051	1 000	1
4-112-1	Lac du Bonnet	40 750	0.051	21 000	7
4-117-1	Creighton/Flin Flon	1 576	0.051	1 000	1
4-118-1	Thompson	10 859	0.051	6 000	2
4-130-1	Northern Saskatchewan | Saskatchewan-Nord	7 550	0.051	4 000	1
4-147-1	Peace River	55 464	0.051	28 000	9
4-156-1	Courtenay	23 920	0.051	12 000	4
4-157-1	Powell River	3 686	0.051	2 000	1
4-161-1	Ashcroft	9 645	0.051	5 000	2
4-164-1	Williams Lake	11 351	0.051	6 000	2
4-165-1	Quesnel/Red Bluff	1 892	0.051	1 000	1
4-166-1	Skeena	10 581	0.051	5 000	2
4-168-1	Smithers	5 156	0.051	3 000	1
4-169-1	Dawson Creek	40 219	0.051	21 000	7
4-170-1	Yukon	1 557	0.051	1 000	1
4-171-1	Nunavut	9	0.051	1 000	1
4-172-1	Northwest Territories | Territoires du Nord-Ouest	971	0.051	1 000	1

Table E2: Opening bids and eligibility points of unencumbered blocks

Tier number and encumbrance level	Service Area Name	Population	Price ($/MHz/pop)	Opening Bid Price ($)	Eligibility Points (per block)
4-001-0	St. John's	255 012	0.065	166 000	60
4-002-0	Placentia	15 304	0.051	8 000	3
4-003-0	Gander/Grand Falls/Windsor	144 229	0.051	74 000	20
4-004-0	Corner Brook/Stephenville	77 974	0.051	40 000	10
4-005-0	Labrador	27 656	0.051	14 000	5
4-006-0	Charlottetown	95 350	0.051	49 000	20
4-007-0	Summerside	47 557	0.051	24 000	8
4-008-0	Yarmouth	55 609	0.051	28 000	9
4-009-0	Bridgewater/Kentville	139 289	0.051	71 000	20
4-010-0	Halifax	435 820	0.065	283 000	90
4-011-0	Truro	56 649	0.051	29 000	10
4-012-0	Amherst	33 373	0.051	17 000	6
4-013-0	Antigonish/New Glasgow	71 445	0.051	36 000	10
4-014-0	Sydney	131 379	0.051	67 000	20
4-015-0	Saint John	142 898	0.065	93 000	30
4-016-0	St. Stephen	25 087	0.051	13 000	4
4-017-0	Fredericton	164 871	0.065	107 000	40
4-018-0	Moncton	178 500	0.065	116 000	40
4-019-0	Miramichi/Bathurst	156 025	0.051	80 000	30
4-020-0	Grand Falls	24 936	0.051	13 000	4
4-021-0	Edmundston	26 504	0.051	14 000	5
4-022-0	Campbellton	26 776	0.051	14 000	5
4-023-0	Matane	112 039	0.051	57 000	20
4-024-0	Mont-Joli	37 788	0.051	19 000	6
4-025-0	Rimouski	56 619	0.051	29 000	10
4-026-0	Rivière-du-Loup	82 869	0.051	42 000	10
4-027-0	La Malbaie	28 193	0.051	14 000	5
4-028-0	Chicoutimi-Jonquière	218 377	0.065	142 000	50
4-029-0	Montmagny	56 808	0.051	29 000	10
4-030-0	Québec	904 330	0.065	588 000	200
4-031-0	Sainte-Marie	53 258	0.051	27 000	9
4-032-0	Saint-Georges	71 425	0.051	36 000	10
4-033-0	Lac-Mégantic	24 223	0.051	12 000	4
4-034-0	Thetford Mines	42 019	0.051	21 000	7

Tier number and encumbrance level	Service Area Name	Population	Price ($/MHz/pop)	Opening Bid Price ($)	Eligibility Points (per block)
4-035-0	Plessisville	22 772	0.051	12 000	4
4-036-0	La Tuque	16 219	0.051	8 000	3
4-037-0	Trois-Rivières	265 152	0.065	172 000	60
4-038-0	Louiseville	21 708	0.051	11 000	4
4-039-0	Asbestos	29 744	0.051	15 000	5
4-040-0	Victoriaville	56 684	0.051	29 000	10
4-041-0	Coaticook	12 981	0.051	7 000	2
4-042-0	Sherbrooke	250 227	0.065	163 000	50
4-043-0	Windsor	16 777	0.051	9 000	3
4-044-0	Drummondville	112 390	0.065	73 000	20
4-045-0	Cowansville	29 083	0.051	15 000	5
4-046-0	Farnham	29 593	0.051	15 000	5
4-047-0	Granby	105 440	0.051	54 000	20
4-048-0	St-Hyacinthe	92 092	0.051	47 000	20
4-049-0	Sorel	58 740	0.051	30 000	10
4-050-0	Joliette	161 106	0.051	82 000	30
4-051-0	Montréal	4 352 037	0.232	10 097 000	3 370
4-052-0	Sainte-Agathe-des-Monts	77 087	0.051	39 000	10
4-053-0	Hawkesbury	64 131	0.051	33 000	10
4-054-0	Mont-Laurier/Maniwaki	48 488	0.051	25 000	8
4-055-0	Ottawa	1 452 852	0.1	1 453 000	480
4-056-0	Pembroke	82 200	0.051	42 000	10
4-057-0	Arnprior/Renfrew	31 367	0.051	16 000	5
4-058-0	Rouyn-Noranda	43 108	0.051	22 000	7
4-059-0	Notre-Dame-du-Nord	16 023	0.051	8 000	3
4-060-0	La Sarre	19 349	0.051	10 000	3
4-061-0	Amos	25 096	0.051	13 000	4
4-062-0	Val-d'Or	44 619	0.051	23 000	8
4-063-0	Roberval/Saint-Félicien	58 438	0.051	30 000	10
4-064-0	Baie-Comeau	43 675	0.051	22 000	7
4-065-0	Port-Cartier/Sept-Îles	46 983	0.051	24 000	8
4-066-0	Chibougamau	45 730	0.051	23 000	8
4-067-0	Cornwall	69 729	0.051	36 000	10
4-068-0	Brockville	70 563	0.051	36 000	10
4-069-0	Gananoque	13 150	0.051	7 000	2
4-070-0	Kingston	177 314	0.065	115 000	40
4-071-0	Napanee	42 993	0.051	22 000	7
4-072-0	Belleville	154 982	0.065	101 000	30

Tier number and encumbrance level	Service Area Name	Population	Price ($/MHz/pop)	Opening Bid Price ($)	Eligibility Points (per block)
4-073-0	Cobourg	65 180	0.051	33 000	10
4-074-0	Peterborough	165 516	0.065	108 000	40
4-075-0	Lindsay	45 902	0.051	23 000	8
4-076-0	Minden	20 813	0.051	11 000	4
4-077-0	Toronto	7 030 750	0.232	16 311 000	5 440
4-078-0	Alliston	129 279	0.051	66 000	20
4-079-0	Guelph/Kitchener	707 534	0.065	460 000	150
4-080-0	Fergus	30 010	0.051	15 000	5
4-081-0	Kincardine	185 818	0.051	95 000	30
4-082-0	Listowel/Goderich	84 257	0.051	43 000	10
4-083-0	Fort Erie	31 072	0.051	16 000	5
4-084-0	Niagara/St. Catharines	349 283	0.065	227 000	80
4-085-0	Haldimand/Dunnville	37 398	0.051	19 000	6
4-086-0	London/Woodstock/St. Thomas	678 149	0.065	441 000	150
4-087-0	Brantford	138 535	0.065	90 000	30
4-088-0	Stratford	51 339	0.051	26 000	9
4-089-0	Chatham	68 885	0.051	35 000	10
4-090-0	Windsor/Leamington	401 719	0.065	261 000	90
4-091-0	Wallaceburg	30 983	0.051	16 000	5
4-092-0	Sarnia	123 953	0.051	63 000	20
4-093-0	Strathroy	46 727	0.051	24 000	8
4-094-0	Barrie	352 290	0.065	229 000	80
4-095-0	Midland	49 059	0.051	25 000	8
4-096-0	Gravenhurst/Bracebridge	61 892	0.051	32 000	10
4-097-0	North Bay	104 524	0.051	53 000	20
4-098-0	Parry Sound	21 123	0.051	11 000	4
4-099-0	Elliot Lake	29 520	0.051	15 000	5
4-100-0	Sudbury	178 872	0.065	116 000	40
4-101-0	Kirkland Lake	32 402	0.051	17 000	6
4-102-0	Timmins	42 086	0.051	21 000	7
4-103-0	Kapuskasing	38 024	0.051	19 000	6
4-104-0	Kenora/Sioux Lookout	64 826	0.051	33 000	10
4-105-0	Iron Bridge	20 162	0.051	10 000	3
4-106-0	Sault Ste. Marie	80 833	0.051	41 000	10
4-107-0	Marathon	24 923	0.051	13 000	4
4-108-0	Thunder Bay	121 061	0.065	79 000	30
4-109-0	Fort Frances	20 095	0.051	10 000	3

Tier number and encumbrance level	Service Area Name	Population	Price ($/MHz/pop)	Opening Bid Price ($)	Eligibility Points (per block)
4-110-0	Steinbach	64 764	0.051	33 000	10
4-111-0	Winnipeg	830 151	0.065	540 000	180
4-112-0	Lac du Bonnet	58 076	0.051	30 000	10
4-113-0	Morden/Winkler	51 609	0.051	26 000	9
4-114-0	Brandon	103 743	0.051	53 000	20
4-115-0	Portage la Prairie	21 273	0.051	11 000	4
4-116-0	Dauphin	75 508	0.051	39 000	10
4-117-0	Creighton/Flin Flon	22 228	0.051	11 000	4
4-118-0	Thompson	50 665	0.051	26 000	9
4-119-0	Estevan	46 006	0.051	23 000	8
4-120-0	Weyburn	22 877	0.051	12 000	4
4-121-0	Moose Jaw	55 141	0.051	28 000	9
4-122-0	Swift Current	46 219	0.051	24 000	8
4-123-0	Yorkton	63 024	0.051	32 000	10
4-124-0	Regina	260 382	0.065	169 000	60
4-125-0	Saskatoon	306 824	0.065	199 000	70
4-126-0	Watrous	27 288	0.051	14 000	5
4-127-0	Battleford	99 433	0.051	51 000	20
4-128-0	Prince Albert	130 446	0.051	67 000	20
4-129-0	Lloydminster	37 539	0.051	19 000	6
4-130-0	Northern Saskatchewan | Saskatchewan-Nord	37 064	0.051	19 000	6
4-131-0	Medicine Hat/Brooks	107 233	0.051	55 000	20
4-132-0	Lethbridge	189 709	0.065	123 000	40
4-133-0	Stettler/Oyen/Wainwright	51 420	0.051	26 000	9
4-134-0	High River	120 208	0.051	61 000	20
4-135-0	Strathmore	45 478	0.051	23 000	8
4-136-0	Calgary	1 416 856	0.1	1 417 000	470
4-137-0	Red Deer	206 387	0.065	134 000	40
4-138-0	Wetaskiwin/Ponoka	54 340	0.051	28 000	9
4-139-0	Camrose	40 145	0.051	20 000	7
4-140-0	Vegreville	15 396	0.051	8 000	3
4-141-0	Edmonton	1 325 857	0.1	1 326 000	440
4-142-0	Edson/Hinton	49 814	0.051	25 000	8
4-143-0	Bonnyville	83 631	0.051	43 000	10
4-144-0	Whitecourt	32 669	0.051	17 000	6
4-145-0	Barrhead	23 437	0.051	12 000	4
4-146-0	Fort McMurray	73 953	0.051	38 000	10

Tier number and encumbrance level	Service Area Name	Population	Price ($/MHz/pop)	Opening Bid Price ($)	Eligibility Points (per block)
4-147-0	Peace River	86 745	0.051	44 000	10
4-148-0	Grande Prairie	110 027	0.051	56 000	20
4-149-0	East Kootenay | Kootenay-Est	60 371	0.051	31 000	10
4-150-0	West Kootenay | Kootenay-Ouest	78 941	0.051	40 000	10
4-151-0	Kelowna	362 815	0.065	236 000	80
4-152-0	Vancouver	2 731 567	0.232	6 337 000	2 110
4-153-0	Hope	26 093	0.051	13 000	4
4-154-0	Victoria	458 861	0.065	298 000	100
4-155-0	Nanaimo	194 922	0.065	127 000	40
4-156-0	Courtenay	118 732	0.051	61 000	20
4-157-0	Powell River	26 865	0.051	14 000	5
4-158-0	Squamish/Whistler	74 365	0.051	38 000	10
4-159-0	Merritt	15 649	0.051	8 000	3
4-160-0	Kamloops	106 972	0.065	70 000	20
4-161-0	Ashcroft	15 070	0.051	8 000	3
4-162-0	Salmon Arm	51 024	0.051	26 000	9
4-163-0	Golden	6 854	0.051	3 000	1
4-164-0	Williams Lake	38 440	0.051	20 000	7
4-165-0	Quesnel/Red Bluff	23 558	0.051	12 000	4
4-166-0	Skeena	56 234	0.051	29 000	10
4-167-0	Prince George	94 607	0.051	48 000	20
4-168-0	Smithers	37 646	0.051	19 000	6
4-169-0	Dawson Creek	68 387	0.051	35 000	10
4-170-0	Yukon	35 928	0.051	18 000	6
4-171-0	Nunavut	35 975	0.051	18 000	6
4-172-0	Northwest Territories | Territoires du Nord-Ouest	41 668	0.051	21 000	7
	Total	**35 150 716**	**0.133**	**46 830 000**	**15 584**

Annex F: The clock stage

1. The clock auction format that ISED will use for the 3800 MHz auction is a bidding process that includes two stages: a clock stage and an assignment stage. The clock stage determines the number of generic blocks that a bidder will win of each product and the prices of the generic blocks. The assignment stage determines the specific frequencies that will be assigned to each winning bidder and the additional prices for the specific frequencies.

F1. Clock stage products

2. In service areas without encumbered blocks, ISED will auction 25 unencumbered blocks in 3650-3900 MHz. In service areas with encumbered blocks, ISED will auction five unencumbered blocks in 3650-3700 MHz and 20 encumbered blocks in 3700-3900 MHz.

3. A pair consisting of a service area and a category (unencumbered or encumbered) is referred to as a "product". A product's supply equals the number of available blocks in that service area and category pair.

F2. Clock stage overview

4. The clock stage consists of a sequence of clock rounds. The licences are auctioned simultaneously over multiple clock rounds.

5. In Round 1, each bidder indicates the number of blocks it demands for each product at the opening bid prices (listed in annex E).

6. Starting in Round 2, a range of prices is associated with each product. The start-of-round price is the lowest price in the range and the clock price is the highest price in the range. In Round 2, a product's start-of-round price equals the product's opening bid price. A bidder can bid either to maintain its demand for a product at the round's clock price or to request to change its demand at a price associated with the round.

7. After each round, bids are processed to determine the number of blocks held by each bidder of each product (the processed demands) and the posted prices of each product for the round, as described in sections F5 through F9 of this annex.

8. If, after the bids have been processed, aggregate demand exceeds supply for at least one product, the auction proceeds to another clock round. The posted price of a product for a round becomes the start-of-round price for the next round.

9. If, after the bids have been processed, there is no excess demand for any product in any service area, the clock stage ends and the auction proceeds to the assignment stage.

F3. Bidding requirements

10. In each round, bidders submit their bids subject to the requirements and restrictions described in this section.

11. In any round, a bidder is not allowed to submit a collection of bids if the associated eligibility points exceed the bidder's eligibility for the round.

12. In Round 1, a bidder can submit at most one bid per product and can only submit bids at the opening bid prices.

13. Starting in Round 2, a bid to maintain a bidder's demand must be at the clock price.

14. The bid price of a bid to change demand must be between the start-of-round price and the clock price (inclusively), and must be:

- a multiple of $10 for bid prices below $10,000
- a multiple of $100 for bid prices between $10,000 and $100,000
- a multiple of $1,000 for bid prices above $100,000

15. Starting in Round 2, a bidder may submit up to five bids to change demand for a product in a round as long as the quantities in those bids are monotonic in price. Therefore, if all of the bids submitted by a bidder in a round for a product are sorted in ascending order of price, the corresponding quantities must all either increase or decrease starting from the bidder's processed demand from the previous round. For example, if the bidder's processed demand is four blocks at the start-of-round price of $100,000 and the clock price for this round is $120,000, the bidder can submit a bid to reduce its demand to two blocks at the price of $105,000 and another bid to further reduce its demand to zero blocks at the price of $115,000.

16. In all rounds, a bidder cannot submit multiple bids for a given product at a single price. For example, the bidder cannot submit a bid for two blocks of a given product and a bid for zero blocks of that product both at the same price.

17. In all rounds, the quantity of blocks in a bid for a product cannot be negative and cannot exceed the product's supply.

18. In all rounds, a bidder is not allowed to submit bids that would result in it exceeding the 100 MHz cross-band cap across the 3500 MHz and 3800 MHz bands. This implies that, for a given service area, a bidder's bid cannot exceed 10, less the number of licences that the bidder has been assigned in the 3500 MHz band in that service area.

19. In the case of a service area with two categories, the sum of a bidder's bids for the unencumbered and encumbered products cannot exceed 10, less the number of licences that the

bidder has been assigned in the 3500 MHz band in that service area. If the bidder submits multiple bids per product in a round after Round 1, the auction software will determine whether the bids are compliant with the cross-band cap based on the bid with the highest price for each product; in other words, based on the quantities that the bidder would have of each product after bid processing for the round, if all of its bids for the two products were applied.

F4. Bids to change demand

20. Starting in Round 2, a bidder will be able to make bids requesting changes in demand by indicating a price between the start-of-round price and the clock price for the round (including both end points) at which its demand for blocks in a product changes. Permitting bidders to submit bids below the clock price (i.e. intra-round bidding) will enable ISED to set relatively large price increments, thereby speeding up the auction, without running the risk that a jump in the clock price will overshoot the market clearing price (the point at which demand for blocks equals the available supply).

21. The auction system will apply a bid requesting a change in demand to the maximum extent possible as described in section F8 of this annex. If it is not possible for the auction system to apply the bid in its entirety, the bid may be applied partially.

22. A bid requesting a reduction in demand indicates that a bidder is willing to pay up to the bid price for a quantity of blocks that is unchanged from its previously demanded quantity. At the bid price, the bidder is willing to accept the unchanged quantity, the changed quantity, or any quantity in between. At a price above the bid price up to the clock price for the round (or, if the bidder submitted more bids for the product at higher prices, up to the bid price of the next bid), the bidder is willing to accept the changed quantity indicated by the bid.

23. A bid requesting a reduction in demand for a product will be applied in full if there is sufficient demand for the product. In other words, the auction system will apply the reduction provided that there is sufficient aggregate demand by all bidders at the time the bid is considered during bid processing to allow the reduction to be applied without the aggregate demand falling below the supply. If there is some excess demand for the product, but not enough to grant the full requested reduction, the auction system will partially apply the reduction, thereby reducing the bidder’s demand by fewer than the requested number of blocks.

24. A bid requesting an increase in demand indicates that at all prices associated with this round (i.e. prices between the start-of-round price and the clock price, inclusively), the bidder is willing to accept its previously demanded quantity, the bid quantity, or any quantity in between. This is because if a bidder is willing to acquire a given number of blocks at the clock price, it must be willing to acquire at least the given number of blocks at all prices less than the clock price. The particular price specified in a bid to increase demand may nonetheless have an impact on whether the bid is processed, as the price affects the order in which this bid is processed

compared to the other bids in the round.

25. A bid requesting an increase in demand will be applied subject to the bidder's eligibility and the application of the cross-band spectrum cap. That is, a bid will not be applied in full if it would cause the bidder's processed activity to exceed the bidder's eligibility or if it would cause the bidder to exceed the cap. If a bid to increase demand cannot be applied in full, the auction system will apply the increase to the extent possible.

F5. Bid processing

26. Sections F6 to F9 of this annex describe how bids are processed after a round, beginning in Round 2. First, missing bids are included as described in section F6. Then, the order in which bids to change demand will be processed is determined as described in section F7. Bids are processed in that order to determine the processed demand of each bidder for each product for the round, as described in section F8. Finally, the posted prices for the round are calculated as described in section F9.

F6. Missing bids

27. For each product for which the bidder had positive processed demand in the previous round, if the bidder does not submit a bid for that product during the current round, the bidder will be deemed to have placed a bid to reduce its demand for that product to zero blocks at the start-of-round price. All such missing bids are processed in the same way as bids submitted by a bidder to purchase a zero quantity of blocks in this product at the start-of-round price.

F7. Order of processing bids

28. The price point of a bid for a product indicates the percentage of the distance between the start-of-round price and the clock price for the product. That is, the price point is equal to the bid price minus the start-of-round price, divided by the clock price minus the start-of-round price. Thus, the price point of a bid is between 0% and 100%, inclusively. For example, if the start-of-round price is $100,000 and the clock price is $105,000, then a bid at $102,000 will have a price point of (102,000-100,000)/(105,000-100,000) = 40%.

29. Bids to change demand are processed in increasing order of price point. That is, a bid with a lower price point is considered to have higher priority than a bid with a higher price point. Pseudo-random numbers are used to break any ties.

F8. Determination of processed demands

30. Bids to maintain demand are always applied during bid processing, whereas bids to change demand are applied to the maximum extent possible.

31. The bid processing algorithm described in this section maintains a queue of all bids to change demand that have not been applied in their entirety. The highest-priority bid to change demand that has not yet been considered is processed. The algorithm checks to what extent the bid can be applied using the most-recently-determined processed demands.

32. A bid to increase demand is applied to the maximum extent possible while ensuring that:

a. the bidder's processed activity (after applying the bid) does not exceed its eligibility for the round; and

b. the bidder's processed demand(s) for the service area together with the bidder's existing holdings in the 3500 MHz band do not exceed the cross-band cap.

Note that it may not be possible to apply a bid because of insufficient bidding eligibility if another bid submitted by the bidder, requesting a reduction, is not applied due to insufficient aggregate demand, thereby not freeing up sufficient eligibility points to support the requested bid to increase demand for another product. This can occur even though the bidder's submitted activity does not exceed its eligibility. Moreover, it may not be possible to apply a bid because of the cross-band cap if another bid submitted by the bidder, requesting a reduction for the other category in that service area, is not applied due to insufficient aggregate demand. Note that, because the cross-band cap is checked during bid submission pursuant to paragraph 18, the cross-band cap condition will always be satisfied during bid processing for a bid to increase demand in a service area with a single category, but it may be necessary to apply the cap condition in paragraph (b) above in a service area with two categories.

33. A bid to reduce demand is applied to the maximum extent possible while ensuring that the reduction does not cause aggregate demand to fall below supply for that product (or to fall further below supply, if it is already below supply). If the aggregate demand for the product is less than or equal to the supply, then the bid to reduce demand for the product is not applied at all.

34. If a bid is not applied in its entirety, then it is placed in the queue so that the remaining part may be applied later.

35. Whenever a bid is applied either partially or in its entirety, the queue is re-tested to determine whether it is possible to apply any bids in the queue (either partially or entirely) according to the conditions described above; if so, the highest-priority bid is applied to the maximum extent possible. When a bid has been applied in its entirety, it is removed from the queue; otherwise, it is kept in the queue so that the remaining part may be applied later. The re-testing of the queue is iterated until no bids remaining in the queue can be applied (either partially or entirely) while satisfying the conditions above. Then the next bid from the round is processed, until (1) all bids from the round have been processed, and (2) no bids in the queue can be applied. At that point, all bids remaining in the queue are discarded.

36. The demands of a bidder following the processing of the bids for the round are referred to as its processed demands.

F9. Determination of posted prices

37. After the round's processed demands have been determined, the auction system calculates the posted price of each product as follows:

a. If the aggregate demand for the product exceeds the product's supply, the posted price will be set equal to the product's clock price for the round.

b. If the aggregate demand for the product equals the product's supply and at least one bid to reduce demand for the product was applied (either entirely or partially), the posted price will be set equal to the highest bid price among all bids to reduce demand for the product that were applied (either entirely or partially). In other words, the posted price will be the price at which a reduction caused demand to equal supply.

c. If the aggregate demand for the product is less than or equal to the product's supply and no bid to reduce demand for the product was applied (either entirely or partially), the posted price will be set to be equal to the round's start-of-round price for the product.

F10. Bid processing example

38. In this example, we consider a product with a supply of 25 blocks and an opening bid price of $10,000. Table F1 below summarizes the price ranges and bids for Round 1 through Round 4 in this example.

Table F1: Price ranges and bids for bid processing example

	Round 1 **[$10,000]**	**Round 2** **[$10,000 - $11,000]**	**Round 3** **[$11,000 - $13,000]**	**Round 4** **[$11,500 - $13,000]**
Bids of B1	8 @ $10,000	8 @ $11,000	7 @ $11,500	7 @ $13,000
Bids of B2	8 @ $10,000	8 @ $11,000	8 @ $13,000	8 @ $13,000
Bids of B3	6 @ $10,000	6 @ $11,000	6 @ $13,000	6 @ $13,000
Bids of B4	4 @ $10,000	4 @ $11,000	4 @ $13,000	4 @ $13,000
Aggregate demand	**26**	**26**	**25**	**25**
Posted price	**$10,000**	**$11,000**	**$11,500**	**$11,500**

39. Four bidders (B1, B2, B3, and B4) are bidding for the product. In Round 1, bidders submit their bids at the opening bid price of $10,000. B1 and B2 bid for eight blocks each, B3 bids for six blocks and B4 bids for four blocks. The aggregate demand is 26, and the posted price equals the opening bid price.

40. In Round 2, the start-of-round price is $10,000 and the clock price is $11,000. Each bidder bids to maintain its demand for the product at the round's clock price. The aggregate demand is still 26, which exceeds supply. Thus, as per paragraph 37 (a) above, the posted price equals the clock price.

41. In Round 3, the start-of-round price is $11,000 and the clock price is $13,000. B1 bids to reduce its demand to seven blocks at $11,500, and each other bidder bids to maintain its demand for the product at the round's clock price. Since there is one unit of excess demand, the bid of B1 to reduce demand from eight to seven blocks is applied. The aggregate demand is now 25, which equals supply. Thus, as per paragraph 37 (b) above, the posted price equals $11,500, which is the price of the bid that caused aggregate demand to equal supply.

42. In Round 4, the start-of-round price is $11,500 and the clock price is $13,000. Each bidder bids to maintain its demand for the product at the round's clock price. The aggregate demand remains equal to supply and no bids to reduce demand are applied (since there are no such bids). Thus, as per paragraph 37 (c) above, the posted price equals the start-of-round price (i.e. $11,500). Note that this is the price at which a bidder's reduction had caused aggregate demand to equal supply (in a previous round).

F11. Next round's clock prices

43. A product's start-of-round price for the next round is equal to the posted price.

44. The price increment for a product is set to x% of the product's start-of-round price, where x% is the increment percentage for the round. The round's clock price is then equal to the start-of-round price plus the price increment. Clock prices greater than $10,000 will be rounded up to the nearest $1,000; and clock prices less than $10,000 will be rounded up to the nearest $100.

F12. Information in the clock rounds

45. Following every clock round, bidders will be provided with information on their own bidding activity from previous rounds and their eligibility for the next round. In addition, each bidder will be informed of the aggregate demand and posted price for each product from the previous round and the clock price of each product for the next round. Bidders will not be informed about the individual bids submitted by other bidders or about the remaining eligibility of other bidders.

F13. Eligibility points

46. Each product has been assigned a specific number of eligibility points in proportion to the opening bid price of the licence. Annex E: Opening bids and eligibility points lists the eligibility points associated with each product.

47. Eligibility points are used in the determination of the pre-auction financial deposits and in the activity rules applied during the auction, which influence the bids that bidders can submit. In its application to participate in the auction, each potential bidder must indicate the maximum number of points it wishes to be able to bid for and win in the auction, and submit a corresponding financial deposit. A bidder's initial eligibility defines an upper limit on the total number of eligibility points for which the bidder can bid in a round. As in past spectrum auctions, bidders begin each clock round with a set number of eligibility points, which determines their maximum activity level for the given clock round.

48. A bidder will not be able to increase its eligibility after the application deadline to participate in the auction.

F14. Activity rule

49. In any round, a bidder will not be allowed to submit a collection of bids if the eligibility points associated with the bids exceed the bidder's eligibility for the round.

50. In order to maintain its eligibility from the previous round, the bidder's activity must correspond to a certain percentage of its eligibility for that round. This percentage is called the "activity requirement." ISED will set the activity requirement between 90% and 100% in all clock rounds. The precise figure for the initial activity requirement will be communicated to all qualified bidders before the auction begins. The activity requirement may change during the auction at ISED's discretion. Bidders will be notified prior to these changes taking effect.

51. A bidder's submitted activity for a round is equal to the eligibility points associated with its submitted demands for the round before these demands have been processed. In other words, a bidder's submitted activity level reflects the bidder's demands before they are applied by the auction system during bid processing. A bidder's processed activity for a round is equal to the eligibility points associated with its processed demands after the bids for the round have been processed. In other words, a bidder's processed activity level will reflect its demands as applied by the auction system during bid processing.

52. In Round 1, a bidder's eligibility is determined by the number of points acquired with its financial deposit.

53. In Round 2, a bidder's eligibility is determined by its submitted activity in Round 1; that is, the eligibility points associated with its submitted demands in Round 1, divided by the activity requirement (e.g. divided by 0.95, if the activity requirement is 95%) and rounded down to a

whole number. Further, the bidder's eligibility for Round 2 is not allowed to exceed the bidder's eligibility for Round 1. Mathematically, a bidder's eligibility for Round 2 is defined as the minimum of:

a. the bidder's eligibility for Round 1; and

b. SA(1) / AR(1), rounded down to a whole number;

where SA(1) denotes the bidder's submitted activity for Round 1, and AR(1) denotes the activity requirement for Round 1.

54. In subsequent rounds, a bidder's eligibility is determined by its processed activity and its submitted activity. Specifically, a bidder's eligibility for the next round is determined by: the maximum of its processed activity in the current round; and the minimum of its processed activity in the previous round and its submitted activity in the current round. This maximum is divided by the activity requirement and rounded down to a whole number. Further, the bidder's eligibility for the next round is not allowed to exceed the bidder's eligibility for the current round. Mathematically, a bidder's eligibility for Round t+1, where t+1>2, is defined as the minimum of:

a. the bidder's eligibility for Round t; and

b. max{PA(t), min[PA(t-1), SA(t)]} / AR(t), rounded down to a whole number;

where PA(t) denotes the bidder's processed activity for Round t, SA(t) denotes the bidder's submitted activity for Round t and AR(t) denotes the activity requirement for Round t.

55. Examples of the activity rule in the clock rounds are described below, in paragraphs 56 to 59.

56. **Example of maintaining demand:** In Round 5, the activity requirement is 95% and the eligibility of Bidder X is 620 eligibility points. In Round 4, the processed activity of Bidder X is 600 points. In Round 5, Bidder X is bidding to maintain its demand on 600 points worth of licences and does not submit any bids to change demand. Therefore, the bidder's processed activity after the round will be 600 points (because bids to maintain demand are always applied during bid processing). That is, the bidder's processed activity in Round 5 is equal to bidder's submitted activity in Round 5. An application of the formula from paragraph 54 (b) yields 631 points. Thus, the bidder will maintain its Round 5 eligibility (620 points) for the next round.

57. **Example of reducing demand:** In Round 6, the activity requirement is 95% and the eligibility of Bidder Y is 2,400 eligibility points. In Round 5, the processed activity of Bidder Y is 2,280 points. Suppose that, in Round 6, Bidder Y submits bids to reduce its demand for some products and that if all these reductions are applied during bid processing, its processed demand will be only 1,700 points. If all of the bidder's bids to reduce demand are applied during bid processing, then the bidder's eligibility in the next round will be 1,789 points (1,700 divided by the activity requirement and rounded down; i.e. 1,700/0.95). If some of the bidder's bids to

reduce demand are not applied during bid processing and the bidder's processed activity for the round is 2,000, then its eligibility in the next round will be 2,105 points (2,000 divided by the activity requirement and rounded down; i.e. 2,000/0.95).

58. **Example where submitted activity exceeds processed activity:** In Round 7, the activity requirement is 100% and the eligibility of Bidder Z is 600 eligibility points. In Round 6, the processed activity of Bidder Z is also 600 points. Products A, B, and C have 200, 400 and 600 eligibility points respectively. The bidder currently has processed demand of one block for product A and one block for product B. The bidder submits the following bids: a bid to reduce its demand for A to zero blocks; a bid to reduce its demand for B to zero blocks; and a bid to increase its demand for C to one block. If all three bids are applied during bid processing, then the bidder's processed activity will be 600 and thus the bidder will maintain its eligibility after this round. If the bid to reduce demand for A is applied but the bid to reduce demand for B is not applied due to insufficient excess demand, then the bid to increase demand for C cannot be applied because that would cause the bidder's processed activity to exceed its eligibility for the round. In that case, the bidder's processed activity will be 400 but the bidder's eligibility in the next round will be 600 points because the bidder's submitted activity for Round 7 and the bidder's processed activity for Round 6 are both equal to 600 points. That is, an application of the formula from paragraph 54 (b) yields 600 points.

59. In continuation of the previous example, suppose that in Round 8, Bidder Z again submits a bid to reduce its demand for B to zero blocks; and a bid to increase its demand for C to one block. If the bid to reduce demand for B is not applied again due to insufficient excess demand, the bidder's eligibility in Round 9 will be 400 points (400 divided by the activity requirement; i.e. 400/1). However, if in Round 8, Bidder Z submits a bid to increase its demand for A to one block and to maintain its demand for B for one block (i.e. if the bidder chooses to return to its bids as they were at the start of Round 7), this bidder will have enough eligibility to submit these bids and will keep its eligibility for Round 9 at 600 points.

F15. Conclusion of bidding in the clock stage

60. The clock stage will conclude for all products in all service areas after the first round in which, after the bids have been processed, there is no excess demand for any product in any service area. This round is referred to as the final clock round.

61. At this point, ISED will announce to bidders that the clock rounds have ended and that the auction will proceed to the assignment stage (see annex G).

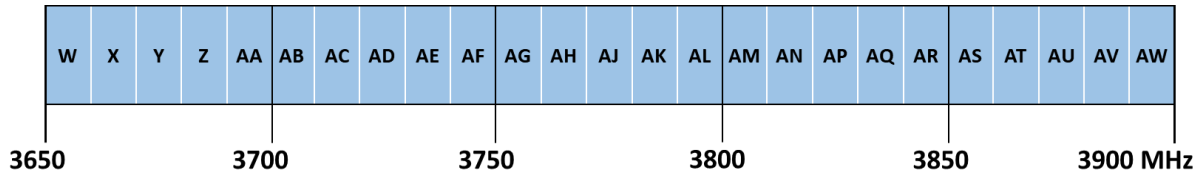
62. After the final clock round, each bidder will know how many blocks it has won in each product and the associated price. The price for a generic block in a product will be the product's posted price for the final clock round. The assignment stage will then determine the specific frequencies that will be assigned to each winning bidder and the additional price for the specific frequencies.

Annex G: The assignment stage

1. After the conclusion of the clock stage, the auction will advance to the assignment stage, where the specific frequencies for the generic licences will be determined. Bidders that have won one or more generic licences in the clock stage will have the option to participate in the assignment stage.

2. The 25 blocks in the 3800 MHz band are labeled W through AW, as shown in figure G1 below.

Figure G1: 3800 MHz band plan



Description of figure G1

Figure G1 shows the band plan for the 3800 MHz band consisting of 25 unpaired blocks of 10 MHz ranging from 3650 MHz to 3900 MHz. The first four blocks from 3650 MHz to 3690 MHz are lettered W to Z. The remaining twenty-one blocks from 3690 MHz to 3900 MHz are lettered AA through AW (noting that there are no blocks labeled AI or AO).

3. The geographic unit for bidding in the assignment stage will be the “assignment area”. An assignment area may comprise a single Tier 4 service area or a combination of two or more Tier 4 service areas that satisfy the criteria of paragraph 7 of this annex. The assignment of specific frequencies determined for an assignment area will apply to each and every service area in this assignment area.

4. The assignment stage will consist of a sequence of assignment rounds. All 25 blocks of an assignment area will be assigned in the same assignment round, irrespective of whether there are encumbered blocks in the assignment area. In each assignment round, each winning bidder will be presented with a set of bidding options for each category and assignment area being assigned in the round where the bidder has winnings from the clock stage.

5. Winning bidders do not have to place bids in the assignment stage if they do not have an assignment preference, as they are guaranteed the number of generic licences that they have won in the clock stage. Each bidder has both a right and an obligation to obtain one of the frequency range options presented to it for each category and assignment area where the bidder has winnings.

6. Each bidder will be assigned these blocks in a contiguous manner only within each category in any given assignment area. Moreover, if there are two categories in an assignment

area and one or more bidders have won blocks in both categories, each cross-category winner (i.e. each bidder with winnings in both categories) will have the option to "opt in" or "opt out" for contiguity across the two categories. In the event that at least one cross-category winner opts in for contiguity, the auction software will guarantee that one of those bidders will be assigned contiguous spectrum across the two categories.

G1. Assignment areas

7. In support of simplifying the assignment stage and facilitating the assignment of contiguous spectrum across service areas, two or more Tier 4 service areas will be combined into an assignment area when the following conditions all hold:

a. the Tier 4 service areas form a contiguous geographic region;

b. the Tier 4 service areas are in the same Tier 2 service area;

c. each of the Tier 4 service areas has the same number of unencumbered and encumbered blocks; and

d. for each of the Tier 4 service areas, the same bidders won the same number of unencumbered and encumbered blocks.

8. Condition 7.c) above implies that a service area with 25 unencumbered blocks will never be combined with a service area that has five unencumbered and 20 encumbered blocks.

9. **Example where service areas without encumbrances are combined into an assignment area:** Consider two services areas that are geographically contiguous, are in the same Tier 2 area, and do not have any encumbrances. In each of these service areas, Bidders 1, 2, 3, 4 and 5 won five unencumbered blocks each. Since the same bidders won the same number of blocks, the two service areas will be combined into an assignment area, and each bidder will be assigned the same frequency blocks in each of these service areas. For example, if Bidder 2 is assigned frequency blocks W.X.Y.Z.AA in one of these service areas, then Bidder 2 will also be assigned blocks W.X.Y.Z.AA in the other service area.

10. **Example where service areas with encumbrances are combined into an assignment area:** Service areas I and II are geographically contiguous and are in the same Tier 2 area. Each of these service areas has five unencumbered and 20 encumbered blocks. Table G1 below lists the number of unencumbered and encumbered blocks won by each bidder. Since the same bidders won the same number of blocks in each category, the two service areas will be combined into an assignment area, and each bidder will be assigned the same frequency blocks in service areas I and II. For example, if Bidder 2 is assigned frequency blocks W.X.Y in service area I, then Bidder 2 will also be assigned blocks W.X.Y in service area II.

Table G1: Example of service areas with encumbrances that are combined into an assignment area

Service area	Number of unencumbered blocks won	Number of encumbered blocks won
I	Bidder 1: 2 blocks Bidder 2: 3 blocks	Bidder 1: 2 blocks Bidder 2: 0 blocks Bidder 3: 8 blocks Bidder 4: 4 blocks Bidder 5: 6 blocks
II	Bidder 1: 2 blocks Bidder 2: 3 blocks	Bidder 1: 2 blocks Bidder 2: 0 blocks Bidder 3: 8 blocks Bidder 4: 4 blocks Bidder 5: 6 blocks

11. **Example of service areas that are not combined into an assignment area:** Table G2 below provides an example of two service areas that cannot be combined into an assignment area. Service areas III and IV are geographically contiguous and are in the same Tier 2 area. Each of these service areas has five unencumbered and 20 encumbered blocks. Table G2 lists the number of blocks won by each bidder in the clock stage in each category. The same bidders won the same number of unencumbered blocks in each of these service areas, but not the same number of encumbered blocks. For instance, Bidder 1 won five encumbered blocks in service area III but only won four encumbered blocks in service area IV. Thus, the two service areas cannot be combined into an assignment area. This means that a bidder will not bid for assignments in service areas III and IV together and will not necessarily be assigned the same frequency blocks in these two service areas.

Table G2: Example of service areas with encumbrances that are not combined into an assignment area

Service area	Number of unencumbered blocks won	Number of encumbered blocks won
III	Bidder 1: 2 blocks Bidder 2: 2 blocks Bidder 3: 1 block	Bidder 1: 5 blocks Bidder 2: 5 blocks Bidder 3: 5 blocks Bidder 4: 5 blocks
IV	Bidder 1: 2 blocks Bidder 2: 2 blocks Bidder 3: 1 block	Bidder 1: 4 blocks Bidder 2: 5 blocks Bidder 3: 6 blocks Bidder 4: 5 blocks

G2. Order for the assignment rounds

12. ISED will conduct the assignment rounds in descending order of population. This process will enable bidders to know which specific frequencies they have won in the most populated assignment areas prior to their participation in the assignment rounds for the less populated assignment areas. If some service areas are combined, the population of the resulting assignment area will be defined to equal the sum of the populations of the Tier 4 service areas that it comprises.

13. ISED will conduct a separate assignment round for each of the eight most populated assignment areas, sequentially, in descending order of population.

14. Once the eight most populated assignment areas have been assigned, bidding for the remaining assignment areas will be conducted in parallel. That is, bidding for assignments in multiple assignment areas will take place during the same assignment round and the bidders will be required to submit their bids for the assignment areas included in the same assignment round at the same time. This will reduce the duration of the assignment stage.

15. After the assignment of the eight most populous assignment areas, all remaining assignment areas will be ranked by population, from highest to lowest, and divided into six sessions per assignment round, subject to the constraint that each assignment round will not include more than one assignment area from within the same Tier 2 service area. This constraint will be relaxed when there are fewer than six assignment areas remaining to be assigned. In addition, if there are six or more assignment areas remaining to be assigned and it is not possible to include six assignment areas in an assignment round while satisfying the constraint, then that

assignment round may include fewer than six assignment areas. ISED is of the view that the session sizes and the mix of geographic areas provide a balance between the need for a timely conclusion of the assignment stage and the ability of bidders to handle assignments in different assignment areas that are run in parallel.

16. Table G3 illustrates the preliminary sequence of assignment rounds in the case that each assignment area consists of a single Tier 4 service area (i.e. no service areas are combined). In that case, there would be 36 assignment rounds. The eight most populated service areas would be assigned sequentially in the first eight assignment rounds. Assignment rounds 9 through 34 would include six service areas each, assignment round 35 would include five service areas, and assignment round 36 would include only three service areas. The number of assignment rounds may be smaller if some service areas are combined into assignment areas.

17. The approach for ordering the assignment rounds in the 3800 MHz auction is the same as the approach used for the 3500 MHz auction. No distinction is made between service areas with one category and service areas with two categories for the purpose of ordering the assignment rounds.

Table G3: Sequence of the assignment rounds when no service areas are combined

Round number	Tier	Tier name	Tier population	Round population
1	4-077	Toronto	7,030,750	7,030,750
2	4-051	Montréal	4,352,037	4,352,037
3	4-152	Vancouver	2,731,567	2,731,567
4	4-055	Ottawa	1,452,852	1,452,852
5	4-136	Calgary	1,416,856	1,416,856
6	4-141	Edmonton	1,325,857	1,325,857
7	4-030	Québec	904,330	904,330
8	4-111	Winnipeg	830,151	830,151
9	4-079	Guelph/Kitchener	707,534	2,429,203
	4-154	Victoria	458,861	
	4-010	Halifax	435,820	
	4-125	Saskatoon	306,824	
	4-037	Trois-Rivières	265,152	
	4-001	St. John's	255,012	
10	4-086	London/Woodstock/St. Thomas	678,149	1,976,337
	4-151	Kelowna	362,815	
	4-124	Regina	260,382	
	4-042	Sherbrooke	250,227	
	4-028	Chicoutimi-Jonquière	218,377	
	4-137	Red Deer	206,387	
…	…	…	…	…
	…	…	…	
	…	…	…	
	…	…	…	
	…	…	…	
	…	…	…	

34	4-020	Grand Falls	24,936	113,874
	4-038	Louiseville	21,708	
	4-105	Iron Bridge	20,162	
	4-059	Notre-Dame-du-Nord	16,023	
	4-159	Merritt	15,649	
	4-140	Vegreville	15,396	
35	4-109	Fort Frances	20,095	80,396
	4-043	Windsor	16,777	
	4-002	Placentia	15,304	
	4-161	Ashcroft	15,070	
	4-069	Gananoque	13,150	
36	4-036	La Tuque	16,219	36,054
	4-163	Golden	6,854	
	4-041	Coaticook	12,981	

G3. Bidding options

18. For each assignment round, each bidder will be presented with a set of bidding options for each category in each assignment area assigned in the round in which the bidder has winnings. Even if two or more service areas have been combined into an assignment area, a bidder with winnings in those service areas will be presented a single set of bidding options for each category in the assignment area.

19. As an example, suppose that the sequence of assignment rounds is as shown in table G3, above. Service area 4-161, which has both unencumbered and encumbered blocks, is assigned in round 35. A bidder that has won solely unencumbered or encumbered blocks in this service area will be presented with one set of bidding options. A bidder that has won both unencumbered and encumbered blocks in this service area will be presented with two sets of bidding options (one for each category).

20. For a given category in a service area, a bidder will be presented with all contiguous bidding options that are consistent with the number of licences that the bidder has won, regardless of the number of blocks won by other bidders. For example, a bidder that has won four unencumbered blocks in a service area with 25 unencumbered blocks will be presented with 22 bidding options: W.X.Y.Z, X.Y.Z.AA, Y.Z.AA.AB, Z.AA.AB.AC, etc. A bidder that has won four unencumbered blocks in a service area with five unencumbered blocks will be presented with two bidding options: W.X.Y.Z and X.Y.Z.AA. As another example, a bidder that has won two unencumbered blocks and two encumbered blocks in a service area with five unencumbered and 20 encumbered blocks will be presented with two sets of bidding options: W.X, X.Y, Y.Z, and Z.AA for the unencumbered category; and AB.AC, AC.AD, etc. for the encumbered category.

21. The bidder might not be able to win some of its bidding options if they would preclude other bidders from being assigned contiguous spectrum in that category. The purpose of presenting all contiguous bidding options, regardless of the number of licences to be assigned to each bidder, is to maintain anonymous bidding as much as possible and thereby reduce the potential for gaming behavior in the assignment stage.

22. A bidder may specify a bid amount for each of its bidding options for a given category and assignment area. The bid amount must be non-negative, must be a multiple of $1,000, and cannot exceed $999,999,000. The auction system will treat the bid value to be zero for any bidding option for which a bidder submits no bid.

23. In a service area with two categories, a cross-category winner will also be given the opportunity to submit a “contiguity bid” representing its bonus value for receiving both its highest frequency unencumbered bidding option and its lowest frequency encumbered bidding option. By submitting a positive contiguity bid, the bidder “opts in” for contiguity across the

categories. If the contiguity bid is zero, the bidder "opts out". If the bidder does not submit a contiguity bid, the auction system will treat the contiguity bid value to be zero.

G4. Overview of assignment and pricing determination

24. After each assignment round, the auction system will determine the assignment for each assignment area in that round. This determination will be done separately for each assignment area.

25. Recognizing the efficiency gains from having contiguous blocks of spectrum, ISED will assign bidders contiguous spectrum within each category in an assignment area. Moreover, in an assignment area with two categories, if one or more bidders have won blocks in both categories and have opted in for contiguity, then one of those bidders will be assigned contiguous spectrum across the two categories.

26. For an assignment area with a single category, ISED will use the same approach as in previous spectrum auctions with an assignment stage. Specifically, the auction system will determine the assignment and the pricing as described in sections G5 and G6 respectively.

27. For an assignment area with two categories in which no cross-category winner has opted in for contiguity, the auction system will determine, separately for each category, the assignment and the pricing as described in sections G5 and G6 respectively.

28. For an assignment area with two categories in which exactly one cross-category winner has opted in for contiguity, the licences that are contiguous across the two categories will be automatically assigned to this bidder, and this bidder's assignment price will equal zero.

29. For an assignment area with two categories in which two or more cross-category winners have opted in for contiguity, the auction system will consider the sum of each such bidder's contiguity bid, its bid for its highest frequency unencumbered bidding option and its bid for its lowest frequency encumbered bidding option. The bidder with the highest such bid sum will be assigned licences that are contiguous across the two categories, and that bidder's assignment price will equal the second-highest such bid sum. If there is a tie for the highest bid sum, the tie will be broken by a pseudo-random number generator built into the auction software and the assignment price of the tie-break winner will equal the highest bid sum (since a tie implies that there are at least two bidders with that bid sum).

30. For an assignment area with two categories, in which one bidder has been assigned contiguous unencumbered and encumbered licences pursuant to paragraphs 28 or 29, the auction system will then determine: (1) the assignment and pricing for the remaining unencumbered blocks, following the approach described in sections G5 and G6, but excluding this bidder and the unencumbered licences that it has already been assigned; and (2) the assignment and pricing for the remaining encumbered blocks, following the approach described in sections G5 and G6, but excluding this bidder and the encumbered licences that it has already been assigned. In

determining the assignment and pricing for the remaining blocks, the auction system will make no further reference to "contiguity bids".

31. **Example with two cross-category winners in a service area:** Consider an assignment area with two categories in which two bidders have winnings in both categories. Bidder 1 (B1) has won two unencumbered and two encumbered blocks, and Bidder 2 (B2) has won one unencumbered and three encumbered blocks. Each of these bidders will be presented with two sets of bidding options: one for unencumbered blocks and one for encumbered blocks. Each bidder's bidding options are listed in table G4 below.

Table G4: Bidding options for example with two cross-category winners

Bidder	Unencumbered bidding options	Encumbered bidding options
B1	W.X, X.Y, Y.Z, **Z.AA**	**AB.AC**, AC.AD, AD.AE, etc.
B2	W, X, Y, Z, **AA**	**AB.AC.AD**, AC.AD.AE, AD.AE.AF, etc.

Each of these bidders will also have the opportunity to submit a contiguity bid. We consider the following cases:

Case 1: Both bidders submitted positive contiguity bids. In this case, both bidders have opted in to contiguity. To determine which of these two bidders is assigned contiguous spectrum, the auction system will consider the following bid sums:

a. B1's bid sum = (B1's contiguity bid) + (B1's bid for Z.AA) + (B1's bid for AB.AC)

b. B2's bid sum = (B2's contiguity bid) + (B2's bid for AA) + (B2's bid for AB.AC.AD)

The bidder with the highest bid sum will be assigned contiguous spectrum. Suppose that the bid sum is larger for Bidder 1. Then, Bidder 1 will be assigned licences Z, AA, AB, and AC, and its assignment price will equal Bidder 2's bid sum (shown in (b) above). Once it has been determined that Bidder 1 is assigned contiguous spectrum, the auction system will determine the assignments for the remaining bidders, separately for each category, excluding Bidder 1 and the licences that it has already been assigned. That is, licences Z, AA, AB, and AC, as well as any bidding options containing those licences, will be excluded.

Case 2: Only one bidder submitted a positive contiguity bid. Suppose that Bidder 1 submitted a contiguity bid of zero and Bidder 2 submitted a positive contiguity bid. This means that Bidder 1 has opted out of contiguity, while Bidder 2 has opted in. Then, Bidder 2 will be assigned contiguous spectrum (namely, licences AA, AB, AC and AD) and its assignment price will be zero. The auction system will determine the assignments for the remaining bidders, separately

for each category, excluding Bidder 2 and the licences that it has already been assigned. That is, licences AA, AB, AC and AD, as well as any bidding options containing those licences, will be excluded.

Case 3: Both bidders submitted contiguity bids of zero. This means that both bidders have opted out of contiguity. The auction system will determine the assignments for all bidders, separately for each category, as described in sections G5 and G6. In this case, there is no guarantee, though it is possible, that one of the cross-category winners will be assigned contiguous spectrum across the two categories.

G5. Assignment for a given category and assignment area

32. For each category in each assignment area in a given assignment round, ISED will use a solver to identify the combination of specific assignments of licences that result in the highest bid amount while ensuring that each bidder is assigned contiguous spectrum within the category. In the case of an assignment area in which one bidder has been assigned contiguous unencumbered and encumbered licences pursuant to paragraphs 28 or 29, this bidder, as well as the licences that have already been assigned to it, will be excluded from the optimizations described below.

33. A separate optimization will be solved for each assignment area and category pair. In the event of a tied outcome with more than one specific assignment producing the same total value, the solver will prefer assignments where all unsold blocks are contiguous. Any further ties will be broken by a pseudo-random number generator built into the auction software.

34. Specifically, if there are two or more unsold blocks in the assignment area and category pair, ties will be broken in two steps. First, the solver will determine whether the highest bid amount remains the same when all unsold blocks are assigned contiguous spectrum. If this is the case, then the solver will select an assignment that achieves the maximum value where each bidder is assigned contiguous spectrum and all unsold blocks are assigned contiguous spectrum. Otherwise, the solver will select an assignment that achieves the maximum value where each bidder is assigned contiguous spectrum (but unsold spectrum is not contiguous).

G6. Pricing for a given category and assignment area

35. In the case of an assignment area in which one bidder has been assigned contiguous unencumbered and encumbered licences pursuant to paragraphs 28 or 29, the assignment price of the bidder that has been assigned contiguous spectrum is determined as described in paragraphs 28 or 29. This section describes the pricing for all other cases.

36. ISED will use a second-price rule to determine the prices to be paid by winning bidders in the assignment stage. More specifically, ISED will apply bidder-optimal core prices and will use the “nearest Vickrey” approach in determining the assignment prices. A separate assignment

price will be determined for each category in each assignment area where the bidder has winnings.

37. The final price paid by a winning bidder will be the sum of the posted price(s) of the final clock round for all generic licences that the bidder won plus any associated assignment price(s).

38. An assignment bid is a package bid for the specific frequency locations of a collection of blocks for a given category in a given assignment area. The assignment prices will be determined from the set of assignment bids for the category in the assignment area. The assignment price is attributable to the entire collection of blocks assigned to a given bidder in a given category and assignment area and not to individual blocks that comprise the package. Given the pricing rules, the assignment price will be equal to or less than the corresponding bid amount, and could even be zero.

39. For the purpose of calculating assignment prices, the Vickrey price for each Bidder J is calculated as follows. First, from the value of the winning combination of assignment bids, subtract Bidder J's winning bid (value A). Next, recalculate the winning combination of assignment bids in the hypothetical situation where all Bidder J's assignment bids are equal to zero, as if Bidder J did not have a preference for any of the assignment options that it was presented with (value B). The Vickrey price for Bidder J is defined as the value of the winning combination of assignment bids with all Bidder J's bids set to equal zero (value B) minus the sum of the winning assignment bids for all bidders other than Bidder J (value A), that is, value B minus value A.

40. An extra payment beyond the Vickrey prices is sometimes required as a result of complementarities. In the event that an extra payment is required, the calculation of the additional payment to be paid by a given bidder will be weighted based on the number of blocks being assigned to that bidder in the given category and assignment area.

41. For a given category and assignment area, the assignment prices must satisfy the following conditions:

- **First condition:** Each assignment price must be positive or zero and not more than the dollar amount of the winning assignment stage bid.
- **Second condition:** The set of assignment prices must be sufficiently high that there is no bidder or group of bidders willing to pay more for an alternative feasible assignment. If there is only one set of assignment prices that satisfies the first two conditions, this determines the assignment prices.
- **Third condition:** If there are many sets of assignment prices that fulfil the first and second conditions, the set(s) of assignment prices minimizing the sum of assignment prices across winning assignment stage bids is (are) selected. If there is only one set of

assignment prices that satisfies these three conditions, this will determine the assignment prices.

- **Fourth condition:** If there are many sets of assignment prices that satisfy the first three conditions, the set of assignment prices that minimizes the weighted sum of squares of differences between the assignment prices and the Vickrey prices will be selected. The weighting is relative to the number of blocks being assigned to the bidder in that category and assignment area. This approach for selecting among sets of assignment prices that minimize the sum of assignment prices across winning assignment bids is referred to as the "nearest Vickrey" approach.

42. A software algorithm will be used to determine the set of assignment prices that meet the conditions outlined above.

43. The following is an example of how assignment prices are calculated. This example is based on the 2013 *Spectrum Auction Design* paper [1,085 KB] by Peter Cramton.

44. For expository ease, in this example there are six blocks in a given category and service area, A, B, C, D, E and F. Suppose that there are five bidders, 1, 2, 3, 4, 5, bidding for the assignment of six blocks. In the clock stage, Bidders 1, 2, 4 and 5 won one block in this category and service area and Bidder 3 won two blocks. Bidders 1 and 4 would like to get Block A, Bidders 2 and 5 would like to get Block B and Bidder 3 would like to get Blocks A and B. Bidders do not put any value on other blocks available for the assignment. The following bids are submitted (the subscript of "b" designates the bidder):

- $b_1\{A\} = \$28$
- $b_2\{B\} = \$20$
- $b_3\{AB\} = \$32$
- $b_4\{A\} = \$14$
- $b_5\{B\} = \$12$

45. The bids of the five bidders are represented in figure G2.

46. In this example, the highest value combination of bids would assign Block A to Bidder 1, Block B to Bidder 2, and Blocks C, D, E and F to Bidders 3, 4 and 5 generating $48 in value. The distribution of Blocks C, D, E and F among Bidders 3, 4 and 5 will be decided by a tie-breaking algorithm based on random numbers. There is no other assignment of the blocks that yields a higher value.

47. To calculate the Vickrey price for Bidder 1, its winning bid ($28) is subtracted from the value of the winning combination ($48), resulting in $20. Next, the winning combination of packages is recalculated for the hypothetical situation in which Bidder 1's bids are excluded. The

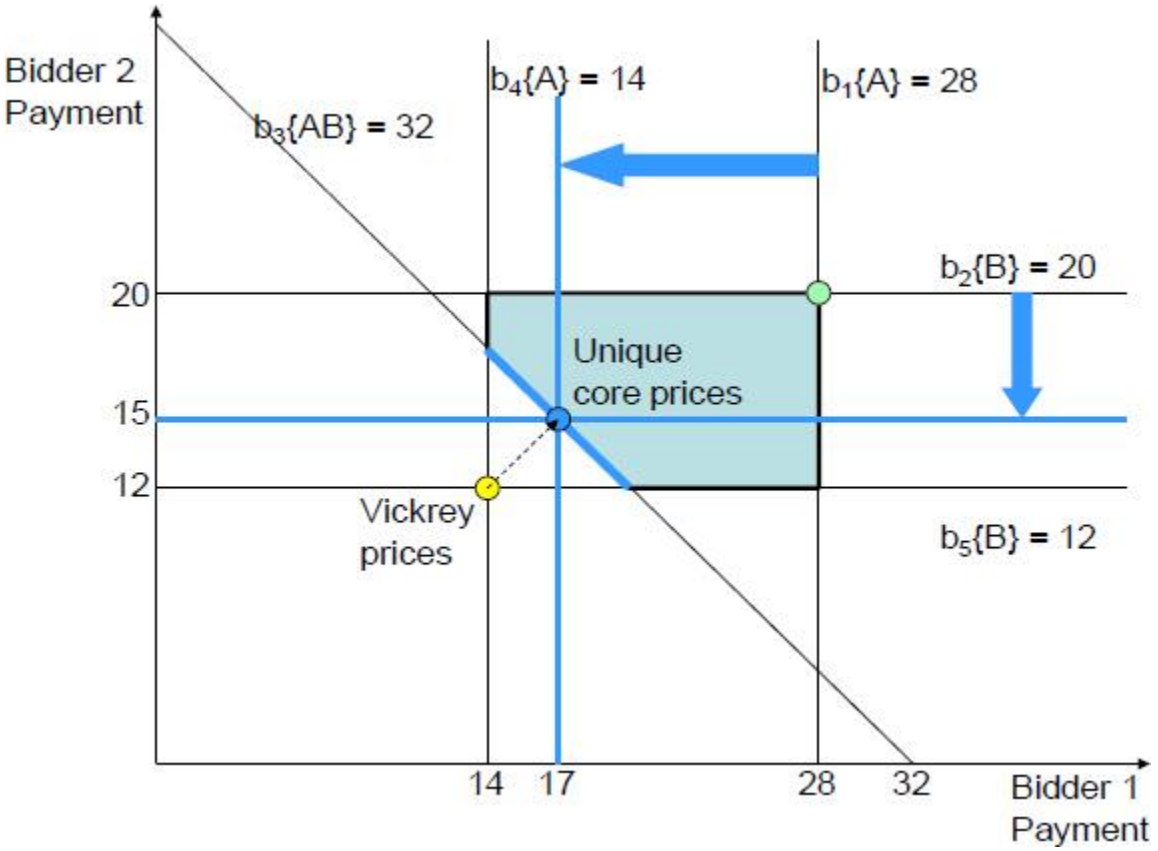
best assignment, excluding Bidder 1, assigns Block A to Bidder 4 at $14 and Block B to Bidder 2 at $20, resulting in $34. The Vickrey price for Bidder 1 is the value of the winning combination of packages with all Bidder 1's bids excluded ($34) less the sum of the winning assignment stage bids for all bidders other than Bidder 1 ($20); that is, its Vickrey price is $14 ($34 - $20).

48. Similarly, to calculate the Vickrey price for Bidder 2, its winning bid ($20) is subtracted from the value of the winning combination ($48), resulting in $28. Next, the winning combination of packages is recalculated for the hypothetical situation in which Bidder 2's bids are excluded. The best assignment, excluding Bidder 2, assigns Block A to Bidder 1 and Block B to Bidder 5, resulting in a value of $40. The Vickrey price for Bidder 2 is the value of the winning combination of packages with all Bidder 2's bids excluded ($40) less the sum of the winning assignment stage bids for all bidders other than Bidder 2 ($28); that is, its Vickrey price is $12 ($40 - $28).

49. Hence, the Vickrey outcome is for Bidder 1 to pay $14 for the assignment of Block A and for Bidder 2 to pay $12 for Block B. Bidders 3, 4, and 5 are assigned Blocks C, D, E and F at zero price. Total revenues with these payments are $14 + $12 = $26. As shown in figure G2, this means that Bidder 1 can reduce its bid to $14 before being displaced by Bidder 4. Similarly, Bidder 2 can reduce its bid to $12 before being displaced by Bidder 5.

50. However, these payments sum to $26, which is less than Bidder 3's bid of $32 for the assignment of Blocks A and B. Therefore, Bidder 1 and Bidder 2 must split an additional payment of $6 ($32 - $26) in order to ensure that their combined payment is greater than that of Bidder 3, satisfying the condition that no other bidder or group of bidders were prepared to pay more for an alternative feasible assignment. To do so, Bidder 1 and Bidder 2 must pay, collectively, at least $32.

Figure G2: Example of calculating assignment prices



Description of figure G2

This figure is a graph illustrating the example in paragraph 44 of annex G, which demonstrates how to calculate assignment prices using a second-price rule and why an additional payment beyond second prices is sometimes required.

51. Because the same number of blocks are being assigned to Bidder 1 and to Bidder 2, the additional payment of $6 is split equally between the two bidders in this example. Each bidder is therefore paying an additional $3 above its Vickrey price, with Bidder 1 paying $17 ($14 + $3) and Bidder 2 paying $15 ($12 + $3), as shown in figure G2.

52. However, if each bidder was being assigned a different number of blocks, the two bidders would split the extra payment proportionately, in reference to the number of blocks being assigned to each bidder (the fourth condition). For example, if two blocks were being assigned to Bidder 1 and one block was being assigned to Bidder 2 then Bidder 1 would pay twice as much as Bidder 2 of the extra payment.

G7. Information at the end of each assignment round

53. Following the end of each assignment round, after the results have been verified, each bidder will be informed of the specific licences that it has won and the assignment price to be paid, for each category and assignment area assigned in the round. In doing this, bidders will know their own results from one assignment round before participating in a subsequent assignment round.

G8. Final price

54. At the end of the assignment stage, ISED will determine the final price that each winning bidder will be required to pay for the licences it has been assigned. This final price will be equal to the sum of the posted price(s) of the final clock round for all generic licences that the bidder won plus any associated assignment price(s).

G9. Information at the end of the assignment stage

55. Following the end of the assignment stage, winning bidders will be informed of the specific licences that they have won, as well as the final price to be paid.

G10. Information after the end of the auction

56. The following information will be made publicly available following the conclusion of the auction process:

a. the list of winning bidders, licences won, and prices to be paid

b. the bids submitted by each bidder in every clock round, including the bidder’s identity

c. the start-of-round and clock prices for each product in every clock round

d. the assignment bids submitted by each bidder, including the bidder’s identity, and the corresponding assignment prices