

SLPB-002-18

March 2018

Spectrum Management and Telecommunications

# Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band

**Note:**

On July 9, 2018, revisions were made to:

- **section 4.3**, Transferability of set-aside spectrum (discussion and decision D1D)
- **section 9.2**, Licence transferability and divisibility (discussion and decision D14)
- **annex B**, Conditions of licence (3. Licence transferability, divisibility and subordinate licensing)

On October 25, 2018, revisions were made to:

- **annex B**, Conditions of licence (2. Eligibility)

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## 1 Intent

1. Through the release of this paper, Innovation, Science and Economic Development Canada (ISED), on behalf of the Minister, announces the decisions resulting from the consultation process undertaken in Canada Gazette notice SLPB-005-17, Consultation on a Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band (hereinafter referred to as the Consultation).
2. All comments and reply comments received on this Consultation are available on ISED's website. Comments and/or reply comments were received from 6Harmonics, Bell Mobility Inc. (Bell), Bragg Communications Inc. (Eastlink), the British Columbia Broadband Association (BCBA), Canadian Association of Broadcasters (CAB), Canadian Cable Systems Alliance Inc. (CCSA), Canadian Electricity Association (CEA), Canadian Association of the Wireless Internet Service Providers (CanWISP), Corridor Communications Inc. (CCI), Cogeco Communications Inc. (Cogeco), Craig Stauffer, Ecotel Inc. (Ecotel), Federation of Canadian Municipalities (FCM), Ice Wireless Inc. (Ice Wireless), Independent Telecommunications Providers Association (ITPA), Key Bridge Wireless LLC (Key Bridge Wireless), MRC de Témiscouata, Québec Média Inc. (Québecor), Railway Association of Canada, Rogers Communications Canada Inc. (Rogers), Saskatchewan Telecommunications (SaskTel), Shaw Communications Inc. (Shaw), Simon Bright, Sogetel Mobilité Inc. (Sogetel), SSi Micro Ltd. (SSi Micro), Tbaytel, TELUS Communications Inc. (TELUS) and Xplornet Communications Inc. (Xplornet) .
3. The following document (hereinafter referred to as the Framework), sets out the technical, policy and licensing framework for the 614-698 MHz frequency band (hereinafter referred to as 600 MHz band).

## 2 Policy objectives

4. The Minister of ISED, through the Department of Industry Act, the Radiocommunication Act and the Radiocommunication Regulations, with due regard to the objectives of the Canadian telecommunications policy set out in section 7 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.
5. In developing the Framework, the Minister has been guided by the objectives stated in section 7 of the Telecommunications Act, and the policy objective of the Spectrum Policy Framework for Canada (SPFC) to maximize the economic and social benefits that Canadians

derive from the use of the radio frequency spectrum. These objectives and the enabling guidelines listed in the SPFC will continue to guide the Minister in managing the spectrum resource.

6. ISED recognizes that Canadians want three things from their telecommunication services: high-quality services, broad coverage and affordable prices. Canadians rely on mobile services to access a variety of mobile applications, such as multi-media services, social networking and Internet browsing, to do business, connect with others, and manage finances, health and homes.

7. A robust wireless telecommunications industry drives the adoption and use of digital technologies and enhances the productivity of the Canadian economy and its international competitiveness. The deployment of the 600 MHz band will contribute to the strengthening of Canada's wireless infrastructure.

8. Additional spectrum will allow providers to increase network capacity to meet the growing demands and support the deployment of next-generation wireless technologies. ISED views the release of the 600 MHz band as an opportunity to encourage investment and improve services. In addition, the release of this spectrum presents a key opportunity to support competition and the provision of high-quality and innovative wireless services to Canadians.

9. Through the Innovation and Skills Plan and its focus on people, technologies and companies, the Government of Canada is committed to promoting growth across all sectors of the Canadian economy. Today's economy is digital. The spectrum discussed in this Framework will support the development of Canada's digital economy and the goals of the Innovation and Skills Plan. Consequently, ISED's objectives for the allocation of the 600 MHz spectrum licences are:

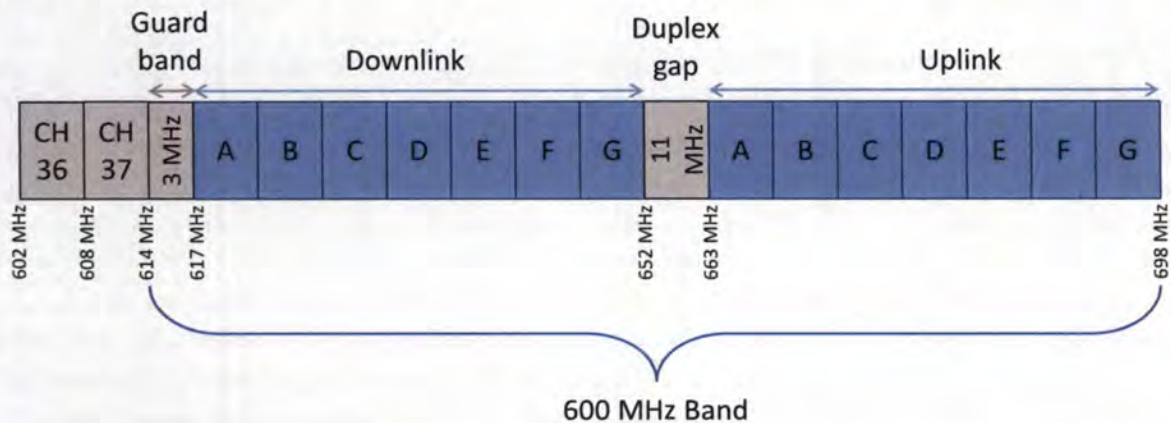
- to foster innovation and investment;
- to support sustained competition, so that consumers and businesses benefit from greater choice; and
- to facilitate deployment and timely availability of services across the country, including rural areas.

10. **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 the Department 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.**

### 3 Band plan

11. As noted in the Consultation, the 2015 *Decision on Repurposing the 600 MHz Band* noted the benefits of adopting the United States (U.S.) band plan for the repurposed spectrum. ISED committed to repurposing the spectrum in collaboration with the U.S. and to adopt the same band plan. The 600 MHz band is designated for flexible use for commercial mobile, fixed, and broadcasting services. The band plan includes seven paired blocks of 5+5 MHz totalling 70 MHz, a duplex gap from 652 MHz to 663 MHz, and a guard band from 614 MHz to 617 MHz, as shown in figure 1.

**Figure 1: Band plan for 600 MHz band**



12. It should be noted that channel 37 will continue to be used for radio astronomy systems and wireless medical telemetry services. Additionally, no Canadian broadcasters are being moved to channel 36 or 37, which will reduce the potential for interference to broadcast services from the mobile services and vice versa.

### 4 Pro-competitive measures

13. Since the introduction of commercial mobile service, substantial investments have been made by wireless service providers to deploy networks across Canada. In 2008, additional service providers were introduced to the wireless market through the *Auction of Spectrum Licences for Advanced Wireless Services (AWS-1) and Other Spectrum in the 2 GHz Range*. As a result, competition has increased, bringing benefits to consumers. The *2017 Price Comparison Study of Telecommunications Services in Canada and Select Foreign Jurisdictions* found that in Canadian regions with strong competition, mobile wireless prices were as much as 27 percent



lower than the national average. ISED intends to continue to promote competition so that all Canadians can have high-quality services at affordable prices.

14. As noted in the *Framework for Spectrum Auctions in Canada* (FSAC), there are various measures available in an auction to promote a competitive marketplace, notably set-asides and spectrum aggregation limits. Factors that ISED may consider when deciding upon the use of a competitive measure are set out in section 4 of the FSAC.

15. In its Consultation, ISED proposed to implement a spectrum set-aside in the 600 MHz band auction.

### **Summary of comments**

16. Bell, Rogers and TELUS disagreed with ISED's proposal to implement a set-aside. They each stated that set-asides are unnecessary as the regional service providers are sufficiently funded vertically integrated companies.

17. BCBA, CCI, Cogeco, Eastlink, Ecotel, Ice Wireless, MRC de Témiscouata, SaskTel, Shaw, Sogetel, SSi Micro, Tbaytel, Québecor and Xplornet agreed with the use of a spectrum set-aside while suggesting modifications to the proposals as described further in sections 4.1, 4.2, 4.3 and 4.4 below.

### **Discussion**

18. The 600 MHz auction process is an opportunity to further support investment by service providers to improve the quality, coverage and prices of wireless services for Canadians. In particular, it presents a key opportunity to support the competitiveness of newer service providers by ensuring that they will have an opportunity to access additional low-band spectrum that is necessary for a robust wireless network.

19. New competitors that entered the market after the 2008 AWS-1 spectrum auction continue to invest in their wireless networks and increase subscribership. Access to additional low-band spectrum would enable them to provide services using the latest technologies and to increase network coverage and capacity in order to meet the traffic demands of a growing subscribership. National incumbent service providers would also benefit from access to additional spectrum, allowing them to increase capacity to better serve their substantial subscriber base.

20. ISED is of the view that there is a risk that competition in the post-auction marketplace could suffer without measures that facilitate access to spectrum for regional service providers.

21. Similar risks have been recognized by spectrum regulators in multiple international jurisdictions. The U.S. 600 MHz incentive auction, in which 30 MHz of spectrum was set-aside



for non-incumbents, is one example where a regulator elected to address these risks by adopting competitive measures.

22. A spectrum set-aside is a mechanism used to support competition by ensuring that a minimum amount of spectrum is effectively reserved for a certain sub-set of entities. Spectrum set-asides were used in the [2008 AWS-1 auction](#), in which approximately 40 percent of the available spectrum was available only to certain bidders, and in the [2015 AWS-3 auction](#), in which approximately 60 percent of the available spectrum was available only to certain bidders.

### Decision

**D1A—A pro-competitive measure will be implemented for the 600 MHz auction in the form of a spectrum set-aside.**

#### 4.1 Amount of set-aside

23. In the Consultation, ISED proposed to set aside 30 MHz of spectrum in the 600 MHz band. This would provide eligible entities with an opportunity to increase their low-band spectrum holdings. The remaining 40 MHz would be open for all bidders.

24. It was also proposed that the specific paired blocks for the set-aside would not be predetermined, but rather would be determined by bidders during the auction.

#### Summary of comments

25. CCI, Ecotel, SaskTel, SSi Micro and Tbaytel agreed with ISED's proposal of a 30 MHz set-aside.

26. Eastlink, MRC de Témiscouata, Shaw, Sogetel and Québecor suggested that, to improve competition in the commercial mobile wireless sector, the amount of spectrum set aside should be increased from 30 MHz to 40 MHz, noting that incumbents on average have larger holdings of low-band spectrum under 1 GHz. Shaw further commented that a 40 MHz set-aside would offer technical benefits, such as maximizing network capacity and peak data rates in a single LTE channel, which in turn would maximize the end-user experience. In its reply comments, Rogers opposed increasing the set-aside to 40 MHz, stating that no network in Canada, including those of incumbents, has access to a 20+20 MHz block of low band spectrum.

27. BCBA and Cogeco suggested a framework featuring a 40 MHz set-aside with a cap of 20 MHz. Xplornet agreed with a 30 MHz set-aside while also suggesting a cap that would vary based on the number of set-aside-eligible bidders in a service area. In its reply comments, Sogetel, Rogers and Ice Wireless supported implementing a cap within the set-aside, while Eastlink, SaskTel and Québecor opposed implementing such proposals.



28. Bell, Rogers and TELUS indicated that, if a competitive measure were to be put in place, a spectrum cap of 20 MHz would be preferable to a set-aside, claiming that it would eliminate advantages for regional companies and reduce opportunities for gaming.

### Discussion

29. ISED expects that this spectrum will be in high demand, as it will provide the opportunity for service providers to increase their low-band holdings and improve the competitiveness of their networks and services. Both regional providers and national incumbents would benefit from the opportunity to obtain spectrum to be able to offer their customers improved network quality and coverage.

30. The minimum technical requirement for the current 4G LTE channel size is a paired 5+5 MHz block. ISED expects that this block size will also be compatible with future mobile technology, such as 5<sup>th</sup> generation technologies known as 5G. The amount of the set-aside spectrum must be balanced with the total amount of existing low-band spectrum holdings. A set-aside of 30 MHz for eligible entities will provide them with an opportunity to increase their low-band spectrum holdings to a level closer to that of the national incumbent service providers. The remaining 40 MHz will give all service providers an opportunity to bid on a significant amount of low-band spectrum according to their needs.

31. The specific paired blocks for the set-aside will not be predetermined, but rather treated as generic licences for bidding purposes. Therefore the blocks associated with set-aside licences will be determined by bidders during the auction and may vary from licence area to licence area.

### Decision

**D1B— A total of 30 MHz of spectrum will be set aside for eligible entities in the auction process for the 600 MHz band.**

## 4.2 Eligibility for set-aside spectrum

32. In the Consultation, ISED proposed that eligibility to bid on the set-aside spectrum be limited to those bidders that are registered with the CRTC as facilities-based providers,<sup>1</sup> that are not national incumbent service providers, and that are actively providing commercial telecommunications services to the general public in the licence area of interest, effective as of the date of application to participate in the 600 MHz auction. ISED proposed that *national incumbent service providers* be defined as “companies with 10% or more of national wireless

<sup>1</sup> An applicant must be registered on one of the CRTC lists of facilities-based providers by the date that applications are due.



subscriber market share”, and that the determination of subscriber market share be based on the most recent [CRTC Communications Monitoring Report](#).

### Summary of comments

33. BCBA, Cogeco and Ice Wireless supported ISED’s proposed eligibility criteria.
34. Bell, Eastlink, Québecor, Rogers, SaskTel, Shaw, Tbaytel and Xplornet proposed to limit the eligibility to entities that are providing commercial wireless services. Shaw and Xplornet proposed to allow eligible entities to bid as set-aside bidders anywhere in the country, and not just in the licence areas where they are currently providing services.
35. CCI and Sogetel suggested excluding entities with revenues over \$100 million to facilitate more competition from smaller companies. BCBA supported this suggestion in its reply comments. Sogetel also suggested excluding those entities that entered the market from the 2008 AWS-1 auction, arguing that they are already well-established. In its reply comments, Cogeco suggested limiting those entities that benefitted from the AWS-1 and AWS-3 set-aside spectrum to no more than 20 MHz of set-aside spectrum for the 600 MHz auction.
36. While TELUS disagreed with ISED’s proposal, TELUS contended that, if a set-aside were implemented, ISED should allow all providers with less than 45 MHz of sub-GHz spectrum in a licence area to bid as set-aside bidders in that area and only when the auction exceeds some high price metric, such as \$1.25 per MHz-pop.
37. SSi Micro suggested a modification to the proposal to allow providers that are offering commercial telecommunications services to the general public in at least one of Canada’s territories, to be eligible to participate as set-aside bidders for all three territories.

### Discussion

38. In its effort to promote a competitive marketplace, ISED has implemented policies in various auctions that reserved spectrum for sub-sets of entities that could compete with the national incumbent service providers.
39. In the past, ISED has used specific definitions to distinguish between established service providers and newer service providers for the purpose of determining bidding eligibility.
40. ISED maintains the view that eligibility to bid on the set-aside spectrum should be limited to a sub-set of service providers that are positioned to compete in the commercial mobile services market.
41. ISED recognizes the unique situation that exists in the North, given the low population density and the high cost of building a network. In the Consultation, ISED proposed that, instead



of licensing the northern territories at a Tier 2 level, which would bundle Yukon, the Northwest Territories and Nunavut together, the area would be licensed on a Tier 4 basis, separating the three territories and effectively facilitating entry in each of these areas individually. ISED notes, however, that licensing on a Tier 4 basis would also have the effect of excluding some entities that currently operate in one or two of these areas from obtaining set-aside spectrum across the entire North. Therefore, the eligibility criteria will be revised so that entities that would be eligible to bid on the set-aside spectrum if the northern licences were auctioned at a Tier 2 level will be deemed eligible to bid for licences in all Tier 4 licence areas in the territories. This revision will effectively allow eligible entities operating in any of the territories to bid on the set-aside spectrum in any or all of the territories.

42. Therefore, eligibility to bid on set-aside spectrum will be limited to those registered with the CRTC as facilities-based providers, that are not national incumbent service providers, and that are actively providing commercial telecommunications services to the general public in the *relevant* Tier 2 area of interest, effective as of the date of application to participate in the 600 MHz auction. *Telecommunications* is defined as the emission, transmission or reception of intelligence by any wire, cable, radio, optical or other electromagnetic system, or by any similar technical system. *National incumbent service providers* will be defined as “companies with 10% or more of national wireless subscriber market share.” The determination of subscriber market share will be based on the most recent CRTC Communications Monitoring Report at the time of application to participate in the auction. All other companies will be referred to as regional service providers.

43. Eligible entities are referred to as set-aside-eligible bidders. Upon application to participate in the auction, applicants will be required to indicate in their application whether they are applying to bid as a set-aside-eligible or set-aside-ineligible bidder on a service area by service area basis.

44. In its assessment of a bidder’s eligibility to bid on the set-aside spectrum, ISED will determine whether commercial telecommunications services are actively being provided to the general public in the licence area by the potential bidder. Potential bidders will be required to demonstrate this by providing relevant documentation to ISED, which will include, but not be limited to, descriptions of:

- the services being offered in the licence area;
- the retail/distribution network; and
- how subscribers access services and the number of subscribers in the service area.

## Decision

**D1C—Eligibility to bid on set-aside spectrum will be limited to those registered with the CRTC as facilities-based providers, that are not national incumbent service providers, as defined in this Framework, and that are actively providing commercial telecommunications services to the general public in the relevant Tier 2 service area of interest, effective as of the application date to participate in the 600 MHz auction.**

### 4.3 Transferability of set-aside spectrum

45. To ensure the effectiveness of the set aside and to deter speculation, it was proposed that the licences acquired by set-aside-eligible bidders not be transferable to set-aside-ineligible entities for the first five years of the licence term, as set out in section 9.2. ISED sought comments on its proposal to limit the transferability of the set-aside spectrum for the first five years of the licence term.

#### Summary of comments

46. Cogeco, Eastlink, Ecotel, Ice Wireless, MRC de Témiscouata, SaskTel, Shaw, Sogetel, Tbaytel, TELUS and Xplornet supported ISED's proposal.

47. BCBA and CCI suggested that the five-year restriction on transfers of set-aside spectrum to set-aside-ineligible entities be extended for the duration of the licence term. Québecor suggested extending the restriction to 10 years.

48. Rogers suggested that ISED apply the restriction to all entities, including set-aside-eligible bidders, in order to limit speculation and ensure spectrum is obtained by operators who will deploy it quickly. CCI suggested restricting all transfers to any entity for the duration of the licence term.

49. Bell opposed the proposed five-year restriction and argued that it is unnecessary, as the Minister of ISED must ultimately approve any spectrum transfer. SSi Micro also commented that the restriction may not be required, given the additional proposed requirement for participants to already be providing service in order to be eligible to bid on set-aside spectrum.

#### Discussion

50. ISED maintains the view that the proposed transferability rules support the SPFC policy objective to maximize the economic and social benefits that Canadians derive from the use of the radio frequency spectrum. The rules strike a balance between deterring speculators (i.e. those with no intention of deploying) from gaining access to spectrum and ensuring that the spectrum can be transferred to entities that are positioned to use it.



51. There are two possible exceptions to this transfer restriction that ISED has considered. The first is to allow subordinate licensing in support of network sharing on certain conditions, as discussed in section 9.2. The second exception is that, in recognition of the principles for promoting the efficient use of spectrum, ISED may allow an exchange of equal amounts of 600 MHz spectrum in the same licence area between a set-aside-eligible entity and a set-aside-ineligible entity, subject to the provisions of section 5.6 of Client Procedure Circular CPC-2-1-23, *Licensing Procedure for Spectrum Licences for Terrestrial Services*.

### Decision

**DID—Set-aside licences acquired by set-aside-eligible bidders will not be transferable to set-aside-ineligible entities for the first five years of the licence term. ISED notes that there are two exceptions to this decision, as discussed in paragraph 51 of this Framework and as set out in the condition of licence on licence transferability, divisibility and subordinate licensing (see annex B).**

### 4.4 Block size of set-aside spectrum

52. In the Consultation, ISED proposed to auction the set-aside spectrum as three separate paired blocks of 5+5 MHz and sought comments on its proposal.

#### Summary of comments

53. BCBA, Bell, Cogeco, Eastlink, Ecotel, Ice Wireless, MRC de Témiscouata, Rogers, SaskTel, Sogetel, Tbaytel, TELUS, Québecor and Xplornet supported ISED's proposal.

54. CCI argued that 5+5 MHz was too small of a block size and indicated that, while 10+10 MHz would be sufficient, given a 30 MHz set-aside, a single 15+15 MHz block would be appropriate. Shaw supported larger 10+10 MHz blocks in the set-aside if its proposal to increase the set-aside to 40 MHz were to be accepted, and supported the 5+5 MHz blocks if the set-aside were to remain at 30 MHz. Ice Wireless disagreed with calls for larger block sizes, suggesting that 5+5 MHz blocks would provide a greater number of carriers with the opportunity to acquire spectrum licences.

#### Discussion

55. One paired block of 15+15 MHz for the set-aside would effectively ensure that, at most, one regional service provider in each licence area would obtain a significant portion of 600 MHz spectrum. Auctioning three separate paired blocks of 5+5 MHz for eligible bidders could alternatively provide multiple set-aside-eligible bidders with an opportunity to acquire licences in each licence area. It would also provide flexibility for set-aside-eligible bidders to express their valuation for one or more blocks during the auction.



56. ISED maintains the view that auctioning the set-aside as three separate paired blocks of 5+5 MHz provides the most flexibility for set-aside-eligible bidders.

#### Decision

**D1E—The set-aside spectrum will be auctioned as three separate paired blocks of 5+5 MHz.**

## 5 Licence areas

57. The *Service Areas for Competitive Licensing* document outlines the general service areas that are used by ISED for the purposes of issuing spectrum licences through an auction. In the Consultation, ISED proposed to use Tier 2 service areas across the country, except in the three territories (Yukon, Northwest Territories and Nunavut) where Tier 4 service areas would apply.

#### Summary of comments

58. Bell, CCI, Ice Wireless, Québecor, SaskTel, Shaw, Rogers and Xplornet supported ISED's proposal to issue licences using Tier 2 service areas.

59. BCBA, CanWISP, CCSA, CEA, Cogeco, Ecotel, ITPA, MRC de Témiscouata and Sogetel disagreed with ISED's proposal, suggesting that ISED use Tier 4 service areas or smaller, in order to facilitate access for rural operators.

60. Eastlink recognized the coordination and interference benefits of using Tier 2 areas to license low-band spectrum, however it supported using Tier 3 areas for the 600 MHz band in order to facilitate access and support rural deployment.

61. Tbaytel suggested that, because of its size and sparse population, Tier 2-09 Northern Ontario should be divided into smaller licence areas. It suggested dividing the Tier vertically into two separate East/West areas to align with existing natural market boundaries.

#### Discussion

62. Tier 2 service areas provide licensees with wide regional coverage. ISED maintains the view that larger geographic service areas enable the deployment of large-scale networks that can be more cost-efficient due to economies of scale, which is critical to the deployment of spectrum given that wireless mobile networks are capital-intensive.

63. Low frequency bands, such as the 600 MHz band, propagate long distances, and users may roam over wide areas. As a result, mobile service areas are generally large in order to provide continuous coverage. In this band, radio waves will carry the radio signals to



significantly longer distances compared to higher frequencies such as the AWS-3 and 2500 MHz bands. Licensing based on larger geographic areas, especially for low-band spectrum, results in less coordination being required between adjacent licensees and allows more effective use of radio spectrum.

64. ISED recognizes that smaller providers generally prefer smaller or customized tier areas that would potentially allow them to either concentrate on the geographic markets of most interest or to aggregate smaller service areas into larger regions that correspond to their business needs.

65. ISED will not be using small tier sizes for licensing the 600 MHz band as a tool for facilitating entry by smaller service providers. Other measures, namely the spectrum set-aside and the deployment conditions, combined with a licensee's ability to make use of subordinate licensing arrangements, are intended to support smaller service providers in their efforts to access spectrum.

66. Concerns were also raised from some stakeholders that large tier areas could result in deployment to urban centres first and rural areas second or not at all. To address this risk, ISED has proposed graduated deployment requirements over the term of the licence, as detailed in section 9.3 of this Framework. These proposed requirements, combined with ISED's transferability and divisibility rules, will strongly encourage licensees to make use of all of their spectrum holdings in all areas, 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 by others for the benefit of Canadians.

### Decision

**D2—Tier 2 service areas will apply for all 600 MHz licences offered in this licensing process, except in Yukon, the Northwest Territories and Nunavut, where Tier 4 service areas will apply.**

## 6 Treatment of existing spectrum users

### 6.1 Over-the-air television (OTA TV) broadcasting

67. OTA TV undertakings in the 600 MHz band are permitted to continue using their current channels and modes of operation (i.e. analog or digital) until the spectrum is needed for the deployment of mobile broadband services, as indicated in SLPB-004-15, [\*Decision on Repurposing the 600 MHz Band\*](#). ISED will issue a displacement notification to these TV



undertakings only if it is determined that the continued operation of these undertakings will prevent the deployment of new mobile services in the 600 MHz band.

68. For these TV undertakings, the following minimum notification periods apply:

- regular power TV undertakings located in urban areas are afforded a minimum of a one-year notification period; and
- regular power TV undertakings located in all other areas are afforded a minimum of a two-year notification period.

69. As mentioned in section 7.4 of Broadcasting Procedures and Rules, BPR-11, *Broadcasting Television Application Procedures During the 600 MHz Transition*, the displacement notification for TV undertakings operating in the 600 MHz band will not displace TV undertakings prior to their scheduled phase completion date. However, new 600 MHz licensees and the incumbent may come to a mutually beneficial agreement in which the notification period may be less than one or two year(s), as applicable, subject to ISED's approval and international obligations with respect to the digital television (DTV) transition schedule. Additional details regarding the DTV transition can be found in the *DTV Transition Schedule* and BPR-11.

## **6.2 Remote rural broadband systems (RRBS)**

70. RRBS operating in the 600 MHz band are afforded a minimum displacement notification period of two years.

## **6.3 Wireless microphones and white space**

71. In November 2017, ISED released SMSE-018-17, *Consultation on the Technical and Policy Framework for White Space Devices* and SMSE-019-17, *Consultation on the Technical, Policy and Licensing Framework for Wireless Microphones*. The decisions resulting from these processes will address issues related to wireless microphones and white space devices in the 600 MHz band.

## **7 Auction format and rules**

72. ISED's objective is to select an auction design that leads to an efficient assignment of spectrum. In selecting the auction format and related rules, consideration is given to the characteristics of the spectrum being auctioned as well as the similarities and complementarities that may exist among blocks.

73. Advances in auction theory and design have led to the development of modifications to combinatorial clock auction (CCA) rules intended to further refine and improve the performance of this format. In the Consultation, ISED proposed three variations of the CCA format for the 600 MHz auction.

### **7.1 Auction attributes**

74. The three proposed variations share some commonalities. These include package bidding, which is an inherent attribute of all CCA formats, generic licences and anonymous bidding. In the Consultation, ISED made specific proposals with regards to the use of generic licences and anonymous bidding as attributes to all three variations.

#### **7.1.1 Generic licences/blocks**

75. In the Consultation, ISED proposed that all seven blocks of paired (5+5 MHz) spectrum be considered as generic. Generic licences are blocks of spectrum that are sufficiently similar and comparable in value that they can be offered in a single category in each service area. If generic licences are offered, the auction starts with the allocation stage, which determines the number of generic licences that a bidder will win in each service area. Bidders will be able to express their preferences for specific blocks during the assignment stage of the auction, which follows the allocation stage. The structure of the auction with generic licences is further explained in annex C. As per the decisions outlined in section 4, 30 MHz of spectrum will be set aside for eligible bidders in each licence area, and the remaining 40 MHz of spectrum will be open to all bidders.

76. As part of the discussion on the auction attributes, ISED sought comments on its proposals that all blocks won by set-aside-eligible bidders be considered set-aside blocks, and be subject to the limit on transferability as set out in section 4.3. In other words, where one or more set-aside-eligible bidder(s) collectively win(s) more than 30 MHz in a given service area, ISED asked if all of these blocks should be considered set-aside blocks, and subjected to the same limits on transferability.

#### **Summary of comments**

77. BCBA, CCI, Ecotel, Ice Wireless, MRC de Témiscouata, Québecor, Rogers, SaskTel, Shaw, Sogetel, SSi Micro, Tbaytel, TELUS and Xplornet all agreed with both proposals.

78. Eastlink opposed the structure of generic blocks, stating that having seven generic blocks in each area with two products is complicated. Eastlink proposed to have four generic blocks for the open market and three generic blocks for the set-aside spectrum. Eastlink also proposed that this change be accompanied by a bidding rule that would permit a set-aside-eligible bidder in a given service area to bid on open blocks only when either the price of the open blocks is less



than the price of the set-aside blocks, or when they are bidding for more than the three available set-aside blocks.

79. In its reply comments, Rogers also proposed a two-product structure for the generic blocks and a bidding rule which would only allow set-aside-eligible bidders to bid on open blocks if they are bidding for more than the supply of set-aside blocks.

### Discussion

80. The use of generic blocks enhances the possibilities for substitution and simplifies the bidding process, as it enables bidders to indicate the quantities of blocks wanted instead of identifying specific blocks. This effectively reduces the number of products available to bid on, and the number of possible combinations that bidders have to consider.

81. In determining whether blocks should be generic, ISED considered the frequency location within the band, the block sizes, as well as the potential technology and interference constraints. It is anticipated that the user equipment ecosystem will be the same for all blocks in the 600 MHz band. In addition, the technical and coordination issues are similar for all blocks. Therefore, all seven 5+5 MHz blocks in any given service area are expected to be similar in value and can be considered as generic blocks. Bidders will be able to express their preferences for specific blocks during the assignment stage of the auction, further explained in annex C.

82. In response to the concerns raised by Eastlink and Rogers, ISED is of the view that the proposed rules address these concerns. Given the set-aside, it will be necessary to divide seven generic blocks in each service area into two products: the set-aside product and the open product. ISED notes that the set-aside will effectively protect set-aside-eligible bidders from competition by national incumbents for 30 MHz of spectrum. However, allowing set-aside-eligible bidders to bid for more than 30 MHz of spectrum will provide them with an opportunity to further increase their low-band spectrum holdings. Therefore, a bidder that is set-aside-eligible in a service area will be allowed to bid for and win up to seven blocks in that area. A bidder that is set-aside-ineligible in a service area will be allowed to bid for and win up to four blocks in that area.

83. In order to discourage speculation from entities that do not intend to use the spectrum to deploy services, in the case where one or more set-aside-eligible bidders collectively win more than 30 MHz in a given service area, ISED is of the view that the same conditions should be applied to these licences. Therefore, all blocks won by set-aside-eligible bidders will be considered as set-aside blocks and will be subject to the rules set out in section 4.3.

### Decision

**D3—In the allocation stage, ISED will auction all seven paired blocks of 5+5 MHz as generic licences in all 16 service areas. There will be two products: the set-aside product and the open product, resulting in a total of 32 products being offered in the auction.**

**In the service area where a bidder is considered to be eligible to bid on the set-aside, the set-aside-eligible bidder's bid for a set-aside product could be for 0, 1, 2, 3, 4, 5, 6 or 7 licences, while a set-aside-ineligible bidder's bid for an open product could be for 0, 1, 2, 3 or 4 licences.**

**In the case where one or more set-aside-eligible bidder(s) win(s) more than 30 MHz in a given service area, all of these blocks will be considered set-aside blocks, and effectively be subject to the same conditions of licence set out in section 9.2.**

### **7.1.2 Anonymous bidding and information disclosure**

84. In the Consultation, ISED sought comments on the proposal to use anonymous bidding during the auction. ISED also sought comments on the information that will be disclosed to bidders during the clock rounds, at the end of the allocation stage and at the end of the assignment stage.

#### **Summary of comments**

85. Bell, CCI, Ice Wireless, MRC de Témiscouata, Quebecor, Rogers, SaskTel, Shaw, Sogetel, SSI Micro, Tbaytel and Xplornet agreed with ISED's proposals for anonymous bidding. Eastlink opposed the use of anonymous bidding, stating that it disadvantages smaller regional service providers.

86. Bell, CCI, MRC de Témiscouata, Quebecor, SaskTel, Sogetel, SSI Micro, Tbaytel and Xplornet supported ISED's proposals on information disclosure. Rogers disagreed with the proposed information withholding policy in the last clock round, stating that it supports the motivation for such a rule, but that the rule would not effectively address concerns about gaming, as some bidders may already have the information they need to engage in price setting strategies, while others do not.

#### **Discussion**

87. The proposal by Eastlink not to use anonymous bidding could result in bidders focusing on the bidding behaviour of others, rather than on their own valuations, in relation to the price and demand information. This would increase the potential for gaming and anti-competitive behaviour, complicating the bidding process for bidders and possibly leading to a less efficient outcome. ISED maintains the view that the level of information disclosure proposed in the Consultation would provide bidders with enough information to make decisions regarding their bidding strategies, while reducing the potential for gaming. ISED also notes that in recent years, auctions around the world have utilised anonymous bidding, regardless of the format used.

#### **Decision**

**D4—ISED will use anonymous bidding for all stages of the auction. Following every clock round, each bidder will be provided with its own bid information from the previous round and its eligibility for the next round. In addition, all bidders will be informed of the aggregate demand for each service area from the previous round and the price of the product on which they are eligible to bid for the next round. Information concerning the aggregate demand from the final clock round will be withheld.**

**At the end of the allocation stage, after the results have been verified by a third party, each bidder will be informed of its own winning package, along with the base price for that package.**

**Following the end of each assignment round, after the results have been verified by a third party, participating bidders will be notified of the specific licences that they have won and the assignment price.**

**At the end of the auction, winning bidders will be notified of the specific licences that they have won and the final prices to be paid, i.e. the sum of the base price and assignment price(s).**

## 7.2 Auction format options

88. ISED sought comments on the advantages and disadvantages of the three variations of the combinatorial clock auction (CCA) format for the 600 MHz auction as outlined below:

- CCA, using the Weak Axiom of Revealed Preference (WARP) based activity rule;
- CCA, using the Generalized Axiom of Revealed Preference (GARP) based activity rule; and
- Enhanced CCA (ECCA).

### Summary of comments

89. BCBA suggested that in order to encourage investment and competition in Canada's rural areas, ISED should implement the simplest bidding process possible for set-aside spectrum, and proposed that set-aside blocks be auctioned using Tier-4 service areas and a Simultaneous Multiple Round Ascending (SMRA) format, rather than the CCA auction format.

90. Bell recommended using a CCA with a WARP-based activity rule, arguing that a GARP-based activity rule would preclude price discovery. It opposed the ECCA format, arguing that there is no peer-reviewed literature, either theoretical or experimental, concerning the ECCA, and that this format has never been put in practice.

91. Cogeco initially supported the ECCA on the grounds that it would provide discount information in the clock rounds, certainty on maximum and protection bids, and a limit on supplementary bids to reduce the impact of strategic bidding. In its reply comments, however, it recommended the use of a CCA with a WARP-based activity rule, but with the added ECCA feature of providing the expected price discount to bidders after each round.

92. Eastlink argued that the CCA format generally discriminates against smaller regional service providers as the package bidding and winner determination features inherently favour larger national service providers. It stated that the ECCA format and the GARP-based activity rules may appear to provide additional protections to help smaller providers to secure their final clock package; however, it expressed concerns that the new formats would not deliver the intended protections and could instead worsen the information asymmetry between regional and national bidders. Eastlink proposed the use of a SMRA format. In addition, Eastlink suggested that, if a CCA format is used, the WARP-based activity rule is the best option.

93. ECOTEL claimed that the proposed auction formats are too complex and put small players at a disadvantage. It suggested that ISED should propose other formats, especially in the context of licensing Tier-4 areas for rural and remote areas. These views were shared by MRC de Témiscouata.

94. Québecor supported the use of the ECCA format as it would reduce second price uncertainty by providing bidders with information on their potential payment, by tightening the revealed preference rules, and through the increased reliance on clock rounds for final pricing. It also highlighted that with the use of an ECCA, the supplementary round would be primarily used to reduce the number of unsold licences.

95. Rogers indicated a preference for either a clock auction or a hybrid SMRA. It argued that a CCA format's limited advantage of allowing combinatorial bids is outweighed by its complexity, its vulnerability to gaming and its propensity to produce asymmetrical results. It suggested that the CCA format is falling out of favour internationally due to efficiency concerns and increasing spectrum costs. Rogers strongly opposed the use of an ECCA, and indicated that a CCA with GARP-based activity rules is preferable to other CCA formats.

96. SaskTel recommended using an SMRA format because it would be far less complex and more transparent. SaskTel opposed the use of the ECCA format as the final price determination could result in prices that do not reflect opportunity costs and hence are contrary to the second price rule. SaskTel indicated a preference for a CCA with GARP-based activity rules over a CCA with WARP-based activity rules.

97. Tbaytel supported the use of the ECCA format, as it is of the view that it would result in the most efficient and straightforward auction.

98. TELUS supported the use of a CCA with WARP-based activity rules noting that this format was tested and proven in two past Canadian auctions. TELUS opposed the use of a CCA with GARP-based activity rules, suggesting that bidders are not familiar with the format and the development of bidder tools would be more complex. TELUS strongly opposed the ECCA format arguing that the ECCA pricing mechanism resembles a first price auction rather than a second price auction.

99. Xplornet indicated that on balance the ECCA format is considered the best option since it reduces the bidder's uncertainty about price.

100. Corridor Communications, Ice Wireless and SSi Micro did not comment or express a preference for any of the options presented in the Consultation.

### **Discussion**

101. In a typical CCA design, bidders submit all-or-nothing, mutually exclusive package bids on the combinations of licences that they are interested in winning. Package bidding reduces complexity for bidders by allowing them to bid on packages of licences that they want on an all-or-nothing basis, rather than trying to put together a package comprised of individual licences. All three variations of the CCA format which were proposed for the 600 MHz auction eliminate the risk that bidders would win some but not all of the licences needed for their business case, known as exposure risk.

102. The CCA format makes it easier for bidders to move to substitute licences in response to price changes, given that—unlike the SMRA auction format—it does not require the identification of a “standing high bidder” who would be held responsible for individual licences at the end of each round. Furthermore, the CCA format reduces opportunities for anti-competitive behaviour during the auction through the use of the second price rule, which encourages truthful bidding.

103. Concerns that smaller service providers will be disadvantaged by the combinatorial auction design: ISED is of the view that the spectrum set-aside and the eligibility requirements for set-aside bidders will improve the ability of smaller service providers to obtain some 600 MHz spectrum. These rules will provide opportunities to both regional and national carriers in each service area.

104. Concerns regarding format complexity: The concerns about the format's complexity will be addressed through bidder training, including early access to a winner and price determination tool and mock auctions. This will provide qualified bidders with the opportunity to familiarize themselves with the auction format and software. Annexes D, E, and F provide further details with regard to the auction activity rules and the process for winner and price determination.



105. Comments supporting the use of an SMRA auction format: The SMRA auction format is familiar to stakeholders, as it has been used in the past in Canada. However, in an SMRA auction, a bidder seeking multiple licences could be subject to exposure risk. This could lead to complicated bidding strategies, particularly for a bidder wanting to acquire a large package of licences, and could potentially result in a less efficient outcome.

106. Comments on the ECCA format: The ECCA format in theory has a number of desirable attributes. It may provide bidders with greater certainty about their final prices as bidding progresses. In addition, the ECCA may be able to reduce the uncertainty that a bidder faces about its chances of winning following the supplementary round. However, ISED recognizes the concerns raised by some stakeholders that the ECCA format has not been tried in practice, and considers that, at this time, it is not the optimal choice for the 600 MHz auction.

107. Activity rules, WARP vs. GARP: The use of anonymous bidding and the hybrid revealed preference/eligibility point activity rule in the CCA format encourages truthful bidding throughout the auction and provides bidders with useful information about the values of the offered licences. The hybrid revealed preference/eligibility point activity rule allows the bidder to switch its bid to a package that exceeds its eligibility in a given round (but within its initial eligibility) when that package has become relatively less expensive compared to bids submitted in earlier rounds. In the 700 MHz and 2500 MHz auctions, this activity rule was based on a principle known as the Weak Axiom of Revealed Preference (WARP). This rule checks whether a bid that exceeds a bidder's current eligibility satisfies revealed preference with respect to bids in eligibility-reducing rounds starting with the last round in which the bidder had sufficient eligibility to bid on that package.

108. Recent advancements in auction theory have developed a method to strengthen the WARP activity rule based on a principle known as the Generalized Axiom of Revealed Preference (GARP). The GARP-based activity rule performs a stricter test when checking whether to allow a bid on a package that exceeds the bidder's eligibility. In the clock rounds, the activity rule is stricter in two aspects. First, the GARP-based activity rule performs a test against bids in all clock rounds starting with the last round in which the bidder had sufficient eligibility to bid on the given package. Second, instead of performing revealed preference checks one by one, the GARP-based activity rule performs a simultaneous check of all relevant revealed preference constraints. The rule is also stricter in the supplementary round, as the maximum bid amount for a given package using the GARP-based activity rule can only be less than or equal to the maximum using the WARP-based activity rule.

109. The GARP-based activity rule maintains the desirable properties of the WARP-based activity rule. First, it provides flexibility so that a bidder can bid truthfully based on a valuation function that specifies a value for each package. Second, it allows a bidder to bid based solely on eligibility points. However, because the GARP-based activity rule is stricter, it may prevent a

bidder from submitting some bids that, with the use of the WARP-based activity rules, would allow bidders to strategically time their eligibility reductions to relax the eligibility requirement. Redefining the hybrid revealed preference/eligibility point rule based on GARP will improve incentives for bidders to bid truthfully, while supporting ISED's objectives for a fair and efficient allocation of spectrum.

### Decision

**D5—In consideration of the above, ISED will use the CCA format with GARP-based activity rules for the 600 MHz auction. Further details are provided in annexes C, D, and E.**

### 7.3 Structure of the assignment stage

110. In the Consultation, ISED sought comments on the proposal to conduct the assignment stage in sequential rounds, service area by service area, in descending order of population. In addition, ISED proposed that two or more service areas be assigned in a single assignment round in the case where the service areas form a contiguous geographic area, and the winners and the number of licences they have won are the same in the service areas being considered.

111. Furthermore, recognizing that using contiguous spectrum is generally more efficient, ISED proposed that winners of multiple blocks in a service area receive contiguous licences.

### Summary of Comments

112. BCBA, Bell, Cogeco, Ice Wireless, MRC de Témiscouata, Québecor, Shaw, Rogers and SaskTel supported ISED's proposal concerning the assignment stage.

113. CCI and Eastlink both supported the general structure of the assignment stage, but opposed conducting the assignment rounds in descending order of population of the service areas being assigned. CCI expressed concern that a potential for gaming may arise from a bidder knowing its assignment in the most populous areas first, suggesting that this could guide that bidder's actions in subsequent assignment rounds. Eastlink cited its concern that this order indicates an inherent bias toward the largest cities and indicated that there is no clear reason why cities should be favoured over rural areas.

114. TELUS opposed the proposed structure of the assignment stage, stating that it does not provide an opportunity for a winning bidder to indicate its preferences for the position of its blocks relative to other winning bidders.

115. Rogers, while supportive of the proposed structure of the assignment stage, shared a concern similar to TELUS' that ISED's proposal ignores the value that bidders may have for being next to actual or potential partners. It proposed changes that would allow actual or potential network partners to obtain contiguous spectrum. To achieve this, Rogers proposed to place established national operators at opposite ends of the band. Subsequently, all other bidders would be able to bid for the remaining licences. Shaw supported this proposal.

116. Other proposals submitted by Rogers, Bell and TELUS relied on the full disclosure to bidders of the results of the allocation stage and allowing them to form a consortium or submit joint bids for options that ensure that they would receive spectrum contiguous to holdings of their network partner.

### Discussion

117. ISED is of the view that the proposed order of assignment rounds will promote an efficient assignment of contiguous blocks of spectrum across service areas. It is important for winners of licences in the most populated areas to know what specific blocks they are assigned in these areas in order to be able to assemble contiguous spectrum across their geographical footprint in the subsequent assignment rounds. As such, the assignment rounds will be run service area by service area in descending order of population, possibly conducting a separate round for each service area. This process will enable bidders to know which specific frequencies they have won in the most populated service areas prior to their participation in the assignment rounds for the other less populated service areas.

118. While ISED recognizes the potential value for bidders from obtaining spectrum close to their network partners, the options proposed by respondents would have an adverse impact on the integrity of the auction. Placing national providers in the opposite ends of the band would reduce the ability of bidders to freely choose and bid on their preferred blocks in the assignment stage.

119. Both the set-aside-eligible and the set-aside-ineligible bidders will have an opportunity to express their preferences for specific blocks at the same time, and there will be no specific blocks reserved for set-aside-eligible or set-aside-ineligible bidders. Winners of multiple blocks in a service area will receive contiguous licences. The structure of the assignment stage is further explained in detail in annex C.

### Decision

**D6—The assignment stage will consist of assigning the specific blocks in sequential rounds, service area by service area, in descending order of population. Two or more service areas will be assigned in a single assignment round when the service areas form a contiguous geographic area, and when the winners and the number of licences they have won are the same in the service areas being considered. The assignment stage will not distinguish**

between set-aside licences and open licences, treating them the same.

#### 7.4 Increasing prices in the clock rounds

120. In the Consultation, ISED proposed that the bid increments for the 600 MHz auction be in the range of 1-20% of prices in the previous clock round (rounded to the nearest thousand dollars).

121. ISED also consulted on the proposed methodology for incrementing prices during the clock rounds that is dependent on the aggregate demand and the price for each product in that service area. The proposed methodology included rules that take into account the potential differences in the demand for the set-aside and open products, with pricing rules that ensure that the price of the set-aside product would never exceed the price of the open product.

#### Summary of comments

122. CCI, SaskTel, Shaw, SSi Micro and Xplornet supported the proposed methodology, while Québecor stated that it had no objection.

123. Bell, Eastlink, Rogers and TELUS did not support the proposed methodology and recommended modifications to how the prices are incremented during the clock rounds.

124. Bell suggested that prices should only increase when there is excess demand for a specific product, and that the rule ensuring that the prices of set-aside blocks do not exceed the prices of open blocks unnecessarily intervenes with market forces. It suggested that this might result in artificially high prices for the open blocks, a position shared by Rogers and TELUS.

125. Eastlink was of the view that the approach to incrementing clock prices is unnecessarily complicated and could result in the price of set-aside licences being artificially inflated. In line with its proposal on the set-aside and open products, Eastlink proposed that prices increase on each product when there is excess demand for that product. Rogers also recommended a similar restructuring of the generic licences, which was supported by Bell.

126. TELUS expressed concern that the proposed methodology for incrementing prices fails to address the potential for set-aside-eligible bidders to drive up the spectrum costs for non-eligible set-aside bidders.

#### Discussion

127. Bid increments are established so that the auction progresses in a timely manner. ISED maintains that increments in the range of 1-20% of prices from the previous clock round (rounded upward to the nearest thousand dollars) provide flexibility to take into account the

actual demand for different products. As such, during the auction, ISED reserves the right to apply round-to-round price increases within this range to facilitate the progress of an efficient and timely auction.

128. ISED considers that the methodology for incrementing prices during the clock rounds, as described in annex C, in combination with an adopted structure of set-aside and open products strikes the right balance between the concerns expressed by set-aside-eligible and set-aside-ineligible bidders. It ensures that the price of the set-aside product never exceeds the price of the open product while limiting the ability of set-aside-eligible bidders to raise the price of open product without affecting the price of the set-aside product.

### Decision

**D7—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 C. Price increases will be in the range of 1-20% of prices in the previous clock round, rounded upward to the nearest thousand dollars. 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.**

## 7.5 Opening bids

129. ISED sought comments on the proposed opening bids, which are the prices for the spectrum licences at the start of the auction, and the minimum that will be accepted for each licence.

130. Due to their similar propagation characteristics, the proposed 600 MHz auction opening bid prices were based on the results of the lowest final price paid in each service area in the 700 MHz auction.

### Summary of comments

131. Rogers, SSi Micro and Xplornet supported the proposed opening bids. Ecotel, Cogeco, MRC de Témiscouata and Sogetel were also supportive but preferred that the licences be auctioned at the Tier 4 level with opening bid prices adjusted accordingly.

132. Ice Wireless and TELUS suggested lowering the opening bid prices to support price discovery.

133. CCI argued that opening bid prices for set-aside spectrum across all Tier 2 areas should be the same as in the Northern Territories at \$0.133/MHz/population (pop).



134. Tbaytel stated that the proposed opening bid price was too high in Northern Ontario (Tier 2-09). CanWISP argued that the opening bid prices were too high for all rural areas.

135. Québecor proposed that ISED assess the four most recent spectrum auctions conducted in Canada, i.e. AWS-1 (2008), 700 MHz (2014), AWS-3 (2015) and 2500 MHz (2015), and base the opening bids on the average of those results.

### **Discussion**

136. ISED maintains the view that the proposed 600 MHz opening bids reflect a conservative estimate of the market value of the spectrum, i.e. high enough so that Canadians receive a fair return for the use of the spectrum, but at a level that does not discourage participation in the auction.

137. Opening bid prices are generally established taking into consideration the market value for similar spectrum bands, propagation characteristics of the spectrum bands, the availability of an equipment ecosystem, as well as pro-competitive policy considerations. Amongst the spectrum bands recently auctioned, ISED concludes that the 600 MHz and 700 MHz bands are most comparable in terms of value.

138. The average proposed opening bid price for the 600 MHz auction is \$0.625/MHz/pop which is lower than the average final price in the 700 MHz auction. In the 700 MHz auction, the average final price paid for the spectrum was \$2.32/MHz/pop, almost six times higher than the average 700 MHz auction opening bid price of \$0.39/MHz/pop. Consequently, ISED is of the view that the proposed opening bid prices will not deter participation in the auction and will provide an opportunity for price discovery in the auction.

139. As a result, ISED maintains that opening bid prices based on the outcome of the 700 MHz auction are most likely to ensure that Canadians receive a fair return for the use of the spectrum.

**Decision**

**D8—The opening bids for the 600 MHz auction are listed in Table 1. The total amount of the opening bids for all spectrum blocks is \$1,536,759,000.**

**Table 1 – Opening bids (in descending order of population)**

Service area #	Service area name	Population	Opening bid prices	
			\$/MHz/ population	Opening bid (\$) per 10 MHz block
2-008	Southern Ontario	10,609,746	0.804	85,302,000
2-005	Southern Quebec	5,895,985	0.804	47,404,000
2-013	British Columbia	4,647,973	0.539	25,053,000
2-012	Alberta	4,070,844	0.539	21,942,000
2-006	Eastern Ontario and Outaouais	2,435,880	0.539	13,129,000
2-004	Eastern Quebec	1,699,378	0.360	6,118,000
2-010	Manitoba	1,278,016	0.360	4,601,000
2-011	Saskatchewan	1,094,705	0.360	3,941,000
2-002	Nova Scotia and Prince Edward Island	1,066,470	0.360	3,839,000
2-009	Northern Ontario	778,449	0.360	2,802,000
2-003	New Brunswick	745,596	0.360	2,684,000
2-001	Newfoundland and Labrador	520,176	0.360	1,873,000
2-007	Northern Quebec	193,926	0.360	698,000
4-172	Northwest Territories	41,668	0.133	55,000
4-171	Nunavut	35,975	0.133	48,000



4-170	Yukon	35,928	0.133	48,000
<b>Total per 10 MHz block</b>		<b>35,150,715</b>	<b>0.625</b>	<b>219,537,000</b>
<b>Total for all blocks</b>				<b>1,536,759,000</b>

## 7.6 Eligibility points for the 600 MHz spectrum auction

140. In the Consultation, ISED proposed that eligibility points be associated with opening bids for the 600 MHz licences being offered. It was proposed that one eligibility point be assigned for each \$48,000 of opening bid prices, rounded to the nearest ten points in all service areas with the exception of the three territories. For the territories it was proposed that each service area be assigned one eligibility point.

141. Based on the proposal, the equivalent of a national licence, comprised of one 10 MHz block of spectrum in the 16 service areas covering the country would be associated with 4,583 eligibility points.

### Summary of comments

142. SSi Micro, Rogers, Eastlink, Québecor and Xplornet supported the eligibility points proposed by ISED.

143. TELUS, Cogeco, CCI and Sogetel supported the methodology but suggested that eligibility points be adjusted to reflect their comments on opening bid prices.

### Discussion

144. Stakeholders were generally supportive or had no comments regarding the proposed eligibility points. Considering the relative value of the spectrum in the determination of the eligibility points enhances price discovery and supports substitution between licences that are similar in value during the auction process. The proposed eligibility points reflect this approach and take into consideration the population per service area, bandwidth per block and the relative value of the spectrum, as expressed in the opening bids.



**Decision**

**D9—The eligibility points for the 600 MHz auction are listed in Table 2. The total eligibility points for a national licence comprised of one 10 MHz block of spectrum in the 16 service areas would be associated with 4,583 eligibility points.**

**Table 2 – Opening bid prices and eligibility points**

Service area #	Service area name	Population	Opening bid prices		Eligibility points
			S/MHz/pop	Opening bid (\$) per 10 MHz block	
2-001	Newfoundland and Labrador	520,176	0.360	1,873,000	40
2-002	Nova Scotia and Prince Edward Island	1,066,470	0.360	3,839,000	80
2-003	New Brunswick	745,596	0.360	2,684,000	60
2-004	Eastern Quebec	1,699,378	0.360	6,118,000	130
2-005	Southern Quebec	5,895,985	0.804	47,404,000	990
2-006	Eastern Ontario and Outaouais	2,435,880	0.539	13,129,000	270
2-007	Northern Quebec	193,926	0.360	698,000	10
2-008	Southern Ontario	10,609,746	0.804	85,302,000	1,780
2-009	Northern Ontario	778,449	0.360	2,802,000	60
2-010	Manitoba	1,278,016	0.360	4,601,000	100
2-011	Saskatchewan	1,094,705	0.360	3,941,000	80
2-012	Alberta	4,070,844	0.539	21,942,000	460
2-013	British Columbia	4,647,973	0.539	25,053,000	520
4-170	Yukon	35,928	0.133	48,000	1
4-171	Nunavut	35,975	0.133	48,000	1
4-172	Northwest Territories	41,668	0.133	55,000	1
<b>Total per 10 MHz block</b>		<b>35,150,715</b>	<b>0.625</b>	<b>219,537,000</b>	<b>4,583</b>
<b>Total for all blocks</b>				<b>1,536,759,000</b>	<b>32,081</b>

## **8 Bidder participation—Affiliated and associated entities**

145. In order to maintain auction integrity and ensure that each bidder is an independent bidder, ISED proposed rules relating to the definition and participation of affiliated and associated entities. As with past auctions, it was proposed that affiliated entities not be allowed to participate separately in the auction. It was 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. Applicants will be required to publicly disclose information about their beneficial ownership, affiliations and associations.

146. ISED sought comments on its proposed rules and definitions regarding affiliated and associated entities and their participation.

### **Summary of comments**

147. BCBA, Bell, CCI, Ecotel, MRC de Témiscouata, Québecor, SaskTel, Sogetel, SSi Micro, Tbaytel, TELUS and Xplornet agreed with the proposed rules regarding affiliated and associated entities.

148. Ice Wireless noted its opposition to any rule that allows affiliated or associated entities to make separate bids claiming this could result in spectrum aggregation in excess of what is permitted by the licensing framework.

149. Cogeco and Eastlink submitted that Bell and TELUS should be required to bid as a single associated entity under the auction rules. Cogeco also suggested that Rogers and Videotron (in Quebec) be considered associated entities and only allowed to bid as one bidder. Cogeco proposed that entities that have network sharing agreements should not be permitted to bid separately as, in its view, these entities could seek to combine the use of their separate spectrum holdings through their agreements. Rogers supported the view that Bell and TELUS should be required to bid as a single bidder, however refuted that Rogers and Videotron are associated. Bell and TELUS disagreed with Cogeco, Eastlink and Rogers' suggestion.

150. Rogers suggested that ISED integrate its policies and auction rules regarding collusion as well as affiliated and associated entities within a single framework to ensure that unintended consequences do not benefit one or more bidders. Rogers added that the associated entity rules should be amended to recognize existing relationships between the national carriers, rather than specific agreements to share the 600 MHz spectrum.

### **Discussion**



151. ISED is of the view that associated entities should be able to bid separately without negatively affecting the auction, given that public disclosure requirements and rules prohibiting collusion are in place to protect the integrity of the auction.

152. Spectrum sharing arrangements support network and spectrum efficiencies, and can result in better network speeds and coverage for Canadians, as long as the service providers that are party to the arrangement are actively and independently competing in the wireless market. Such arrangements can also help to address the scarcity of spectrum, the high demand for capacity by customers and the high cost of network deployment, particularly in rural areas.

153. 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 [Framework Relating to Transfers, Divisions and Subordinate Licensing of Spectrum Licences for Commercial Mobile Spectrum](#) (Transfer Framework).

154. In response to the suggestion regarding the integration of the policies and auction rules pertaining to collusion and affiliated and associated entities, 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.

155. Given the above and that the proposed definitions are consistent with recent auction processes, the definitions will be as proposed in the Consultation.

### Decision

**D10—ISED is adopting the rules and definitions of affiliated and associated entities outlined in sections 8.1 and 8.2 below.**

### 8.1 Affiliated entities

156. **Definition of affiliated entities:** An entity will be deemed to be affiliated with a bidder if in ISED's judgement 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.

157. **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.

158. 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.

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

160. Should the 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, based on the above, that the entities in question are affiliated.

161. **Eligibility to participate in the auction:** Only one member of an affiliate relationship will be permitted to become a qualified bidder in the auction. 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.

## 8.2 Associated entities

162. **Definition of associated entities:** 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.

163. Depending on the nature of the association, it may not preclude the ability of the entities to participate separately in the auction.

164. **Eligibility to participate separately in the auction:** Associated entities could be permitted to apply to ISED to participate in the auction separately if, following a review of their application and narrative description of the association, ISED is satisfied that their participation would not have an adverse impact on auction integrity. The submitted narrative (as set out in section 8.4 below) would be assessed to determine whether permitting both entities to participate



separately would negatively impact the integrity of the auction process. The auction integrity would be best assured by the transparent disclosure of the relationships between bidders participating in the auction. ISED may request additional documents. Any information considered by the applicant to be confidential should be properly marked as such. If ISED deems it necessary to disclose any information marked as confidential, the applicant would be consulted prior to the information's release.

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

166. Associated entities intending to participate in the auction separately would be required to submit their application at least 10 days in advance of the final application deadline to participate in the auction. This would provide ISED with the additional time required to make an assessment of the association and provide a decision on the associated entities' ability to participate in the auction separately, if so requested. Should the request be denied, the associated entities would be required to select which entity will apply to participate in the auction.

167. Applicants should note that all entities participating in the auction will be subject to the same prohibition of collusion rules, as stated in section 8.3.1.

### **8.3 Prohibition of collusion and other communication rules**

168. In the Consultation, ISED sought comments on the proposed rules prohibiting collusion and other communication rules. The proposed rules were consistent with previous auctions for the 700 MHz, 2500 MHz and AWS-3 bands, as well as the residual 700 MHz and AWS-3 auctions.

#### **Summary of comments**

169. BCBA, Bell, Eastlink, Ecotel, Ice Wireless, MRC de Témiscouata, Québecor, Railway Association of Canada, SaskTel, Shaw, Sogetel, SSi Micro, Tbaytel, TELUS and Xplornet supported the proposed rules prohibiting collusion and other communication. CCI Wireless also supported the proposal, however requested that the specific period in which communication is prohibited be clearly defined.

#### **Discussion**

170. 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 the auction

rounds and stages. Any such discussions occurring at any time prior to the public announcement of provisional licence winners by ISED were prohibited. In addition, if any prospective applicants or their representatives contravened any of these rules, they would not qualify to participate in the auction.

171. 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

**D11—ISED is adopting the rules regarding prohibiting collusion and other communication rules as set out below in paragraphs 171 to 185.**

### 8.3.1 Prohibition of collusion

172. In order to maintain the integrity of the auction, bidders are prohibited from signalling, either publicly or privately, their bidding intentions or planned post-auction market structure related to the spectrum licences being auctioned. This would include comments or any communication with or via the media. An example would be making a public announcement regarding which licences the company intends to bid on or its rollout intentions.

173. **Prohibition of collusion:** All applicants, including affiliated and associated entities, are prohibited from cooperating, collaborating, discussing or negotiating agreements with competitors in relation to the licences being auctioned or to the post-auction market structure, including, for example, frequency selection, bidding strategy and post-auction market strategy, until after ISED's public announcement of the provisional licence winners.

174. 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 declaration, "competitor" means any entity, other than the applicant or its affiliates, that could potentially be a bidder in this auction based on its qualifications, abilities or experience.

175. 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 independently of, and in addition to, the policies contained in this Framework.

### 8.3.2 Communication during the auction process

176. In order to preserve the integrity of the auction process, any communication from an applicant, its affiliates, associates or beneficial owners, or their representatives that discloses or comments on bidding strategies, including but not limited to the intent of bidding and post-auction market structures, shall be considered contrary to this Framework and may result in disqualification and/or forfeiture penalties. This will include communication with or via the media.

177. 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. Another example would be making a public announcement regarding which licences the company intends to bid on or its rollout intentions. This prohibition of communication applies until ISED's public announcement of the provisional licence winners.

178. Prior to the auction, an applicant who wishes to participate separately in the licensing process may approach another potential bidder to discuss a joint infrastructure build, a joint equipment purchasing agreement or a potential spectrum sharing agreement under the restrictions outlined in the following two paragraphs (178 and 179).

179. Once a consortium has been established and if the entities within that consortium have had communications that contravene the prohibition of collusion rules, these entities would no longer be eligible to participate separately in the auction. The same entities would therefore no longer be deemed competitors for the purpose of the auction, and discussions regarding issues such as bidding strategies could then take place. Should the consortium be dissolved prior to the auction, only one of the entities would be eligible to participate in the auction, and all parties would continue to be subject to the prohibition of collusion rules. The same restrictions apply to entities that have had unsuccessful discussions regarding the formation of a consortium to bid as a single bidder.

180. Where communications that fall within the definition of associated entities have taken place, the nature of the association must be disclosed. 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.



### 8.3.3 Discussion regarding beneficial ownership

181. 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, from the receipt deadline for applications until ISED's public announcement of the provisional licence winners, would fall into the area of prohibited discussions and would be considered contrary to the auction rules.

182. 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 a new party with a beneficial interest or which significantly alters the beneficial ownership structure is effected at least 10 days before the commencement of bidding; and
- The applicant informs the Minister of ISED 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.

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

### 8.3.4 Other communication rules

184. **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 ISED's public announcement of the provisional licence winners. 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.

185. **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.

186. **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.

#### **8.4 Auction integrity and transparency**

187. In order to ensure auction integrity and transparency, ISED proposed that all entities wishing to participate in the auction process be required, as part of their application, to disclose in writing the names of affiliated and associated entities and to provide a narrative 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 the said entities. It was proposed that this include arrangements with another potential bidder that relate in any way, directly or indirectly, to the future use of the spectrum being auctioned in this process.

#### **Summary of comments**

188. There were no comments regarding the requirements and procedures that ISED proposed to maintain the integrity and transparency of the auction.

#### **Discussion**

189. Given that there were no comments and that these requirements and procedures are consistent with previous auctions, ISED will impose the measures as proposed in the Consultation to maintain the integrity and transparency of the auction.

#### **Decision**

**D12—In order to protect the integrity of the auction, ISED adopts the rules to protect auction integrity and transparency as set out in paragraphs 189 to 191.**

190. **Disclosure requirements:** Associated entities wishing to participate separately in the 600 MHz auction are required to disclose the names of associated entities within their application, and to provide a narrative describing all key elements as well as the nature of the association in relation to the acquisition of the spectrum licences being auctioned and the post-auction relationships of the said entities. The relevant entities may be asked to provide copies of related agreements. Confidential and commercially sensitive information regarding agreements between associated entities will not be disclosed by ISED. However, the narrative will be made available on ISED's website prior to the auction.

191. Some examples of arrangements that would require disclosure include, but are not limited to, agreements to establish a joint network using spectrum licences acquired by each of the entities and agreements with respect to a joint backhaul network. In addition, agreements such as

significant joint equipment purchases must be disclosed. 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.

192. The submitted narrative would 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.

## **9 Conditions of licence for spectrum in the 600 MHz band**

193. ISED sought comments on the conditions of licence that would apply to licences issued through the auction process for spectrum in the 600 MHz band.

### **9.1 Licence term**

194. In its Consultation, ISED proposed to issue spectrum licences in the 600 MHz band with a 20-year licence term.

#### **Summary of comments**

195. Bell, Cogeco, Eastlink, Ecotel, Ice Wireless, MRC de Témiscouata, Québecor, Rogers, SaskTel, Shaw, Sogetel, SSi Micro, Tbaytel, TELUS and Xplornet agreed with the proposal of 20-year licence terms. BCBA, CanWISP and CCI preferred shorter licence terms.

196. Québecor, Rogers and SaskTel commented on the issue of opportunistic access to spectrum that was raised in the Consultation. They expressed the view that the 600 MHz band would not be an appropriate band for this at this time. Bell, BCBA and Rogers supported this view in their reply submissions. BCBA noted that since it has not been tested or deployed previously, there was no guarantee that opportunistic access would address the rural issues.

#### **Discussion**

197. As stated in the FSAC, ISED recognizes that licence terms in excess of 10 years 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.

198. ISED maintains its view that the 600 MHz band has the potential to facilitate the offering of high-capacity mobile broadband services to Canadians. Given that the use of this band is harmonized in North America, there is little risk that there will be any usage changes to this spectrum in the foreseeable future. It is also unlikely that any developments in technology would result in a change to another use that is incompatible with mobile broadband services.



199. As noted in the Consultation, ISED recognizes that the rate of wireless technology development is ever evolving and these developments, such as cognitive radio and dynamic spectrum access, are expected to provide opportunities for increased efficiency for spectrum access. Recognizing that the technologies that would allow new sharing paradigms and opportunistic access to spectrum are nascent, ISED will not implement any specific provisions to allow this kind of use as part of this Framework. As noted in section 6.3, issues related to wireless microphones and white space devices in the 600 MHz band will instead be addressed in the decisions resulting from the SMSE-018-17 and SMSE-019-17 consultation processes. ISED notes that further changes could be forthcoming during the licence term and those changes would be subject to a future consultation. ISED will continue to monitor the development of these technologies with the view of enhancing the efficient use of spectrum.

### Decision

**D13—The condition of licence relating to the licence term is as follows:**

**The term of this licence is 20 years. At the end of this 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 terms and conditions of the new licence, will be determined by the Minister following a public consultation.**

### 9.2 Licence transferability and divisibility

200. In general, spectrum licences may be transferred in whole or in part (either in geographic area or in bandwidth) subject to the approval of the Minister. All commercial mobile spectrum licence transfer requests are subject to review under the Client Procedure Circular CPC-2-1-23, *Licensing Procedure for Spectrum Licences for Terrestrial Services*, and the *Framework Relating to Transfers, Divisions and Subordinate Licensing of Spectrum Licences for Commercial Mobile Spectrum* (Transfer Framework) as provided for in the proposed condition of licence below.

201. In the Consultation, ISED proposed wording for the condition of licence on transferability and divisibility consistent with the wording used in the Transfer Framework and in other commercial mobile licences.

### Summary of comments

202. 6Harmonics, Cogeco, Eastlink, Ecotel, Ice Wireless, MRC de Témiscouata, SaskTel, Shaw, Sogetel, Tbaytel, TELUS and Xplornet agreed with the proposed wording for the condition of licence on transferability and divisibility.
203. BCBA, Bell, Québecor and Rogers generally agreed with the wording, except for the proposed restriction on transfers of set-aside spectrum to non-set-aside-eligible entities.
204. BCBA and CCI suggested that the five-year restriction on transfers of set-aside spectrum to non-set-aside-eligible entities be extended for the duration of the licence term. Québecor suggested extending the restriction to 10 years.
205. Rogers suggested ISED extend the restriction to all entities, including set-aside-eligible ones, in order to limit speculation and ensure spectrum is obtained by operators who will deploy it quickly.
206. Bell opposed the proposed five-year restriction and argued that it is unnecessary, as the Minister of ISED must ultimately approve any spectrum transfer. SSi Micro also commented that the restriction may not be required, given the additional proposed requirement for participants to already be providing service in order to be eligible to bid on set-aside spectrum.
207. CCI suggested restricting all transfers to all entities for the duration of the licence term.
208. CCSA, CanWISP, Ecotel, Ice Wireless, MRC de Témiscouata and Sogetel emphasized the importance of subordinate licensing to serve rural areas, indicating there should be a condition to mandate subordinate licensing of unused spectrum.

### **Discussion**

209. Licensees are strongly encouraged to make use of all of their spectrum holdings in all areas, including rural, 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 by others for the benefit of Canadians. ISED notes that this is the first licence term for the 600 MHz band, and conditions such as mandating subordinate licences are premature at this time. ISED will first provide the primary licensee with an opportunity for deployment in accordance with the conditions of licence discussed in section 9.3 below.
210. As commercial mobile services are permitted in the 600 MHz band, the provisions outlined in section 5.6 of CPC-2-1-23 will apply to requests for any type of transfer of spectrum licences in this band. Licences acquired by set-aside-eligible licensees will be considered as “set-aside licences” as set out in section 4.3 of this Framework.



211. **Provisions applicable to set-aside licences:** As detailed in section 4.3, transfers will not be permitted where they will result in a set-aside-ineligible entity obtaining a set-aside spectrum licence for the first five years of the licence term. After the first five years, set-aside spectrum licences will be treated like all other commercial mobile spectrum licences and may be transferred in accordance with the provisions of section 5.6 of CPC-2-1-23. Similarly, transfers between set-aside-eligible entities may take place at any time, subject to the provisions of section 5.6 of CPC-2-1-23. As part of its review of any proposed transfer, ISED will analyze, among other factors, the change in spectrum concentration levels that would result from the licence transfer, or will examine the ability of the licence transfer applicants and other existing and future competitors to provide services, given the post-transfer concentration of commercial mobile spectrum in the affected licence area(s).

212. Despite the general restriction on transfers of set-aside licences, the Consultation proposed that a subordinate licence may be granted in support of an agreement to share spectrum.

213. In order for a subordinate licence to be granted in that case, there are two conditions that need to be met. First, licensees must demonstrate that the conditions under section 5.6.3 of CPC-2-1-23 are fully met. Second, licensees will be required to demonstrate to the satisfaction of ISED that they intend to, and will continue to, make use of the 600 MHz spectrum to actively and independently provide services in the applicable licence area, based on the assessment factors set out below.

214. **Assessment factors:** ISED will consider a range of criteria to determine whether the associated entities provide, or intend to provide, wireless services. Assessment criteria may include, but will not be limited to:

- the companies' 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; and
- the companies' demonstration of separate presences in the marketplace.

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

- all agreements relating to the transfer of, use of and access to the 600 MHz spectrum;
- business plans for the area in which the agreement(s) will provide access to spectrum; and

- business and financial results, including investments and customer acquisition.
216. ISED may request additional documentation to complete its assessment and may require that documents be certified by an officer of the company.
217. ISED's review will not extend to an overall assessment of the effects of the agreement between associated entities on competition in the marketplace.
218. Licensees must apply to ISED for the issuance of subordinate licences prior to the implementation of any spectrum sharing agreements or any agreement that provides for another party to operate the licensee's spectrum.
219. **Exchange of spectrum licences:** In recognition of the principles for promoting the efficient use of spectrum, ISED may also permit, after the announcement of the provisional licence winners, a transfer or "exchange" of equal amounts of 600 MHz spectrum within the same licence area between a set-aside-eligible entity and a set-aside-ineligible entity, subject to the provisions of section 5.6 of CPC-2-1-23.
220. For further information on all of the requirements related to transfers, refer to CPC-2-1-23, as amended from time to time. These requirements are subject to revision and amendment for reasons including furtherance of the policy objectives related to the 600 MHz band. Licence transfers may also be subject to the provisions of the *Competition Act*.

## Decision

### **D14—The condition of licence on transferability and divisibility is as follows:**

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

**The licensee must make the Transfer Request in writing to ISED. 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.**

**The licensee must apply in writing to ISED 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 ISED 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 ISED 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 ISED 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.

The following provision applies to set-aside licences as defined under the *Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band* (the Framework): For the first five years of the licence term, a set-aside licence is not transferable to a set-aside-ineligible entity (as defined in the Framework) with two exceptions:

1) a Subordinate Licence to a set-aside-ineligible entity may be granted in support of a spectrum sharing agreement provided that the requirements in section 5.6.3 of CPC-2-1-23 are met *and* that ISED is satisfied that the relevant entities will actively and independently provide wireless services in the applicable licence areas, based on the assessment factors set out in section 9.2 of the Framework; and

2) an exchange of equal amounts of 600 MHz spectrum within the same licence area between a set-aside-eligible entity and a set-aside-ineligible entity may be allowed, subject to the provisions of section 5.6 of CPC-2-1-23.

In all cases, the licensee must follow the procedures as outlined in CPC-2-1-23.

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

### 9.3 Deployment requirements

221. In the Consultation, ISED proposed that licensees be required to meet specific deployment levels based on: Tier 2 service areas (Tier 4 in the North) by year 5, Tier 3 service areas (Tier 4 in the North) by year 10, and Tier 4 service areas by year 20.

#### Summary of comments

222. Bell, Eastlink, FCM, Québecor, Rogers, Shaw, SSi Micro and Xplornet supported the proposed 600 MHz tiered deployment requirements.

223. CCI, Ecotel, MRC de Témiscouata, SaskTel, Sogetel and TELUS proposed stricter requirements to encourage operators to deploy faster and emphasize rural coverage.

224. Tbaytel commented that the proposed Tier 2 deployment level is too high for Tier 2-09 Northern Ontario, given the population in the area in which Tbaytel operates.

#### Discussion

225. The deployment requirement levels reflect the minimum population coverage that licensees are required to meet within a specific timeframe. Similar conditions of licence have been applied to previously auctioned spectrum licences (e.g. 700 MHz, 2500 MHz, and AWS-3 spectrum bands).

226. ISED maintains the view that the proposed graduated deployment requirements support ISED's 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.

227. Deployment by a subordinate licensee will count towards the requirement of the primary licensee. Licensees are strongly encouraged to make use of all of their spectrum holdings in all areas, 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 by others for the benefit of Canadians.

228. To support the objectives outlined in paragraph 224, the deployment requirements will be applied as proposed.

#### Decision

**D15—The condition of licence on deployment requirements is as follows:**

**Licensees will be required to demonstrate to the Minister that this spectrum has been put to use to provide services as specified in table A1 within 5 years of the initial issuance of the licence, as specified in table A2 within 10 years of the initial issuance of the licence, and as specified in table A3 within 20 years of the initial issuance of the licence.**

**The Department will review licensees' compliance with their deployment conditions at years 5, 10 and 20. Where, at any point in the licence term, the licensee is not in compliance with its deployment conditions, the Department 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, the Department may determine that the most appropriate course of action is to revoke the licence.**

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



## 9.4 Other conditions of licence

229. ISED also sought comments on other conditions of licence as outlined in annex G of the Consultation. These conditions were based on existing policies and procedures that would apply to licences issued through the auction process for spectrum in the 600 MHz band.

### Summary of comments

230. BCBA, Bell, CCI, Cogeco, Eastlink, Ecotel, FCM, Ice Wireless, MRC de Témiscouata, Québecor, Rogers, SaskTel, Shaw, Sogetel, SSi Micro, Tbaytel, TELUS and Xplornet generally agreed with ISED's proposals.

231. However, some disagreed with specific conditions of licence as indicated below.

232. **Lawful interception:** Bell and Rogers suggested that this condition of licence be limited to the capabilities of industry standards and commercially available equipment.

233. **Research and development:** Bell, Québecor, Rogers and TELUS suggested removing this condition from all spectrum licences as they believe it is out of date. Bell and Rogers further suggested that if the condition is retained, ISED should lower the spending requirement on research and development. Sogetel also supported lowering the requirement. Cogeco supported other stakeholders in suggesting that ISED review this condition.

234. **Mandatory roaming:** Bell and TELUS suggested that this condition of licence does not incentivize carriers to invest in or upgrade their own networks rather than to roam on one or more of their competitors' networks.

235. **Annual reporting:** BCBA, Bell, Québecor, Rogers, SaskTel and TELUS suggested that ISED reduce the regulatory burden associated with annual reporting. BCBA suggested that ISED reduce the requirements for smaller companies generating less than \$10 million in revenue. Cogeco supported other stakeholders in suggesting that ISED review this condition.

### Discussion

236. As mentioned above, the conditions of licences outlined in the Consultation were based on existing policies and procedures.

237. **Lawful interception:** The condition of licence on lawful interception was first introduced in 1996 for Personal Communications Services (PCS) spectrum licences. This condition has been applied to most spectrum licences that carry public traffic to and from the public networks. The requirement has been modified over the years to ensure consistency with the *Telecommunications Act* and related regulations. Therefore, the lawful interception condition

of licence will be adopted as proposed. ISED notes that licensees may request forbearance from this condition of licence, in cases where it may be technically or commercially unfeasible.

238. **Research and development:** R&D requirements align with the spectrum objectives of the government, namely to foster innovation and investment, and to maximize the economic and social benefits that Canadians derive from the use of the radio frequency spectrum resource. In February 2014, ISED released a decision, modifying the R&D condition, as published in SLPB-002-14, *Decisions on Conditions of Licence Regarding Research and Development and Learning Plans*.

239. R&D continues to be recognized as a significant contributing factor to the ongoing success of the digital economy in Canada. Maintaining the R&D requirement supports research, technology and investment for the current and future prosperity of Canadians. As such, the R&D condition of licence will be adopted as proposed.

240. **Mandatory roaming:** The mandatory roaming condition of licence applies to all commercial mobile spectrum bands. Therefore it would be impractical not to apply it to one particular band. Recognizing the opposing views received on the proposed condition of licence, ISED may consult in the future to review this condition of licence in the context of all commercial mobile bands. At present, the mandatory roaming condition of licence will remain as proposed.

241. **Annual report:** Many comments indicated that annual reporting should be removed or modified to result in less frequent reporting and lowering of the administrative burden on licensees. Currently, spectrum licence conditions include a requirement to submit an annual report to ISED to provide some basic information on spectrum use as well as existing company reports. While this reporting provides ISED with valuable information, the concerns of respondents have been noted. ISED may consult in the future to review the annual reporting requirements. At present, the annual reporting condition of licence will remain as proposed.

#### Decision

**D16—The conditions of licence outlined in annex B will be applied to licences in the 600 MHz band issued through this licensing process.**

## 10 Auction process

242. The following section outlines the proposed general process for submitting an application to participate in the 600 MHz auction, as well as the general requirements and rules that would apply prior to, during and following the auction.

243. 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.

### **10.1 Application to participate**

244. To participate in an auction, all applicants must submit their completed application forms, along with a financial deposit, details of their beneficial ownership, information on any affiliations and associations as discussed in section 8 of this document, and other corporate documentation as required. ISED will publish the list of applicants on its website soon after the application deadline.

245. The application forms for participating in the auction will be available on request by email. Additional documentation may be required in support of the application forms. As discussed in section 4.2, applicants will be required to indicate in their application whether they are applying to bid as a set-aside-eligible or set-aside-ineligible bidder on a service area by service area basis, and to provide relevant documentation along with the rest of the materials.

### **10.2 Submissions**

246. 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. Associated entities wishing to participate separately in the 600 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 600 MHz licences have been issued.

247. 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.

248. 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*.

### **10.3 Pre-auction deposits**

249. In order to maintain the integrity of the auction, ISED requires that all bidders submit a pre-auction financial deposit with their application.

250. In the Consultation, ISED proposed to determine the value of the pre-auction financial deposits based on the licences on which the applicant intends to bid. Each licence was assigned a specific number of eligibility points that are approximately proportionate to the population covered by the licence, and it was proposed that the financial deposit be equal to \$48,000 per eligibility point.

#### **Summary of comments**

251. SSi Micro, Rogers, Eastlink, Québecor and Xplornet supported the pre-auction financial deposits proposed by ISED.

252. TELUS, Cogeco, CCI and Sogetel supported the methodology but noted that pre-auction financial deposits and eligibility points would have to be adjusted to reflect their comments on opening bid prices.

253. BCBA suggested that the requirement for pre-auction financial deposits be reduced by 50 percent for entities with less than \$10 million in annual revenues, as pre-auction deposits impose significant financing requirements on small companies, discouraging their participation in the auction process.

#### **Discussion**

254. The value of the pre-auction financial deposits is based on the licences on which the applicant intends to bid.

255. The proposed 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 are bidding for spectrum that they cannot afford and that they will default on their winning bids at the end of the auction. Considering that the price in the auction is expected to increase in comparison to opening bids, the required amount of financial deposits based on the opening bid prices does not appear to be excessive.



Lowering of the pre-auction financial deposits would run contrary to the purpose of this requirement.

## Decision

**D17— Pre-auction financial deposits will be equal to \$48,000 per eligibility point. Eligibility points associated with each licence are listed in Table 2 of this Framework. As part of its application, a bidder will be required to submit its total pre-auction financial deposit. The deposits are to be made in the form described in section 10.4.**

An individual bidder requesting to be eligible to bid on the equivalent of one national paired block of 5+5 MHz will be required to submit deposits covering 4,583 points, which will equate to \$219,984,000 (i.e. \$48,000 x 4,583). Financial deposit(s) 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.

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 bid value on a package of licences and the bidding activity. The additional financial deposit will be based on a percentage, not exceeding 50%, of the value of the bidder's package bid for licences in a specified round. Bidders will be provided three full business days to submit their additional financial deposits to ISED. The deposits are to be in the form described in section 10.4.

### 10.4 Process to submit the applications and financial deposit

256. 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 15 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.

257. For previous licensing processes, application forms and associated documents were to be physically delivered to ISED. For this licensing process, in an effort to streamline the submission of the application forms and associated documents, ISED will provide the option to use Canada Post's epost Connect service. The epost Connect service is a way for business and government to securely send confidential digital messages and documents over the Internet with bank-grade encryption. The service is certified to transmit documents up to the Protected B classification level. Canada Post certifies that all data sent through their service stays within Canada, on Canadian servers.

258. Requests for auction application forms are to be sent to ISED's Spectrum Auctions email account. Upon receipt of requests to use Canada Post's epost Connect service, ISED will set up an epost account for each prospective applicant.

259. Through a standard web browser, ISED (the administrator) and the auction applicant (the client) will log in to a secure web application. Through this site, ISED will send an initial message to the auction applicant who will receive a notification by email that contains a link. The auction applicant will then click on the link, which will bring it to the secure epost Connect website where it will be prompted to log in. If the auction applicant already has an epost account, it can immediately log in. Otherwise, the auction applicant will be required to create an account before logging in. Once the applicant logs in, ISED's initial message sent to the applicant becomes associated with the applicant's epost account. Canada Post calls this a conversation.

260. Once the conversation is established, messages can be initiated by either ISED or the auction applicant. A message could be simple text or it could also include files. This will allow ISED to send the application and bid forms to each auction applicant. In turn, the auction applicants will be able to respond to ISED and send their completed forms and other relevant documents.

261. For more information, refer to Canada Post's epost Connect website.

262. Similar to previous auction processes, the pre-auction financial deposit must be received by the Manager, Auction Operations by the date specified.

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

264. 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. In the event that a qualified bidder does not become a provisional licence winner, 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 from the Receiver General for Canada will need to be processed.

265. 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.

266. 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.

267. A list of all applicants will be made public on the [Spectrum 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.

### **10.5 Bidder qualification**

268. 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 will also assess the eligibility to obtain set-aside licences on a service area by service area basis and may request further information and/or verify the information.

269. Applications that are received without a deposit by the application deadline will be rejected.

270. 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.



271. Applicants that do not comply with the request contained in ISED's written statement 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.

272. 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 will include, among other items, a bidder information document, a user manual and the schedule for the information session and mock auctions.

273. 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](#). The number of eligibility points and the financial deposit amounts will not be published prior to the auction.

#### **10.6 Withdrawal of application forms**

274. 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 15. This request is to be delivered before 12:00 p.m. noon (EDT) on the business day preceding the opening of the auction.

#### **10.7 Change of information**

275. An Auction Authorized Representative is an individual authorized by the bidding company, for the 600 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.

276. Written notification must be sent by the Auction Authorized Representative to the address provided in section 15 within five business days of any such material changes.

#### **10.8 Backup procedures**

277. 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.

278. 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 submitted after the application date.

279. 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.

### **10.9 Bidder payment**

280. Within 10 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.

281. The remaining portion, 80% of the final payment, will be due within 30 business days of the announcement of the provisional licence winners. Failure by the 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 10.10). These final payments will be non-refundable. If the licence winner fails to make this payment within the specified period, then the provisional winner's irrevocable standby letter of credit will be drawn upon.

282. 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.

283. These payments for the initial 20-year term are in lieu of any fees that will be fixed for radio authorization under the *Radiocommunication Act* or any other act.

### **10.10 Forfeiture penalties**

284. Following the conclusion of the auction, 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. Furthermore, non-compliant bidders 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.

285. In the event of licence 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 amount bid for the licence(s) forfeited. 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.

286. A winning bidder that forfeits on a licence (as well as any of that bidder's affiliated and associated entities) will not be eligible to bid on any subsequent licensing process for the related band.

### **10.11 Enforcement of the auction rules**

287. 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 10.10; and
- e) the applicant may be subject to administrative monetary penalties or prosecution under the *Radiocommunication Act*.

### **10.12 Issuance of licences**

288. ISED will issue spectrum licences to provisional winners upon receipt of the payment of the sum of their bids and the sum of their penalties.



## **11 Bidder training and support**

289. 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.

290. A mock auction 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.

291. The full schedule for the auction process is included in the [Table of Key Dates](#) on ISED's Spectrum Management and Telecommunications website.

## **12 Post-auction licensing process for unassigned licences**

292. ISED will consider making unassigned licences available for licensing through an alternative process, which could include a subsequent auction at a later date. The timing and form of such a process will depend on the demand for the available licences. ISED may conduct a public consultation should it consider it necessary.

## **13 Licence renewal process**

293. In the Consultation, ISED proposed a renewal process that includes a public consultation process commencing approximately two years prior to the end of the licence term.

### **Summary of comments**

294. Stakeholders that provided feedback on the licence renewal process supported ISED's proposal.

### **Discussion**

295. 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.



296. 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, and the applicable licence fees.

297. 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, including compliance with the deployment requirement levels at the end of the licence term. During the renewal process, ISED may consider factors such as changing technology and an individual licensee's efforts to meet the conditions of licence.

#### Decision

**D18— 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.**

#### 14 Clarification questions process

298. 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.

299. ISED may also amend or supplement the auction rules and procedures contained in this Framework. Any such amendment or supplement will be published on ISED's website and will be sent to all qualified bidders.

300. Questions regarding the 600 MHz auction may be sent to the Manager, Auction Operations, by [email](#).

301. All questions should cite the *Canada Gazette*, Part I, the publication date, the title and the notice reference number (SLPB-002-18). Questions and responses will be posted on ISED's [Spectrum Management and Telecommunications website](#).

## 15 Obtaining copies

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

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

Innovation Science and Economic Development Canada  
c/o Manager, Auction Operations  
Spectrum Licensing Policy Branch  
235 Queen Street (6th floor, East Tower)  
Ottawa, Ontario K1A 0H5  
Telephone: 343-291-1400  
TTY: 1-866-694-8389  
Email: [ic.spectrumauctions-encheresduspectre.ic@canada.ca](mailto:ic.spectrumauctions-encheresduspectre.ic@canada.ca)



## Annex A—Deployment requirements

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

**Table A1: 5-year deployment requirements**

Auction service areas	Service area name	Population	Minimum population coverage
2-001	Newfoundland and Labrador	520,176	15%
2-002	Nova Scotia and Prince Edward Island	1,066,470	15%
2-003	New Brunswick	745,596	20%
2-004	Eastern Quebec	1,699,378	25%
2-005	Southern Quebec	5,895,985	25%
2-006	Eastern Ontario and Outaouais	2,435,880	25%
2-007	Northern Quebec	193,926	15%
2-008	Southern Ontario	10,609,746	25%
2-009	Northern Ontario	778,449	25%
2-010	Manitoba	1,278,016	25%
2-011	Saskatchewan	1,094,705	20%
2-012	Alberta	4,070,844	25%
2-013	British Columbia	4,647,973	25%
4-170	Yukon	35,928	10%
4-171	Nunavut	35,975	10%
4-172	Northwest Territories	41,668	10%

**Table A2: 10-year deployment requirements**

Auction service areas	Tier 3	Service area name	Population	Minimum population coverage
2-001 Newfoundland and Labrador	3-001	Newfoundland and Labrador	520,176	40%
2-002 Nova Scotia and Prince Edward Island	3-002	Prince Edward Island	142,907	40%
	3-003	Mainland Nova Scotia	792,184	50%
	3-004	Cape Breton	131,379	40%
2-003 New Brunswick	3-005	Southern New Brunswick	167,985	60%
	3-006	Western New Brunswick	216,311	40%
	3-007	Eastern New Brunswick	361,300	40%
2-004 Eastern Quebec	3-008	Bas du fleuve/Gaspésie	289,315	25%
	3-009	Québec	1,042,589	60%



Auction service areas	Tier 3	Service area name	Population	Minimum population coverage
	3-010	Chicoutimi-Jonquière	367,474	50%
2-005 Southern Quebec	3-011	Eastern Townships	555,933	40%
	3-012	Trois-Rivières	832,846	40%
	3-013	Montréal	4,381,630	60%
	3-014	Upper Outaouais	125,576	20%
2-006 Eastern Ontario and Outaouais	3-015	Ottawa/Outaouais	1,516,983	60%
	3-016	Pembroke	113,567	25%
	3-018	Cornwall	69,729	60%
	3-019	Brockville	83,713	50%
	3-020	Kingston	177,314	60%
	3-021	Belleville	197,975	50%
	3-022	Cobourg	65,180	40%
2-007 Northern Quebec	3-023	Peterborough	211,418	60%
	3-017	Abitibi	193,926	40%
2-008 Southern Ontario	3-024	Huntsville	82,705	40%
	3-025	Toronto	7,030,750	60%
	3-026	Barrie	716,446	40%
	3-027	Guelph/Kitchener	737,544	60%
	3-028	Listowel/Goderich/Stratford	135,596	25%
	3-029	Niagara-St. Catharines	380,354	60%
	3-030	London/Woodstock/St. Thomas	854,082	60%
	3-031	Chatham	99,868	60%
	3-032	Windsor/Leamington	401,719	60%
	3-033	Strathroy	170,680	60%
2-009 Northern Ontario	3-034	North Bay	125,647	50%
	3-035	Sault Ste. Marie	130,515	60%
	3-036	Sudbury	178,872	60%
	3-037	Kirkland Lake	112,511	40%
	3-038	Thunder Bay	230,904	50%
2-010 Manitoba	3-039	Winnipeg	1,098,765	60%
	3-040	Brandon	179,251	30%
2-011 Saskatchewan	3-041	Regina	392,289	50%
	3-042	Moose Jaw	101,361	35%
	3-043	Saskatoon	601,055	50%
2-012 Alberta	3-044	Edmonton	1,642,295	60%
	3-045	Medicine Hat/Brooks	198,798	40%
	3-046	Lethbridge	189,709	50%



Auction service areas	Tier 3	Service area name	Population	Minimum population coverage
	3-047	Calgary	1,582,542	60%
	3-048	Red Deer	260,727	35%
	3-049	Grande Prairie	196,772	35%
2-013 British Columbia	3-050	Kootenays	139,312	25%
	3-051	Okanagan/Columbia	436,342	50%
	3-052	Vancouver	2,858,890	60%
	3-053	Victoria	458,861	60%
	3-054	Nanaimo	194,922	50%
	3-055	Courtenay	118,732	60%
	3-056	Thompson/Cariboo	184,040	50%
	3-057	Prince George	188,487	50%
	3-058	Dawson Creek	68,387	40%
4-170 Yukon			35,928	30%
4-171 Nunavut			35,975	13%
4-172 Northwest Territories			41,668	25%

**Table A3: 20-year deployment requirements**

Auction service areas	Tier 3 service area	Tier 4	Service area name	Population	Minimum population coverage
2-001 Newfoundland and Labrador	3-001 Newfoundland and Labrador	4-001	St. John's	255,012	70%
		4-002	Placentia	15,304	30%
		4-003	Gander/Grand Falls/Windsor	144,229	20%
		4-004	Corner Brook/Stephenville	77,974	30%
		4-005	Labrador	27,656	30%
2-002 Nova Scotia and Prince Edward Island	3-002 Prince Edward Island	4-006	Charlottetown	95,350	60%
		4-007	Summerside	47,557	40%
	3-003 Mainland Nova Scotia	4-008	Yarmouth	55,609	50%
		4-009	Bridgewater/Kentville	139,289	50%
		4-010	Halifax	435,820	70%
		4-011	Truro	56,649	40%
		4-012	Amherst	33,373	30%
		4-013	Antigonish/New Glasgow	71,445	40%
3-004 Cape Breton	4-014	Sydney	131,379	70%	

2-003 New Brunswick	3-005 Southern New Brunswick	4-015	Saint John	142,898	70%
		4-016	St. Stephen	25,087	25%
		4-017	Fredericton	164,871	60%
	3-006 Western New Brunswick	4-020	Grand Falls	24,936	30%
		4-021	Edmundston	26,504	60%
		4-018	Moncton	178,500	60%
	3-007 Eastern New Brunswick	4-019	Miramichi/Bathurst	156,025	40%
		4-022	Campbellton	26,776	30%
		4-023	Matane	112,039	40%
2-004 Eastern Quebec	3-008 Bas du fleuve/Gaspésie	4-024	Mont-Joli	37,788	25%
		4-025	Rimouski	56,619	60%
		4-026	Rivière-du-Loup	82,869	50%
		4-027	La Malbaie	28,193	40%
	3-009 Québec	4-029	Montmagny	56,808	50%
		4-030	Québec	904,330	70%
		4-031	Sainte-Marie	53,258	60%
		4-028	Chicoutimi-Jonquière	218,377	70%
	3-010 Chicoutimi-Jonquière	4-063	Roberval/Saint-Félicien	58,438	30%
		4-064	Baie-Comeau	43,675	50%
		4-065	Port-Cartier/Sept-Îles	46,983	50%
		4-032	Saint-Georges	71,425	50%
2-005 Southern Quebec	3-011 Eastern Townships	4-033	Lac-Mégantic	24,223	50%
		4-034	Thetford Mines	42,019	70%
		4-035	Plessisville	22,772	30%
		4-039	Asbestos	29,744	40%
		4-040	Victoriaville	56,684	70%
		4-041	Coaticook	12,981	40%
		4-042	Sherbrooke	250,227	70%
		4-043	Windsor	16,777	50%
		4-045	Cowansville	29,083	70%
		3-012 Trois-Rivières	4-036	La Tuque	16,219
	4-037		Trois-Rivières	265,152	70%
	4-038		Louiseville	21,708	40%
	4-044		Drummondville	112,390	70%
	4-047		Granby	105,440	70%
	4-048		St-Hyacinthe	92,092	70%
	4-049		Sorel	58,740	60%
	3-013 Montréal	4-050	Joliette	161,106	40%
		4-046	Farnham	29,593	25%
	3-014 Upper Outaouais	4-051	Montréal	4,352,037	70%
		4-052	Sainte-Agathe-des-Monts	77,087	30%
		4-054	Mont-Laurier/Maniwaki	48,488	40%



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2-006 Eastern Ontario and Outaouais	3-015 Ottawa Outaouais	4-053	Hawkesbury	64,131	50%
		4-055	Ottawa/Outaouais	1,452,852	70%
	3-016 Pembroke	4-056	Pembroke	82,200	50%
		4-057	Arnprior/Renfrew	31,367	50%
	3-018 Cornwall	4-067	Cornwall	69,729	70%
	3-019 Brockville	4-068	Brockville	70,563	50%
		4-069	Gananoque	13,150	50%
	3-020 Kingston	4-070	Kingston	177,314	70%
	3-021 Belleville	4-071	Napanee	42,993	25%
		4-072	Belleville	154,982	25%
	3-022 Cobourg	4-073	Cobourg	65,180	40%
3-023 Peterborough	4-074	Peterborough	165,516	60%	
	4-075	Lindsay	45,902	60%	
2-007 Northern Quebec	3-017 Abitibi	4-058	Rouyn-Noranda	43,108	50%
		4-059	Notre-Dame-du-Nord	16,023	40%
		4-060	La Sarre	19,349	40%
		4-061	Amos	25,096	40%
		4-062	Val-D'Or	44,619	50%
		4-066	Chibougamau	45,730	20%
2-008 Southern Ontario	3-024 Huntsville	4-076	Minden	20,813	40%
		4-096	Gravenhurst/ Bracebridge	61,892	50%
	3-025 Toronto	4-077	Toronto	7,030,750	70%
	3-026 Barrie	4-078	Alliston	129,279	50%
		4-081	Kincardine	185,818	50%
		4-094	Barrie	352,290	60%
		4-095	Midland	49,059	50%
	3-027 Guelph/ Kitchener	4-079	Guelph/Kitchener	707,534	70%
		4-080	Fergus	30,010	50%
	3-028 Listowel/ Goderich/ Stratford	4-082	Listowel/Goderich	84,257	30%
		4-088	Stratford	51,339	60%
	3-029 Niagara- St. Catharines	4-083	Fort Erie	31,072	70%
		4-084	Niagara-St. Catharines	349,283	70%
	3-030 London/ Woodstock/St. Thomas	4-085	Haldimand/Dunnville	37,398	40%
		4-086	London/Woodstock/ St. Thomas	678,149	70%
		4-087	Brantford	138,535	70%
	3-031 Chatham	4-089	Chatham	68,885	70%
		4-091	Wallaceburg	30,983	40%
	3-032 Windsor/ Leamington	4-090	Windsor/Leamington	401,719	70%
	3-033 Strathroy	4-092	Sarnia	123,953	70%
4-093		Strathroy	46,727	60%	

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2-009 Northern Ontario	3-034 North Bay	4-097	North Bay	104,524	60%
		4-098	Parry Sound	21,123	40%
	3-035 Sault Ste. Marie	4-099	Elliot Lake	29,520	50%
		4-105	Iron Bridge	20,162	30%
		4-106	Sault Ste. Marie	80,833	60%
	3-036 Sudbury	4-100	Sudbury	178,872	60%
	3-037 Kirkland Lake	4-101	Kirkland Lake	32,402	50%
		4-102	Timmins	42,086	50%
		4-103	Kapuskasing	38,024	30%
	3-038 Thunder Bay	4-104	Kenora/Sioux Lookout	64,826	30%
		4-107	Marathon	24,923	30%
		4-108	Thunder Bay	121,061	70%
		4-109	Fort Frances	20,095	40%
2-010 Manitoba	3-039 Winnipeg	4-110	Steinbach	64,764	30%
		4-111	Winnipeg	830,151	70%
		4-112	Lac du Bonnet	58,076	20%
		4-113	Morden/Winkler	51,609	40%
		4-115	Portage la Prairie	21,273	50%
		4-117	Creighton/Flin Flon	22,228	30%
		4-118	Thompson	50,665	30%
	3-040 Brandon	4-114	Brandon	103,743	60%
		4-116	Dauphin	75,508	20%
		4-119	Estevan	46,006	20%
2-011 Saskatchewan	3-041 Regina	4-120	Weyburn	22,877	50%
		4-123	Yorkton	63,024	30%
		4-124	Regina	260,382	70%
		4-121	Moose Jaw	55,141	60%
	3-042 Moose Jaw	4-122	Swift Current	46,219	40%
		4-125	Saskatoon	306,824	70%
	3-043 Saskatoon	4-126	Watrous	27,288	20%
		4-127	Battleford	99,433	25%
		4-128	Prince Albert	130,446	50%
		4-130	Northern Saskatchewan	37,064	20%
2-012 Alberta	3-044 Edmonton	4-129	Lloydminster	37,539	50%
		4-140	Vegreville	15,396	40%
		4-141	Edmonton	1,325,857	70%
		4-142	Edson/Hinton	49,814	40%
		4-143	Bonnyville	83,631	20%
		4-144	Whitecourt	32,669	40%
		4-145	Barrhead	23,437	40%
		4-146	Fort McMurray	73,953	70%

	3-045 Medicine Hat/Brooks	4-131	Medicine Hat/Brooks	107,233	70%
		4-133	Stettler/Oyen/ Wainwright	51,420	30%
		4-139	Camrose	40,145	50%
	3-046 Lethbridge	4-132	Lethbridge	189,709	50%
	3-047 Calgary	4-134	High River	120,208	40%
		4-135	Strathmore	45,478	40%
		4-136	Calgary	1,416,856	70%
	3-048 Red Deer	4-137	Red Deer	206,387	60%
		4-138	Wetaskiwin/Ponoka	54,340	40%
	3-049 Grande Prairie	4-147	Peace River	86,745	25%
4-148		Grande Prairie	110,027	50%	
2-013 British Columbia	3-050 Kootenays	4-149	East Kootenay	60,371	30%
		4-150	West Kootenay	78,941	25%
	3-051 Okanagan/ Columbia	4-151	Kelowna	362,815	60%
		4-159	Merritt	15,649	50%
		4-162	Salmon Arm	51,024	50%
		4-163	Golden	6,854	50%
	3-052 Vancouver	4-152	Vancouver	2,731,567	70%
		4-153	Hope	26,093	25%
		4-157	Powell River	26,865	50%
		4-158	Squamish/Whistler	74,365	50%
	3-053 Victoria	4-154	Victoria	458,861	70%
	3-054 Nanaimo	4-155	Nanaimo	194,922	60%
	3-055 Courtenay	4-156	Courtenay	118,732	60%
	3-056 Thompson / Cariboo	4-160	Kamloops	106,972	70%
		4-161	Ashcroft	15,070	20%
		4-164	Williams Lake	38,440	40%
		4-165	Quesnel/Red Bluff	23,558	40%
	3-057 Prince George	4-166	Skeena	56,234	30%
		4-167	Prince George	94,607	70%
		4-168	Smithers	37,646	20%
3-058 Dawson Creek	4-169	Dawson Creek	68,387	40%	
4-170 Yukon				35,928	60%
4-171 Nunavut				35,975	25%
4-172 Northwest Territories				41,668	50%



## **Annex B—Conditions of licence**

The following conditions will apply to licences in the 600 MHz band.

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 continues to have the power to amend the terms and conditions of spectrum licences, under section 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.

### **1. Licence term**

The term of this licence is 20 years. At the end of this 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 terms and conditions of the new licence, will be determined by the Minister following a public consultation.

### **2. 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 Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band (the Framework). The licensee must notify the Minister of any change that would have a material effect on its eligibility. Such notification must be made in advance for any proposed transactions within its knowledge.

### **3. Licence transferability, divisibility and subordinate licensing**

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

The licensee must make the Transfer Request in writing to ISED. 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.



The licensee must apply in writing to ISED 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 ISED 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 ISED 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 ISED 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.

The following provision applies to set-aside licences as defined under the *Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band* (the Framework): For the first five years of the licence term, a set-aside licence is not transferable to a set-aside-ineligible entity (as defined in the Framework) with two exceptions:

- 1) a Subordinate Licence to a set-aside-ineligible entity may be granted in support of a spectrum sharing agreement provided that the requirements in section 5.6.3 of CPC-2-1-23 are met *and* that ISED is satisfied that the relevant entities will actively and independently provide wireless services in the applicable licence areas, based on the assessment factors set out in section 9.2 of the Framework; and
- 2) an exchange of equal amounts of 600 MHz spectrum within the same licence area between a set-aside-eligible entity and a set-aside-ineligible entity may be allowed, subject to the provisions of section 5.6 of CPC-2-1-23.

In all cases, the licensee must follow the procedures as outlined in CPC-2-1-23.

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

#### 4. 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 Client Procedures Circular CPC-2-1-23,



Licensing Procedure for Spectrum Licences for Terrestrial Services, 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.

## 5. 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.

## 6. Lawful interception

The 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.



## 7. Research and development

The licensee must invest, as 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*.

## 8. Deployment requirements

Licensees will be required to demonstrate to the Minister that this spectrum has been put to use to provide services as specified in table A1 within 5 years of the initial issuance of the licence, as specified in table A2 within 10 years of the initial issuance of the licence, and as specified in table A3 within 20 years of the initial issuance of the licence.

The Department will review licensees' compliance with their deployment conditions at years 5, 10 and 20. Where, at any point in the licence term, the licensee is not in compliance with its deployment conditions, the Department 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, the Department may determine that the most appropriate course of action is to revoke the licence.

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

## 9. 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.

## 10. Mandatory roaming



The licensee must comply with the roaming 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.

## 11. Annual reporting

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 (ISED 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; and
- other information related to the licence as specified in any notice updating the reporting requirements as issued by ISED.

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 ISED at the following address:

Innovation, Science and Economic Development  
Spectrum Management Operations Branch  
Manager, Operational Policy  
235 Queen Street  
Ottawa, Ontario K1A 0H5

Where a licensee holds multiple licences, spectrum implementation reports should be broken down by service 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 ISED to monitor the effectiveness of these conditions in meeting the policy objectives regarding the band and the Department's intent that the spectrum be deployed in a timely manner for the benefit of Canadians.

## **12. Amendments**

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



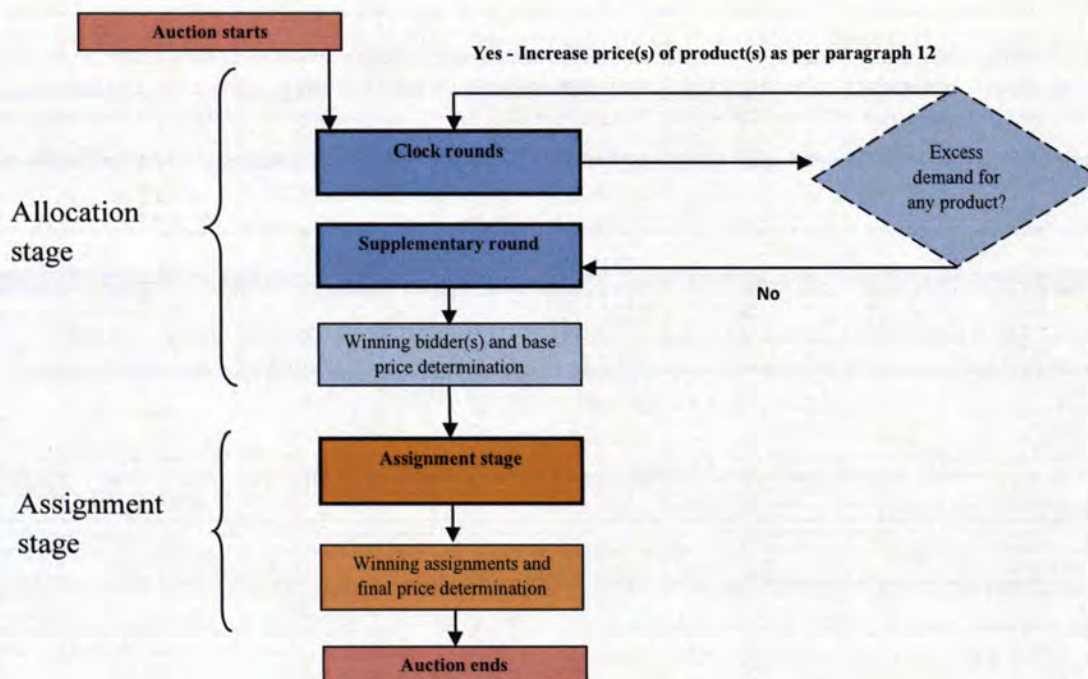
## **Annex C—Combinatorial clock auction format with Generalized Axiom of Revealed Preference based activity rule**

1. ISED will use a combinatorial clock auction (CCA) format with Generalized Axiom of Revealed Preference (GARP) based activity rule for the 600 MHz licensing process. A CCA involves a bidding process that includes a price discovery stage, which is similar to the simultaneous multiple round ascending (SMRA) auction format. However, the CCA format also has attributes that remove or reduce some design concerns associated with the SMRA format. In particular, the CCA format allows bidders to bid on packages of licences instead of individual licences, eliminating the risk that bidders may win some but not all of the licences that they desire. This is particularly important given the regional nature of the licences to be auctioned in this process and the complementarities that exist between these licences.
2. The GARP-based activity rule maintains the desirable properties of the Weak Axiom of Revealed Preference (WARP) based activity rule that was used for the 700 MHz and 2500 MHz auctions. First, it provides flexibility so that a bidder can bid truthfully based on a valuation function that specifies a value for each package. Second, it allows a bidder to bid based solely on eligibility points. However, because the GARP-based activity rule is stricter, it may prevent a bidder from submitting some bids that would have been possible using the WARP-based activity rule. Thus, redefining the hybrid revealed preference/eligibility point rule based on GARP may improve incentives for bidders to bid truthfully, while supporting ISED's objectives for a fair and efficient allocation of spectrum.
3. Upon application to participate in the auction, applicants will be required to indicate whether they are applying as a set-aside-eligible or set-aside-ineligible bidder on a service area by service area basis (and, hence, the category of product that they would like to bid for on a service area by service area basis). Set-aside eligibility will be subject to ISED approval.
4. There will be a supply of seven blocks in each of the 16 service areas. Three blocks in each of the 16 services areas will be reserved for set-aside-eligible bidders. The pairing of a service area and a category is referred to as a "product." Given that there will be two categories ("set-aside" and "open") in each of the 16 service areas, there will be a total of 32 products offered in the 600 MHz auction.

### **1. Overview of the CCA**

5. The CCA consists of two stages: the allocation stage and the assignment stage. Figure C1 illustrates the process in each stage. In the allocation stage, the number of spectrum licences that a bidder will win in each service area, as well as the base price to be paid by each winning bidder, is determined. Where generic licences are offered, an additional stage is needed to determine the specific frequencies that will be assigned to each winning bidder. This stage is referred to as the assignment stage.

Figure C1 — CCA process



## 2. The allocation stage

6. The allocation stage of the auction determines the winning bidders as well as the number of licences they have won. It is divided into two phases: the clock rounds and the supplementary round. All valid bids submitted during the allocation stage are used to determine the winning packages and the base prices.

7. The clock rounds allow for price discovery, helping to reduce a bidder's uncertainty regarding the value of the licences. Bidders are able to respond to the price changes accordingly, shifting their bids to licences that continue to be consistent with their business objectives.

8. During each clock round, bidders are able to bid on only one package of licences; however, there may be other packages that they would be interested in winning. The supplementary round provides bidders with an opportunity to improve on bids that they placed in the clock rounds and/or to submit bids on packages that they were eligible to bid on, but did not bid on, during the clock rounds.

**3. Clock rounds**

9. The allocation stage begins with the clock rounds.

10. The licences are auctioned simultaneously over multiple clock rounds. In each round, bidders indicate the number of licences in each service area on which they would like to bid, given the prevailing prices. A bidder that is set-aside-eligible in a service area can only bid for the set-aside product in that area. A bidder that is set-aside-ineligible in a service area can only bid for the open product in that area. The bid for a product cannot exceed the product's maximum supply. Thus, a set-aside-eligible bidder's bid for a set-aside product could be for 0, 1, 2, 3, 4, 5, 6 or 7 licences, while a set-aside-ineligible bidder's bid for an open product could be for 0, 1, 2, 3 or 4 licences. This applies to bids in both the clock rounds and the supplementary round. All of the individual bids placed by a bidder in a given round are considered to be a single package bid, creating an all-or-nothing bid. The price of the package bid is equal to the sum of the bids for individual products, evaluated at the prevailing clock prices.

11. In the first clock round, the price of all licences in each product will be equal to the opening bid price listed in section 7.5 of the Framework.

12. In subsequent clock rounds:

- a. The price of only the set-aside product in a service area will increase from the previous round when the aggregate demand for the set-aside product exceeds three and both of the following conditions are satisfied: (i) the aggregate demand for the open product is at most four; and (ii) the price of the set-aside product is less than the price of the open product. However, if this would result in the price of the set-aside product exceeding the price of the open product, then the price of the open product will instead be set equal to the same price that has been determined for the set-aside product. The price of the set-aside product will never be set above the price of the open product.
- b. The price of only the open product in a service area will increase from the previous round when the aggregate demand for the open product exceeds four and the aggregate demand for the set-aside product is at most three.
- c. The prices of both products in a service area will increase from the previous round when the aggregate demand for the set-aside product exceeds three and either of the following two conditions are satisfied: the aggregate demand for the open product exceeds four; or the prices of the two products are equal and the sum of the aggregate demands for the set-aside and open products exceeds seven.
- d. If none of the conditions (a), (b) or (c) are satisfied for a service area, then the prices of neither of the products in the service area will increase from the previous round.



13. The bid increments for the 600 MHz auction will be in the range of 1-20% of prices in the previous clock round (rounded upward to the nearest multiple of one thousand dollars). Throughout the course of the auction, ISED reserves the right to adjust the bid increments to facilitate an efficient and timely auction.

14. To remain in the auction, a bidder must submit a valid bid with a value greater than zero for at least one licence in the first clock round. The last valid bid that a bidder submits during each clock round will be binding and will be considered in determining both winning packages and base prices at the end of the allocation stage. However, bidders may increase their bids from the clock rounds in the supplementary round, subject to the activity rules.

#### **4. Conclusion of bidding in the clock rounds**

15. The clock rounds will end when there is a round in which there is no product in any service area whose price is required to be incremented. This round is referred to as the final clock round. The package on which a bidder placed a bid in the final clock round is referred to as its final clock package. At this point, ISED will announce to bidders that the clock rounds have ended and that the auction will proceed to the supplementary round (see section 8 of this annex).

#### **5. Information in the clock rounds**

16. Before the start of each clock round, bidders will receive information regarding their own bids from the previous round and their own eligibility in the next round. In addition, all bidders will be informed of the aggregate demand for each service area from the previous round and the price of the product on which they are eligible to bid 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. Information about the aggregate demand from the final clock round will be withheld.

#### **6. Eligibility points**

17. Each of the 16 service areas has been assigned a specific number of eligibility points in proportion to the estimated value of the spectrum. One eligibility point has been assigned per \$48,000 in opening bid prices for each 10 MHz block of spectrum in a service area. Section 7.6 of the Framework lists the eligibility points associated with a product in each service area, as well as the population of the service area.

18. 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, each potential bidder must indicate the total number of "points" worth of licences on which it wishes to bid and submit a corresponding financial deposit. A bidder's initial eligibility defines an upper limit on the size of the packages of licences for which the bidder can bid. 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. For example, a bidder with 100 eligibility points can bid on any package of licences, up to a total sum of 100

points. Subsequent levels of eligibility are based on bids in previous clock rounds.

19. Bidders will not be able to increase their eligibility points after the deadline for application changes.

#### **7. GARP-based activity rule in the clock rounds**

20. The revealed preference/eligibility point hybrid activity rule will be applied in each clock round. It comprises both an eligibility point activity rule and a revealed preference activity rule. The revealed preference component of the activity rule is based on the generalized axiom of revealed preference (GARP).

21. The activity rule has been established to promote truthful bidding throughout the clock rounds, facilitating the price discovery process and allowing bidders to make changes to their bidding strategies dynamically during the auction, in response to increasing prices. The activity rule discourages bidders from misrepresenting their true demand, as doing so will limit their ability to bid on what they really want later in the auction.

22. ISED will institute a 100% eligibility point activity requirement for the 600 MHz spectrum auction. Specifically, in each round, a bidder will be required to bid on licences totalling 100% of its eligibility points if it wishes to maintain that eligibility in the subsequent round.

23. This means that the eligibility point component considers the “size” of the package being bid on, in terms of total eligibility points, and requires bidders to bid on packages that are the same size or smaller as prices increase. When a bidder switches to a smaller package of licences (in other words, totalling fewer eligibility points) the bidder’s eligibility is reduced to the eligibility points of that package.

24. Bidders are required to have eligibility points to bid during the clock rounds. If a bidder reduces its eligibility to zero, the bidder will no longer be able to bid in the clock rounds, but will still be able to bid in the supplementary round provided that it has submitted at least one valid bid with a value greater than zero during the clock rounds.

25. However, there are some shortcomings with using only an eligibility point activity rule. It may create an incentive for bidders to choose only larger packages when prices are low, rather than packages that may work better for them, so that they maintain a larger number of eligibility points for later in the auction. This could lessen price discovery. Furthermore, an eligibility point activity rule may prevent a bidder from making a desirable substitution to a package that is larger in terms of associated eligibility points, but which has become relatively less expensive. In such a case, the eligibility point activity rule would prevent the bidder from bidding on its most preferred package.

26. Under the GARP-based activity rule, a bidder is allowed to submit a bid for a package *Q* that exceeds its eligibility if all of its bids—starting with the last round in which the bidder had sufficient eligibility for package *Q* and ending in the current round with a bid for package *Q*—

are consistent with truthful bidding for the bidder's implied set of valuations. It is possible that these valuations would not be expressed as bids during the auction. Nonetheless, based on actual bids placed up to this point, it is reasonable that the bidder would possess such a set of implied valuations and would bid in accordance with them. Annex D provides the algebraic description of the GARP-based activity rule and annex E provides an example.

27. While a bidder may be permitted by the revealed preference/eligibility point hybrid activity rule to bid for a package larger than its current eligibility, bidding on the larger package will not increase the bidder's eligibility in subsequent rounds. Furthermore, the bidder will never be able to bid on a package with associated eligibility points that exceed the bidder's initial eligibility.

28. Using an activity rule containing both an eligibility point component and a revealed preference component will provide extra flexibility to the bidder. A bidder can continue to bid the same as it would under the eligibility point activity rule. In addition, the bidder is given some extra flexibility to bid on a larger package, provided that the larger package has become relatively less expensive, thereby allowing more opportunity for bidders to adjust their bids in response to information received during the clock rounds.

29. Compared to the WARP-based activity rule that was used in the 700 MHz and 2500 MHz auctions, the GARP-based activity rule performs a stricter test when checking whether to allow a bid on a package that exceeds the bidder's eligibility. In the clock rounds, the activity rule is stricter in two aspects. First, instead of checking only revealed preference constraints generated by eligibility-reducing rounds,<sup>2</sup> the GARP-based activity rule performs a test against bids in all clock rounds starting with the last round in which the bidder had sufficient eligibility to bid on the given package. Second, instead of performing revealed preference checks one by one, the GARP-based activity rule performs a simultaneous check of all relevant revealed preference constraints.

## **8. Supplementary round**

30. The second phase of the allocation stage is the supplementary round. This is a single round process where bidders have the opportunity to place additional bids for packages of licences at prices they choose, subject to constraints based on the bids that they submitted during the clock rounds (see section 9 of this annex). Supplementary bids are critical to ensuring both that the licences are allocated to the bidders who value them the most and that winning bidders pay an amount that is sufficient to ensure that no other bidder or group of bidders was willing to pay more for the licences. The supplementary round will still be held even when all licences are provisionally allocated at the end of the clock rounds.

31. During each clock round, bidders are limited to submitting a single package bid at the announced prices for that round. However, bidders may want to increase their bids in order to reflect their own values for those packages of licences. Furthermore, bidders may be interested in

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<sup>2</sup> All clock rounds in which the bidder does not bid on licences worth the full amount of its eligibility in that round are considered eligibility-reducing rounds.



winning other packages that they were eligible for in the clock rounds, but have yet to bid on. The supplementary round provides bidders with an opportunity to submit their best and final bids on packages that they have previously bid on and to submit new bids on the other packages that they are interested in.

32. The supplementary bids will be all-or-nothing, mutually exclusive package bids on the combinations of licences that the bidder is interested in winning. Valid quantities of licences follow the same rules as in paragraph 10 of this annex.

#### **9. GARP-based activity rule in the supplementary round**

33. The activity rule for bids on packages in the supplementary round complements the activity rule in the clock rounds, encouraging truthful bidding throughout the allocation stage of the auction by ensuring that supplementary bids are consistent with preferences expressed in the clock rounds.

34. Any bidder that placed at least one valid bid with a value greater than zero in the clock rounds will be able to submit bids in the supplementary round. However, a bidder is not required to submit bids in the supplementary round.

35. All packages of licences for which the bidder is eligible to bid are available for bidding in the supplementary round, irrespective of whether the bidder bid for them in the clock rounds. Thus, bidders will be able to improve on bids submitted during the clock rounds or to submit bids for packages of licences that they were eligible to bid for in the clock rounds but did not.

36. A bidder will be able to submit a supplementary bid for any given package of licences within its initial eligibility. However, bidders will not be allowed to submit a bid on the zero package (i.e. null set), as the only allowable bid amount is zero (\$0). The limit on the number of different supplementary round packages that a bidder will be allowed to place will be announced after the bidder qualification has occurred, but will be no less than 500 different packages.

37. The bid amount of a package bid in the supplementary round must be at least the sum of the opening bid prices for all of the licences included in the package. Furthermore, if a bidder submits a package bid on a package from the clock rounds, the bid amount for that package must be greater than the bidder's highest clock round bid for that package.

38. There is no limit on the supplementary bid amount for the final clock package, which is the package that the bidder bid on in the final clock round, unless the final clock package is the zero package. The GARP-based activity rule requires that each package bid in the supplementary round must satisfy revealed preference with respect to the final clock round and all rounds (if any) in which the bidder bid for packages of a smaller size than this package.

39. The structure of the supplementary round bidding constraints guarantees that the final clock allocation will not change if there is no excess supply in the final clock round. Each winner is guaranteed to win its final clock package without making any supplementary bids. If there is excess supply, a bidder will be allocated its final clock package if its only supplementary bid is

for the final clock package, but with a bid amount that is increased by at least the value of the excess supply as evaluated at the final clock prices less the opening bid prices of the excess supply. However, because the aggregate demand in the final clock round will not be made available to bidders as they go into the supplementary round, the bidder should be motivated to bid truthfully to improve its chance of winning its most preferred package. Furthermore, the ability to ensure this allocation may be compromised if any other supplementary bid does not include, at a minimum, all of the licences contained in the bidder's final clock package.

40. The revealed preference limit in conjunction with the non-disclosure of the final clock round aggregate demand provides a strong incentive for truthful bidding during the supplementary round, encouraging bidders to bid based on their valuations rather than on any expected guarantee of winning their final clock package.

41. Note that the bid for a constraining package may itself be subject to a revealed preference limit with respect to another package. Thus, the rule may have the effect of creating a chain of constraints on the dollar amount of a supplementary bid for a package  $Q$  relative to the dollar amounts of other clock bids or supplementary bids.

42. See annex D for the algebraic formulation of the GARP-based activity rule and see annex E for an example.

#### **10. Determining the winning packages in the allocation stage**

43. All valid bids received from bidders in the clock rounds and in the supplementary round are considered for the determination of winning packages.

44. A reserve bid for every licence, at the opening bid price, will be included in the determination of winning bidders at the end of the allocation stage. In this process, it is as though ISED is a bidder in the auction, placing a bid on every licence at the opening bid price. The purpose of including a reserve bid for every licence is to ensure that the incremental value that a bidder would be prepared to pay for an additional licence is at least the opening bid price of that licence. The reserve bids will not be treated as a package, but rather as having been placed by different bidders so that any number of reserve bids can be selected in the winning combination.

45. A solver will be used to identify the highest value combination of valid bids subject to the requirements that each bidder wins no more than one of its packages, the quantity of open blocks allocated in a service area must not exceed four, and the quantity of open plus set-aside blocks allocated in a service area must not exceed seven. Note that it is possible to assign more than three blocks to a set-aside-eligible bidder in a service area. If there is only one combination of bids that meets the criteria, this will be the winning outcome that determines the winning packages and the winning bidders.

46. If more than one combination of valid bids has the same highest value, the tie will first be resolved by minimizing the number of "lost licences," where a lost licence is a licence that was included in the bidder's final clock package, but is not included in an alternate package that could be assigned to the bidder. The rationale for selecting the combination of valid bids that

minimizes the number of lost licences as the first tie-breaking rule is so that an allocation that is the most similar to the final clock allocation is selected.

47. If there is still a tie, the second tie-breaking rule will be to select the combination of valid bids that includes the greatest number of associated eligibility points. Note that if reserve bids are part of the winning combination, the eligibility points associated with the reserve bids will not count towards the eligibility points of the winning combination. This is to maximize the quantity of spectrum that is allocated. If, subsequently, there is still a tied outcome, the tie will be broken by a pseudo-random number generator built into the auction software.

#### **11. Determining the base price in the allocation stage**

48. The base price is the minimum amount that winning bidders will pay for their generic winning packages; it does not include the additional, incremental amount that winning bidders may pay for specific licences, as determined in the assignment stage. The base price will be determined using all valid bids submitted by all bidders during the allocation stage, as well as the reserve bids.

49. ISED will use a second-price rule to calculate the base prices such that winning bidders, individually and collectively, will pay an amount that is sufficient to ensure that there is no other bidder or group of bidders prepared to pay more for the licences. This amount will be less than or equal to the actual winning bid submitted in the allocation stage, either in the clock rounds or the supplementary round, and must be greater than or equal to the total sum of the opening bid prices for the combination of licences included in their winning package. The benefit of using a second-price rule is that it encourages bidders to bid truthfully, potentially leading to a more efficient outcome.

50. ISED will apply bidder-optimal core prices and will use the “nearest Vickrey” approach to determine the base prices. In some cases, the second price (Vickrey price) may not be high enough to ensure that there is no alternative bidder or group of bidders prepared to pay more for the licences in question, and so an additional payment above Vickrey prices may be required. In the event that such a payment is required, the calculation of the additional payment to be paid by each winning bidder will be weighted based on the relative size of its winning package of licences evaluated at the opening bid prices. Further information on the determination of base prices can be found in annex F.

#### **12. Information at the end of the allocation stage**

51. At the end of the allocation stage, each bidder will be informed of its own winning package, along with the base price that it will pay for its package.

52. At this point, bidders will know with certainty the number of licences in each product that they have won; however, given that these are generic licences, they will not necessarily know the specific frequency blocks that they have won.



**13. The assignment stage**

53. As generic licences will be offered, the auction will then advance to the assignment stage, where the specific assignment of the generic licences will be determined. Only bidders that have won one or more generic licences during the allocation stage will have the option to participate in the assignment stage.

54. The assignment stage will be used to determine the specific frequency blocks that winning bidders will be assigned. The assignment stage will make no distinction between bidder types (set-aside-eligible or set-aside-ineligible) in the determination of specific assignments.

55. The assignment stage will consist of a sequence of assignment rounds. In each assignment round, bidders will be presented with a set of options available to them for the products being assigned, taking into consideration the number of licences that the bidder won in the allocation stage (see section 14 of this annex).

56. The assignment rounds will be run service area by service area (or combined service area—see paragraph 57 of this annex) in descending order of population, possibly conducting a separate round for each service area. This could potentially result in up to 16 assignment rounds. This process will enable bidders to know which specific frequencies they have won in the most populated service areas prior to their participation in the assignment rounds for the other less populated service areas.

57. In support of simplifying the assignment stage and facilitating the assignment of contiguous spectrum across service areas, two or more service areas will be combined into a single assignment round when they form a contiguous geographic area and when the winners and the number of licences they have won are the same in the service areas to be combined. In the previous sentence, note that set-aside licences and open licences are treated the same; for example, if Bidder A has won two set-aside licences in service area I and has won two open licences in service area II, that will not prevent service areas I and II from being combined into a single assignment round.

58. For example, the two contiguous service areas shown in the tables below would be eligible to be combined into a single assignment round.

**Table C1: Example of contiguous service areas**

Service area	Blocks						
	A	B	C	D	E	F	G
Service area I	Bidders 1, 2 and 3 win 1 block; Bidder 4, 5 win 2 blocks						
Service area II	Bidders 1, 2 and 3 win 1 block; Bidder 4, 5 win 2 blocks						

One possible assignment could be:

**Table C2: Example of possible assignment**

Service area	Blocks						
	A	B	C	D	E	F	G
Service area I	Bidder 5	Bidder 5	Bidder 3	Bidder 1	Bidder 2	Bidder 4	Bidder 4
Service area II	Bidder 5	Bidder 5	Bidder 3	Bidder 1	Bidder 2	Bidder 4	Bidder 4

With the combined service areas, bidders will only be permitted to bid for and win assignments that would give them the exact same blocks in each service area.

59. 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 already been allocated. Each winning bidder has both a right and an obligation to purchase one of the frequency range options presented to it in the assignment round at the determined price.

60. For each assignment round, a solver will be used to identify the combination of specific assignments of licences that result in the highest bid amount. In the event of a tied outcome with more than one specific assignment producing the same total value, the tie will be broken by a pseudo-random number generator built into the auction software.

61. Similar to the determination of base prices in the allocation stage, a second-price rule will be used to determine the assignment price to be paid for the assignment of specific licences such that winning bidders will pay an amount sufficient to ensure that there is no other bidder or group of bidders prepared to pay more for the licence(s).

62. The additional amount to be paid for the assignment of specific licences, known as the assignment price, is calculated for the package of specific licences bid for in the round, not for the individual licences. Given the pricing rules, the assignment price of each winning assignment stage package will be equal to or less than the corresponding winning bid amount, and could even be zero.

63. ISED will apply bidder-optimal core prices and use a “nearest Vickrey” approach to determine assignment prices. In the event that an additional payment above Vickrey prices is required, the calculation of the additional payment to be paid by each winning bidder will be weighted based on the relative size of the package it is being assigned in the given assignment round, evaluated at the opening bid prices. Further information on the determination of assignment prices can be found in annex F.

**14. Assigning contiguous spectrum in the assignment stage**

64. Recognizing the efficiency gains from having contiguous blocks of spectrum, ISED will assign bidders contiguous spectrum within a service area.

65. ISED will present all contiguous bidding options that are consistent with the allocation

stage winnings of a bidder, regardless of what other bidders have won. For example, a bidder that won two generic blocks in the allocation stage will have six bidding options: AB, BC, CD, DE, EF and FG, regardless of what other bidders won in the allocation stage. The bidder might not be able to win some of its bidding options if they are inconsistent with the contiguity restrictions of paragraph 64 of this annex. The purpose in presenting all contiguous bidding options, regardless of what other bidders have won, is to maintain anonymous bidding as much as possible and thereby reduce the potential for gaming behaviour in the assignment stage.

66. Further information on the process for submitting assignment round bids will be available in the information package provided to qualified bidders.

**15. Information at the end of each assignment round**

67. Following the end of each assignment round, after the results have been verified, participating bidders will be notified of the specific licences that they have won and the assignment price to be paid. In doing this, bidders will know their own results from one assignment round before participating in a subsequent assignment round.

**16. Final price**

68. At the end of the assignment stage, ISED will determine the final price that each winning bidder will be required to pay for the package of licences it has won. This final price will be equal to the base price plus any associated assignment price(s).

**17. Information at the end of the assignment stage**

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

**18. Information after the end of the auction**

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

- the list of winning bidders, licences won (including category) and prices to be paid;
- the bids submitted by each bidder in every clock round, including their identity;
- the prices for each product in every clock round;
- the supplementary bids submitted by each bidder, including their identity; and
- the assignment bids submitted by each bidder, including their identity.



## Annex D—Algebraic description of the GARP-based activity rules in the clock rounds and the supplementary round

### 1. Algebraic description of the GARP-based activity rule in the clock rounds

1. The GARP-based activity rule allows a bidder to submit a bid for a package  $Q$  that exceeds its eligibility if all of its bids—starting with the last round in which the bidder had sufficient eligibility for package  $Q$  and ending in the current round with a bid for package  $Q$ —are consistent with truthful bidding according to some set of implied valuations.

2. Algebraically, to check whether in round  $t$  a bidder is permitted to bid on a package  $Q_t$  that exceeds the bidder's eligibility, the auction system considers the last round (denoted by  $s$ ) that the bidder had sufficient eligibility for the package  $Q_t$ . The bidder is allowed to bid on package  $Q_t$  in round  $t$  if there exists a set of numbers  $V_k$  for  $k = s, \dots, t$  such that the following inequalities are satisfied:

$$V_j - \sum_{i=1}^m P_{k,i} \cdot Q_{j,i} \leq V_k - \sum_{i=1}^m P_{k,i} \cdot Q_{k,i}, \quad \text{for all } j = s, \dots, t \quad \text{and} \quad k = s, \dots, t,$$

where:

$j$  and  $k$  index the rounds

$i$  indexes the products

$m$  is the number of products (i.e. 32)

$Q_{j,i}$  is the quantity of the  $i^{\text{th}}$  product in package  $Q_j$  of clock round  $j$

$Q_{k,i}$  is the quantity of the  $i^{\text{th}}$  product in package  $Q_k$  of clock round  $k$

$P_{k,i}$  is the clock price of the  $i^{\text{th}}$  product in clock round  $k$

$V_j$  is the bidder's implied valuation for package  $Q_j$  of clock round  $j$

$V_k$  is the bidder's implied valuation for package  $Q_k$  of clock round  $k$

The inequalities above require that, for each round  $k$ , the bidder's implied valuation for the package it selected in round  $k$  minus the price for that package in round  $k$  is greater than or equal to the bidder's implied valuation for the package it selected in another round, for example  $j$ , minus the price for that package in round  $k$ . This test is conducted for all pairs of rounds up to round  $t$ .

3. The existence of numbers  $V_k$  for  $k = s, \dots, t$  that satisfy the inequalities in paragraph 2 of this annex is equivalent to satisfying the GARP-based activity rule. GARP requires that the bidder's

bidding choices in rounds  $s, s+1, \dots, t$  correspond to truthful bidding with respect to some set of implied valuations,  $v(Q)$ , for every package  $Q$ . A bidder bids truthfully with respect to a set of valuations  $v(Q)$  if, given the current price  $P_Q$  for each package  $Q$ , the bidder maximizes its profit  $v(Q) - P_Q$  in each round.

## 2. Algebraic description of the GARP-based activity rule in the supplementary round

4. There is no limit on the supplementary bid amount for the final clock package unless the final clock package is the zero package. The GARP-based activity rule requires that each other package bid in the supplementary round must satisfy revealed preference with respect to the final clock round and all rounds (if any) in which the bidder bid for packages of a strictly smaller size than this package.

5. A supplementary bid,  $B$ , for the package  $Q$  satisfies revealed preference with respect to a clock round  $s$ , if the bid amount  $B$  minus the price for package  $Q$  in round  $s$  is less than or equal to the highest dollar amount bid on the package bid on in clock round  $s$ —that is,  $B_s$ —minus the price for that package in round  $s$ . Algebraically, the revealed preference constraint is the condition that:

$$B - \sum_{i=1}^m P_{s,i} \cdot Q_i \leq B_s - \sum_{i=1}^m P_{s,i} \cdot Q_{s,i},$$

where:

$i$  indexes the products

$m$  is the number of products

$Q_i$  is the quantity of the  $i^{\text{th}}$  product in package  $Q$

$Q_{s,i}$  is the quantity of the  $i^{\text{th}}$  product in package  $Q_s$  of clock round  $s$

$P_{s,i}$  is the clock price of the  $i^{\text{th}}$  product in clock round  $s$

$B$  is the dollar amount of the supplementary bid on package  $Q$

$B_s$  is the highest dollar amount bid on package  $Q_s$  either in a clock round or in the supplementary round

6. The bidder is allowed to submit a supplementary bid for an amount  $B$  on a package  $Q$  if it satisfies the inequality condition of paragraph 5 of this annex for all rounds  $s$  that are the final clock round or another round in which the bidder bid for a package of strictly smaller size than  $Q$ .

**Annex E—Example of the GARP-based activity rule for the clock rounds and supplementary round**

1. Consider a set-aside-ineligible bidder, with initial eligibility of 200 points and a budget of \$1,600,000, which is interested in ten (10) service areas associated with the following eligibility points: SA1, ..., SA5 (20 points) and SA6, ..., SA10 (14 points).
2. Suppose the bidder wants to bid on two open licences in each of five service areas, SA1 to SA5 (Package A). However, if the price of Package A exceeds the price of a package with two licences in SA6 to SA10 (Package B) by more than \$400,000, then the bidder prefers Package B.
3. As prices increase, the bidder may be unable to continue bidding on either Package A or Package B, and will need to reduce its demand to one licence. In this case, the bidder prefers one licence in SA1 to SA5 (Package C) but will switch to one licence in SA6 to SA10 (Package D) if the price of Package C exceeds the price of Package D by more than \$200,000.
4. Table E1 provides the clock round bidding history for this bidder. Round 8 is the final clock round.

**Table E1: Clock round bidding history**

Round	Prices (thousands)						Bid (package)	Activity (eligibility)	Bid amount (thousands)
	SA1	...	SA5	SA6	...	SA10			
1	\$100	...	\$100	\$70	...	\$70	2 open in SA1 to SA5 (A)	200 (200)	\$1,000
2	\$120	...	\$120	\$70	...	\$70	2 open in SA6 to SA10 (B)	140 (200)	\$700
3	\$140	...	\$140	\$90	...	\$90	2 open in SA6 to SA10 (B)	140 (140)	\$900
4	\$140	...	\$140	\$110	...	\$110	2 open in SA1 to SA5 (A)	200 (140)	\$1,400
5	\$160	...	\$160	\$130	...	\$130	2 open in SA1 to SA5 (A)	200 (140)	\$1,600
6	\$180	...	\$180	\$150	...	\$150	2 open in SA6 to SA10 (B)	140 (140)	\$1,500
7	\$200	...	\$200	\$170	...	\$170	1 open in SA1 to SA5 (C)	100 (140)	\$1,000
8	\$220	...	\$220	\$170	...	\$170	1 open in SA6 to SA10 (D)	70 (100)	\$850

5. In rounds 1, 2, 3, 6, 7 and 8, bids were within the bidder's eligibility, so revealed preference did not apply; however, in rounds 4 and 5, the bidder's activity exceeded its eligibility points.



*Round 4*

6. Using the GARP-based activity rule, to bid on Package A in Round 4, all of the bidder's bids, starting with the last round in which the bidder had sufficient eligibility to bid on Package A (Round 2) and ending in Round 4 with a bid on Package A, must be consistent with truthful bidding for some implied valuations. Mathematically, these revealed preference constraints are calculated as follows.

There needs to exist values  $V_2, V_3$ , and  $V_4$  such that the following inequalities are satisfied.

$$\begin{aligned} V_3 - (\text{Price of } B \text{ in } R2) &\leq V_2 - (\text{Price of } B \text{ in } R2) \\ V_4 - (\text{Price of } A \text{ in } R2) &\leq V_2 - (\text{Price of } B \text{ in } R2) \\ V_2 - (\text{Price of } B \text{ in } R3) &\leq V_3 - (\text{Price of } B \text{ in } R3) \\ V_4 - (\text{Price of } A \text{ in } R3) &\leq V_3 - (\text{Price of } B \text{ in } R3) \\ V_2 - (\text{Price of } B \text{ in } R4) &\leq V_4 - (\text{Price of } A \text{ in } R4) \\ V_3 - (\text{Price of } B \text{ in } R4) &\leq V_4 - (\text{Price of } A \text{ in } R4) \end{aligned}$$

The first two inequalities arise because of the bid in Round 2, the next two inequalities because of the bid in Round 3, and the final two inequalities because of the desired bid on Package A in Round 4.

7. These six inequalities then become

$$\begin{aligned} V_3 - \$700,000 &\leq V_2 - \$700,000 &\Rightarrow & V_3 \leq V_2 \\ V_4 - \$1,200,000 &\leq V_2 - \$700,000 &\Rightarrow & V_4 \leq V_2 + \$500,000 \\ V_2 - \$900,000 &\leq V_3 - \$900,000 &\Rightarrow & V_2 \leq V_3 \\ V_4 - \$1,400,000 &\leq V_3 - \$900,000 &\Rightarrow & V_4 \leq V_3 + \$500,000 \\ V_2 - \$1,100,000 &\leq V_4 - \$1,400,000 &\Rightarrow & V_2 \leq V_4 - \$300,000 \\ V_3 - \$1,100,000 &\leq V_4 - \$1,400,000 &\Rightarrow & V_3 \leq V_4 - \$300,000 \end{aligned}$$

8. These six inequalities are satisfied if and only if  $V_2 = V_3$  and  $V_3 + \$300,000 \leq V_4 \leq V_3 + \$500,000$ . Since there exist values that satisfy all of these constraints simultaneously, the bidder is allowed to bid on Package A in Round 4.

*Note:* Given the same relative clock prices in both Round 2 and Round 3, and the fact that the bidder bid on the same package in both rounds, the revealed preference constraints associated with one of these rounds (either Round 2 or Round 3) are redundant and can be omitted. As a result, the system of six inequalities can be simplified to a system with one equation,  $V_2 = V_3$ , and two inequalities:

$$\begin{aligned} V_4 - \$1,400,000 &\leq V_3 - \$900,000 &\Rightarrow & V_4 \leq V_3 + \$500,000 \\ V_3 - \$1,100,000 &\leq V_4 - \$1,400,000 &\Rightarrow & V_3 \leq V_4 - \$300,000 \end{aligned}$$

*Round 5*

9. Similar to Round 4, to bid on Package A in Round 5, all of the bidder's bids, starting with

Round 2 and ending in Round 5, must be consistent with truthful bidding for some implied valuation. As noted in paragraph 8 of this annex, the revealed preference constraints associated with one of Round 2 or Round 3 are redundant and can be omitted. Mathematically, these revealed preference constraints are calculated as follows.

There needs to exist values  $V_2, V_3, V_4,$  and  $V_5$  such that  $V_2 = V_3$  and the following inequalities are satisfied.

$$\begin{aligned} V_4 - (\text{Price of A in R3}) &\leq V_3 - (\text{Price of B in R3}) \\ V_5 - (\text{Price of A in R3}) &\leq V_3 - (\text{Price of B in R3}) \\ V_3 - (\text{Price of B in R4}) &\leq V_4 - (\text{Price of A in R4}) \\ V_5 - (\text{Price of A in R4}) &\leq V_4 - (\text{Price of A in R4}) \\ V_3 - (\text{Price of B in R5}) &\leq V_5 - (\text{Price of A in R5}) \\ V_4 - (\text{Price of A in R5}) &\leq V_5 - (\text{Price of A in R5}) \end{aligned}$$

The first two inequalities arise because of the bid in Round 3, the next two because of the bid in Round 4, and the final because of the desired bid on Package A in Round 5.

10. These six inequalities then become

$$\begin{aligned} V_4 - \$1,400,000 &\leq V_3 - \$900,000 &\Rightarrow V_4 &\leq V_3 + \$500,000 \\ V_5 - \$1,400,000 &\leq V_3 - \$900,000 &\Rightarrow V_5 &\leq V_3 + \$500,000 \\ V_3 - \$1,100,000 &\leq V_4 - \$1,400,000 &\Rightarrow V_3 &\leq V_4 - \$300,000 \\ V_5 - \$1,400,000 &\leq V_4 - \$1,400,000 &\Rightarrow V_5 &\leq V_4 \\ V_3 - \$1,300,000 &\leq V_5 - \$1,600,000 &\Rightarrow V_3 &\leq V_5 - \$300,000 \\ V_4 - \$1,600,000 &\leq V_5 - \$1,600,000 &\Rightarrow V_4 &\leq V_5 \end{aligned}$$

11. These six inequalities are satisfied if and only if  $V_4 = V_5$  and  $V_3 + \$300,000 \leq V_5 \leq V_3 + \$500,000$ . Since there exist values that satisfy all of these constraints simultaneously, the bidder is again allowed to bid on Package A in Round 5.

*Note:* Given the same relative clock prices in both Round 4 and Round 5, and the fact that the bidder bid on the same package in both rounds, the revealed preference constraints associated with one of these rounds (either Round 4 or Round 5) are redundant and can be omitted. As a result, the system of six inequalities can be simplified to a system with one equation,  $V_4 = V_5$ , and two inequalities:

$$\begin{aligned} V_5 - \$1,400,000 &\leq V_3 - \$900,000 &\Rightarrow V_5 &\leq V_3 + \$500,000 \\ V_3 - \$1,300,000 &\leq V_5 - \$1,600,000 &\Rightarrow V_3 &\leq V_5 - \$300,000 \end{aligned}$$

*Supplementary round*

12. The following table summarizes the bidder's highest bid on each of its packages based the clock round bidding history listed above. These four bids will be carried into the supplementary round.

<b>Table E2: Clock round package bids</b>				
<b>Package</b>	<b>Round</b>	<b>Bid</b>	<b>Activity</b>	<b>Bid amount (thousands)</b>
A	5	2 open in SA1 to SA5	200	\$1,600
B	6	2 open in SA6 to SA10	140	\$1,500
C	7	1 open in SA1 to SA5	100	\$1,000
D	8	1 open in SA6 to SA10	70	\$850

13. Suppose that this bidder does not increase its bids for any of its clock packages (A, B, C and D) in the supplementary round.

14. Suppose that the bidder is now interested in bidding on a package consisting of one licence in all service areas (SA1 to SA10), called Package E, which is associated with 170 eligibility points.

15. The GARP-based activity rule requires that each supplementary bid satisfy revealed preference with respect to the final clock round and all rounds (if any) in which the bidder bid for packages of a smaller size than this package.

16. For Package E, the bid must satisfy revealed preference with respect to rounds 2, 3, 6, 7 and 8. Rounds 1, 4 and 5 are excluded because Package A (bid on in rounds 1, 4 and 5) is larger than Package E.

*Package B with respect to Round 2*

$$\begin{aligned} (\text{Sup. Bid on E}) - (\text{Price of E in R2}) &\leq (\text{Highest bid on B}) - (\text{Price of B in R2}) \\ (\text{Sup. Bid on E}) &\leq (\text{Highest bid on B}) - (\text{Price of B in R2}) + (\text{Price of E in R2}) \\ (\text{Sup. Bid on E}) &\leq \$1,500,000 - \$700,000 + \$950,000 \\ (\text{Sup. Bid on E}) &\leq \$1,750,000 \end{aligned}$$

*Package B with respect to Round 3*

$$\begin{aligned} (\text{Sup. Bid on E}) - (\text{Price of E in R3}) &\leq (\text{Highest bid on B}) - (\text{Price of B in R3}) \\ (\text{Sup. Bid on E}) &\leq (\text{Highest bid on B}) - (\text{Price of B in R3}) + (\text{Price of E in R3}) \\ (\text{Sup. Bid on E}) &\leq \$1,500,000 - \$900,000 + \$1,150,000 \\ (\text{Sup. Bid on E}) &\leq \$1,750,000 \end{aligned}$$

*Package B with respect to Round 6*

$$\begin{aligned} (\text{Sup. Bid on E}) - (\text{Price of E in R6}) &\leq (\text{Highest bid on B}) - (\text{Price of B in R6}) \\ (\text{Sup. Bid on E}) &\leq (\text{Highest bid on B}) - (\text{Price of B in R6}) + (\text{Price of E in R6}) \\ (\text{Sup. Bid on E}) &\leq \$1,500,000 - \$1,500,000 + \$1,650,000 \\ (\text{Sup. Bid on E}) &\leq \$1,650,000 \end{aligned}$$

*Package C with respect to Round 7*



$$\begin{aligned}(\text{Sup. Bid on } E) - (\text{Price of } E \text{ in } R7) &\leq (\text{Highest bid on } C) - (\text{Price of } C \text{ in } R7) \\(\text{Sup. Bid on } E) &\leq (\text{Highest bid on } C) - (\text{Price of } C \text{ in } R7) + (\text{Price of } E \text{ in } R7) \\(\text{Sup. Bid on } E) &\leq \$1,000,000 - \$1,000,000 + \$1,850,000 \\(\text{Sup. Bid on } E) &\leq \$1,850,000\end{aligned}$$

*Package D with respect to Round 8*

$$\begin{aligned}(\text{Sup. Bid on } E) - (\text{Price of } E \text{ in } R8) &\leq (\text{Highest bid on } D) - (\text{Price of } D \text{ in } R8) \\(\text{Sup. Bid on } E) &\leq (\text{Highest bid on } D) - (\text{Price of } D \text{ in } R8) + (\text{Price of } E \text{ in } R8) \\(\text{Sup. Bid on } E) &\leq \$850,000 - \$850,000 + \$1,950,000 \\(\text{Sup. Bid on } E) &\leq \$1,950,000\end{aligned}$$

Without submitting a supplementary bid that increases the bid amount on any of its constraining packages, the bidder would be allowed to submit a bid on Package E up to \$1,650,000.<sup>3</sup>

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<sup>3</sup> Note that this limit is lower than the limit that would be calculated by the WARP-based activity rule used in the 700 MHz and 2500 MHz auctions (a limit of \$1,750,000), because the GARP-based activity rule includes revealed preference constraints for more rounds. See annex D of the Consultation for details.

## Annex F—Pricing rule

1. Prices will be determined at two points in the auction in the following order: first, at the end of the allocation stage in order to determine the base prices, which are the minimum that winning bidders will pay for their winning packages; and second, in the assignment stage at the end of each assignment round in order to determine the incremental payments for specific licences, known as assignment prices.
2. ISED will use a second-price rule to determine the prices to be paid by winning bidders. More specifically, ISED will apply bidder-optimal core prices and use the “nearest Vickrey” approach in determining both the base prices and the assignment prices. The final price paid by a winning bidder is the sum of the base price and the assignment price(s).

### *Base prices*

3. Each winning allocation stage bid has an associated price for the package of licences contained within the bid, known as the base price. A separate base price is determined for each winning bidder.
4. ISED will use a second-price rule to calculate base prices such that the base price for a winning bidder will be at least the opening bid price, but no higher than the actual amount bid. Second prices are often referred to as Vickrey prices and represent the opportunity cost of the bidder winning the package.
5. The Vickrey price for each winning bidder (known as “Bidder J” in this explanation) is calculated as follows. First, from the value of the winning combination of packages, subtract Bidder J’s winning bid (value A). Next, recalculate the winning combination of packages for the hypothetical situation in which all Bidder J’s bids are excluded, as if Bidder J had not participated (value B). The Vickrey price for Bidder J is calculated as the value of the winning combination of packages with all Bidder J’s bids excluded (value B) minus the sum of the winning allocation stage bids for all bidders other than Bidder J (value A), that is, value B minus value A. This is the minimum amount that the winning bidder could have bid in order to still have won the package, given the bids of all other bidders.
6. 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 payment to be made will be adjusted relative to the size of the bidder’s package, as measured by the bidder’s winning package evaluated at the opening bid prices.
7. The set of base prices for the winning allocation stage bids must satisfy the following conditions:

- (a) **First condition:** The base price for a winning allocation stage bid must be greater than or equal to the opening bid prices for the licences included in the package associated with the winning bid, but not more than the dollar amount of the winning bid.
  - (b) **Second condition:** The set of base prices must be sufficiently high that there is no alternative bidder, or group of bidders prepared to pay more than any winning bidder or group of winning bidders. If there is only one set of base prices that meet the first and second conditions, this determines the base prices for the allocation stage.
  - (c) **Third condition:** If there are many sets of base prices that fulfill the first and second condition, the set(s) of base prices minimizing the sum of base prices across winning bidders is (are) selected. If there is only one set of base prices satisfying these three conditions, this set determines the base prices for the allocation stage.
  - (d) **Fourth condition:** If there is more than one set of base prices that satisfy the first three conditions, the set of base prices that minimize the weighted sum of squares of differences between the base prices and the Vickrey prices will be selected. The weighting is relative to the price of the bidder's package as evaluated at the opening prices. This approach for selecting among sets of base prices that minimize the sum of base prices across winning bidders is referred to as the "nearest Vickrey" approach.
8. These conditions characterize a unique set of base prices such that each winning bidder pays no more than the dollar amount of its winning bid and pays at least the aggregate value of the opening bid prices for the package of licences.
9. A software algorithm will be used to determine the set of base prices that meets the conditions outlined above.
10. The following is an example of how base prices are calculated. This example is based on the 2013 *Spectrum Auction Design* paper by Peter Cramton.
11. For expository ease, in this example there are only two products, A and B, and the supply of each is equal to one. Suppose that there are five bidders, 1, 2, 3, 4, 5, bidding for two licences, A and B. The following bids are submitted ("b" designates the bidder):

$$b_1\{A\} = \$28$$

$$b_2\{B\} = \$20$$

$$b_3\{AB\} = \$32$$

$$b_4\{A\} = \$14$$

$$b_5\{B\} = \$12$$

The bids of the five bidders are represented in figure F1.

12. In this example, the highest value combination of bids would assign Licence A to Bidder 1 and Licence B to Bidder 2, generating \$48 in value. There is no other assignment of the licences that yields a higher value.

13. 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 Licence A to Bidder 4 at \$14 and Licence 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 allocation stage bids for all bidders other than Bidder 1 (\$20) — that is, its Vickrey price is \$14 (\$34 - \$20).

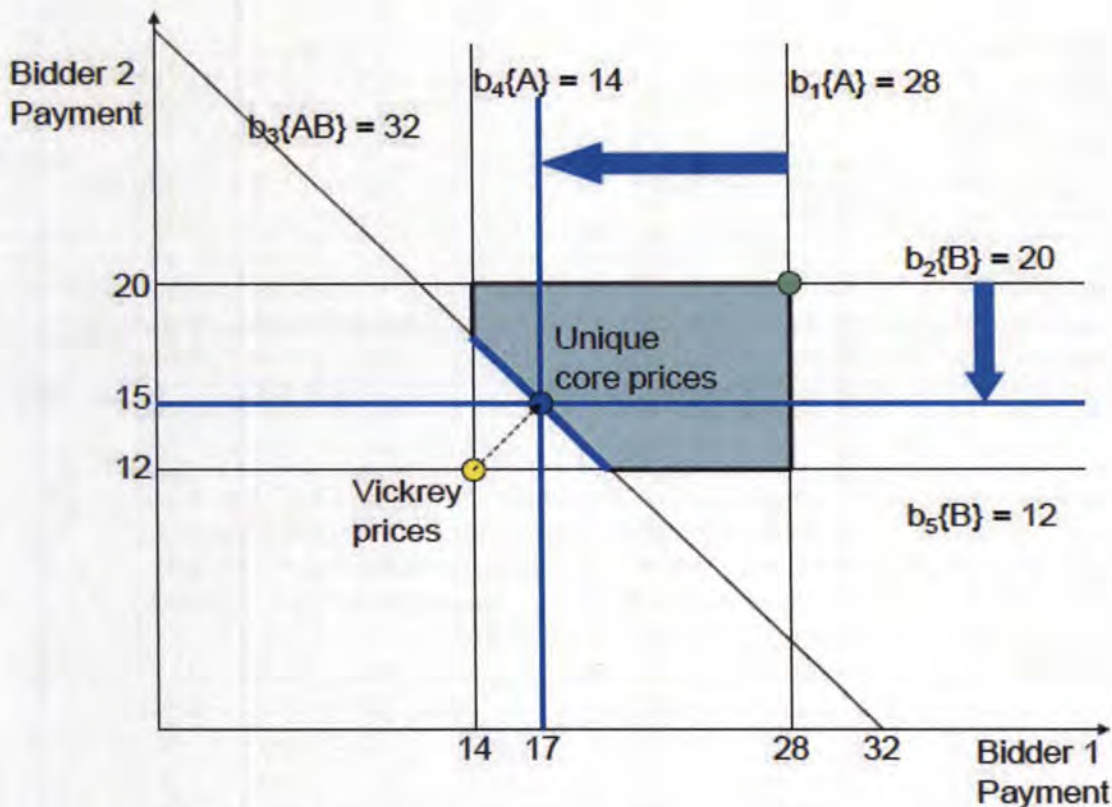
14. Similarly, to calculate the Vickrey price for Bidder 2, its winning bid (\$20) is subtracted from the value of the winning combination (\$48), resulting in \$28. Next, the winning combination of packages is recalculated for the hypothetical situation in which Bidder 2's bids are excluded. The best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

15. Hence, the Vickrey outcome is for Bidder 1 to pay \$14 for Licence A and for Bidder 2 to pay \$12 for Licence B. Total revenues with these payments are  $\$14 + \$12 = \$26$ . As shown in figure F1, 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.

16. However, these payments sum to \$26, which is less than Bidder 3's bid of \$32 for both licences 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 the licences in question. To do so, Bidder 1 and Bidder 2 must pay, collectively, at least \$32.



Figure F1: Example of calculating base prices



17. If the opening bid prices for Licence A and Licence B are the same amount, 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 F1.

18. However, if the opening bid prices for the two licences are different amounts, the two bidders must split the extra payment proportionately, in reference to the opening bid amounts (the fourth condition). For example, if the opening bid price for Licence A is \$8 and the opening bid price for Licence B is \$4, then the opening bid price of Bidder 1's package is twice as large as that of Bidder 2. Therefore, in this example, Bidder 1 would pay twice as much as Bidder 2 of the extra payment, with Bidder 1 paying an additional \$4, for a total payment of \$18 and Bidder 2 paying an additional \$2, for a final payment of \$14.

*Assignment prices*

19. The assignment stage will make no distinction between the set-aside or open status of a license in making specific assignments. The assignment rounds will be run service area by service area in descending order of the service area populations, and possibly conducting a separate round for each service area. This could potentially result in up to 16 assignment rounds.

20. In support of simplifying the assignment stage and facilitating the assignment of contiguous spectrum across service areas, two or more service areas will be combined into a single assignment round when the service areas form a contiguous geographic area and when the winners and the number of licences they have won are the same. See section 13 of annex C for an example.

21. The assignment bid is a package bid for the specific frequency locations of all licences being assigned in the round. The assignment prices will be determined from the set of assignment bids for the products being assigned in that round.

22. ISED will use a second-price rule to calculate the assignment prices. The assignment price is attributable to the entire collection of licences assigned in a given assignment round and not to individual licences that comprise the package.

23. For the purpose of calculating assignment prices, the Vickrey price for each winning 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 in the round (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.

24. The assignment prices from each assignment round must satisfy the following conditions:

- (a) **First condition:** The assignment prices must be positive or zero and not more than the dollar amount of the winning assignment stage bid.
- (b) **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.
- (c) **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 bidders is (are) selected. If there is only one set of assignment prices that satisfies these three conditions, this determines the assignment prices.
- (d) **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 price of the bidder's package being assigned in the given assignment round, evaluated at the opening prices. This approach for selecting among sets of assignment prices that minimize the sum of assignment prices across bidders is referred to as the "nearest Vickrey" approach.

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

