



Spectrum Management and Telecommunications

Consultation on a Licensing Framework for Mobile Broadband Services (MBS) — 700 MHz Band

June 18, 2012

Note: Clarification has been added to Annex B (paragraphs 17, 42 and 53) and to Annex C (paragraph 26).

Contents

1.	Intent	1
2.	Background	1
3.	General.....	2
3.1	Service Area for Lloydminster (Alberta/Saskatchewan)	3
4.	Auction Format and Rules	4
4.1	Auction Format	4
4.2	Proposed Auction Format for the 700 MHz Auction	5
5.	Bidder Participation — Affiliated and Associated Entities	11
5.1	Prohibition of Collusion.....	14
6.	Conditions of Licence for Spectrum in the 700 MHz Band	16
7.	Auction Process	30
7.1	Application to Participate	30
7.2	Opening Bids	30
7.3	Proposed Eligibility Points for the 700 MHz Spectrum Auction	31
7.4	Pre-auction Deposits	33
7.5	Bid Payment and Forfeiture Penalties	33
8.	Bidder Training and Support	34
9.	Post-auction Licensing Process for Unassigned Licences	34
10.	Licence Renewal Process.....	34
11.	Clarification Questions Process.....	35
12.	Submitting Comments.....	35
13.	Obtaining Copies.....	36
	Annex A – Glossary	37
	Annex B – The Combinatorial Clock Auction (CCA) Format	41
	Annex C – Example of the Proposed Activity Rules.....	54
	Annex D – Algebraic Description of Proposed Revealed Preference Activity Rules in the Clock Rounds and the Supplementary Round.....	61
	Annex E – Proposed Pricing Rule	64

1. Intent

1. Through the release of this paper, Industry Canada is hereby initiating a consultation on a licensing framework for Mobile Broadband Services (MBS) in the band 698-806 MHz (also known as the 700 MHz band) as announced in *Canada Gazette* notice SMSE-002-12, *Policy and Technical Framework: Mobile Broadband Services (MBS) – 700 MHz Band, Broadband Radio Service (BRS) – 2500 MHz Band*.¹

2. Subsequent to the initial consultation entitled SMSE-018-10, *Consultation on a Policy and Technical Framework for the 700 MHz Band and Aspects Related to Commercial Mobile Spectrum*,² released in November 2010, and the resulting policy decisions recently announced in the document SMSE-002-12,³ Industry Canada is now seeking comments on licensing considerations related to auction format, rules and processes, as well as on conditions of licence for spectrum in the 700 MHz band.

2. Background

3. The Minister of Industry, 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.

4. In developing a licensing framework for MBS in the 700 MHz band, Industry Canada will be guided by the objectives stated in section 7 of the *Telecommunications Act*, the policy objective stated in the *Spectrum Policy Framework for Canada*⁴ (SPFC) to maximize the economic and social benefits that Canadians derive from the use of the radio frequency spectrum, and the policy objectives outlined in SMSE-002-12,⁵ as follows:

- sustained competition in the wireless telecommunications services market so that consumers and businesses benefit from competitive pricing and choice in service offerings;

¹ See SMSE-002-12, *Policy and Technical Framework: Mobile Broadband Services (MBS) – 700 MHz Band, Broadband Radio Service (BRS) – 2500 MHz Band* (<http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10223.html>).

² See SMSE-018-10, *Consultation on a Policy and Technical Framework for the 700 MHz Band and Aspects Related to Commercial Mobile Spectrum* (<http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf09947.html>).

³ See SMSE-002-12, *Policy and Technical Framework: Mobile Broadband Services (MBS) – 700 MHz Band, Broadband Radio Service (BRS) – 2500 MHz Band* (<http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10121.html>).

⁴ See *Spectrum Policy Framework for Canada* (<http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf08776.html>).

⁵ See SMSE-002-12, *Policy and Technical Framework: Mobile Broadband Services (MBS) – 700 MHz Band, Broadband Radio Service (BRS) – 2500 MHz Band* (<http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10121.html>).

- robust investment and innovation by wireless telecommunications carriers so that Canadians benefit from world-class networks and the latest technologies; and
- availability of these benefits to Canadians across the country, including those in rural areas, in a timely fashion.

5. Industry Canada will also be guided by the general approaches and processes outlined in the *Framework for Spectrum Auctions in Canada* (FSAC),⁶ revised in March 2011.

3. General

6. In SMSE-002-12, *Policy and Technical Framework: Mobile Broadband Services (MBS) – 700 MHz Band, Broadband Radio Services (BRS) – 2500 MHz*, Industry Canada announced specific policy decisions related to the licensing process for spectrum in the 700 MHz band. Consistent with those decisions, the following provides an overview of the licences to be auctioned:

- licences will be “spectrum licences in respect of the utilization of specified radio frequencies within a defined geographic area,” as defined in subparagraph 5(1)(a)(i.1) of the *Radiocommunication Act*;
- licences will be auctioned using Tier 2 service areas (14 service areas) for all frequency blocks;
- a total of five blocks of paired spectrum and two blocks of unpaired spectrum will be available in each service area (seven licence blocks);
- a total of 98 licences will be offered;
- a spectrum cap of two paired frequency blocks will apply to all licensees; the unpaired blocks will not be subject to a spectrum cap;
- a spectrum cap of one paired spectrum block from within blocks B, C, C1 and C2 will apply to all large wireless service providers.⁷

7. For a complete list of policy decisions related to the 700 MHz band, refer to Section B of SMSE-002-12.⁸

⁶ See *Framework for Spectrum Auctions in Canada* (<http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf01626.html>).

⁷ Large wireless service providers are defined as companies with 10% or more of the national wireless subscriber market share, or 20% or more of the wireless subscriber market share in the province of the relevant licence area.

⁸ SMSE-002-12, *Policy and Technical Framework: Mobile Broadband Services (MBS) – 700 MHz Band, Broadband Radio Service (BRS) – 2500 MHz Band* (<http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10121.html>).

8. The following frequency blocks will be available in all 14 service areas for the 700 MHz auction.

Table 1 – Block size for spectrum in the 700 MHz band

Block	Frequency	Pairing	MHz
A	698–704 MHz/728–734 MHz	paired	6+6 MHz
B	704–710 MHz/734–740 MHz	paired	6+6 MHz
C	710–716 MHz/740–746 MHz	paired	6+6 MHz
D	716–722 MHz	unpaired	6 MHz
E	722–728 MHz	unpaired	6 MHz
C1	777–782 MHz/746–751 MHz	paired	5+5 MHz
C2	782–787 MHz/751–756 MHz	paired	5+5 MHz

3.1 Service Area for Lloydminster (Alberta/Saskatchewan)

9. In SMSE-002-12, Industry Canada indicated that Tier 2 service areas will be used to license all frequency blocks for the auction of 700 MHz spectrum licences. It also stated that the issue with respect to the tier boundaries around Lloydminster, Saskatchewan, would be discussed in the 700 and 2500 MHz consultations on licensing issues.

10. The issue surrounding Lloydminster was raised by SaskTel in response to SMSE-005-11, *Decisions on a Band Plan for Broadband Radio Service (BRS) and Consultation on a Policy and Technical Framework to License Spectrum in the Band 2500-2690 MHz*, where it proposed that tier area boundaries around Lloydminster are worthy of further consideration by Industry Canada.

11. Industry Canada uses service areas, called tiers, for all competitive licensing processes. These areas are based on Statistics Canada’s Census Divisions and Subdivisions. Four tier sizes, as outlined in the document *Service Areas for Competitive Licensing*, have been established to accommodate various wireless services, applications and frequency bands. The definition of the service areas within these tiers and accompanying maps and data tables are available on Industry Canada’s website.⁹

12. The smallest Tier service areas roll up to fit within the larger tier areas. Some minor deviations from provincial borders exist. These deviations were made around provincial borders to avoid having a service area boundary cut through a population centre, thereby minimizing potential interference problems.

13. For example, a large portion of Lloydminster, which falls in both Saskatchewan and Alberta, has been captured by service area 4-129 Lloydminster (Alberta). Consequently, the majority of the City of Lloydminster is included in service area 4-129 Lloydminster (Alberta) and respectively in the Tier 3 service area 3-44 (Edmonton) and Tier 2 service area 2-12 (Alberta). As

⁹ Service Areas for Competitive Licensing (http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/h_sf01627.html).

the smaller service area 4-129 is part of the Alberta tier, the effect is that the majority of the City of Lloydminster is currently part of the Alberta service area in tiers 2, 3 and 4.

14. Industry Canada considers that the rationale for the deviations around provincial borders continues to be valid and that any changes which would affect the licensing consistency of existing and future licensing processes are not warranted. Therefore, it is proposed that the current boundaries surrounding service area 4-129 (and thus tiers 3-44 and 2-12) continue to apply.

Industry Canada is seeking comments on whether or not the service area boundary for licences in the 700 MHz band should deviate from the provincial boundary around the City of Lloydminster, (Alberta/Saskatchewan).

4. Auction Format and Rules

15. The auction format should be simple, fair and transparent for bidders; one that leads to an efficient assignment of spectrum. In the selection of an auction format and related rules, consideration is given to the characteristics of the spectrum being auctioned, for example, the quantity and size of the blocks, their geographic characteristics and the similarities that may exist among the blocks.

4.1 Auction Format

16. Industry Canada used the Simultaneous Multiple Round Ascending (SMRA) auction format in its first auction in 1999 and in four of its six subsequent spectrum auctions.¹⁰ The SMRA auction format has been used in spectrum auctions in many countries for more than 15 years. Countries that have used this format in recent spectrum auctions include Italy, Germany, Mexico, Spain, the United States, as well as the Special Administrative Region of Hong Kong.

17. In an SMRA auction, all licences are auctioned simultaneously over a series of rounds. In each round, bids are submitted on individual licences at the announced prices. At the end of each round, a standing high bidder is identified for each licence. The standing high bidder is then committed to the licence and cannot withdraw its bid without the possibility of incurring a penalty. The standing high bidder is released from its commitment when outbid by another bidder. When a licence receives at least one bid, the price for the licence increases in the next round. As the prices rise gradually over multiple rounds, bidders gather information about how the other auction participants value the licences. This price discovery helps to reduce a bidder's uncertainty regarding the value of the licences. Bidders are able to respond to these changes in prices accordingly, shifting their bids to licences that continue to be consistent with their business

¹⁰ Industry Canada used an SMRA for the 24 and 38 GHz auction in 1999, the Personal Communications Services (PCS) auction in 2001, the 2300/3500 MHz auction in 2004, the two-phased residual auction for 2300/3500 MHz in 2004 (Phase 1) and 2005 (Phase 2), and the Advanced Wireless Services (AWS) auction in 2008. Industry Canada used a sealed bid, second-price auction design for two auctions held in 2009 (the Air-Ground auction and the auction of residual spectrum licences in the 2300/3500 MHz bands).

objectives. Activity rules are in place to compel active bidding and encourage truthful bids throughout the auction, that is, bidding in a straightforward manner that is consistent with how they truly value the licences. The auction ends when a round passes in which no new bids are received on any licences.

18. The SMRA auction format is a well understood, effective approach to assigning spectrum licences and it remains popular to date; however, it does have some weaknesses. The most notable weakness is the exposure risk, that is, the possibility that a bidder will win some but not all of the licences needed for its business case and may be left stranded with licences that cannot be used as effectively. In an SMRA auction format, bidding is for individual licences only, leaving bidders which seek to aggregate blocks of licences that are contiguous and/or across multiple service areas, vulnerable to the exposure risk.

19. In an SMRA auction, in order to mitigate the exposure risk, bidders are able to withdraw their standing high bids, switching to other desired licences or withdrawing from the auction altogether. However, they may be subject to withdrawal penalties, which are in place to discourage bidders from withdrawing their bids frivolously.

20. Advancements in auction theory and design have led to the development of new auction formats and rules. Industry Canada has been examining these new developments in consideration of the auction format and rules for the 700 MHz auction. One of these advancements is the combinatorial clock auction (CCA) format, which is a variation of the SMRA format in that all licences are auctioned at the same time over multiple rounds. Similar to the SMRA format, the CCA format provides a simple bidding process for participants, including a price discovery stage; however, instead of bidding on individual licences, bidders express their demand for a package of licences at the prevailing prices. The use of package bidding eliminates the exposure risk inherent in the SMRA format. Furthermore, unlike the SMRA format, the CCA format does not require the identification of a ‘standing high bidder’ that is held responsible for individual licences at the end of each round, which makes it easier for bidders to move to substitute licences in response to price changes.

4.2 Proposed Auction Format for the 700 MHz Auction

21. Industry Canada is proposing to use the CCA format for the 700 MHz auction. Pricing and activity rules will be established to encourage truthful bidding throughout the auction (see Section 4.2.3). Industry Canada is also proposing to limit the degree of information disclosed regarding bidding activity (see Section 4.2.4). Further information on the proposed CCA format and auction rules for the 700 MHz auction can be found in Annex B.

22. CCAs have been used in several countries since 2008, including the United Kingdom, the Netherlands, Denmark, Austria and Switzerland, and are planned for upcoming digital dividend auctions in Australia, Ireland and the United Kingdom.

4.2.1 Proposed Auction Attributes

23. One of the key attributes of the CCA is the use of package bidding wherein for each round, the participant specifies the set of licences that it would like, at the announced prices, creating a single bid for a package. The package bid is treated as an all-or-nothing bid and the package is awarded in its entirety, or not at all. By bidding on a package of licences rather than individual licences, the exposure risk is eliminated given that only the bid for the entire package can be a winning bid, and not the components of that package. This is particularly important given the regional nature of the licences to be auctioned and the potential for complementarities across these regional licences.

Generic Licences

24. For the 700 MHz auction, Industry Canada is proposing the use of generic licences as an additional attribute to the CCA format.

25. Generic licences are blocks of spectrum that are similar enough and of comparable value such that they can be offered in a single category, as described in Table 2 below. A category can include a single licence or a group of generic licences for each service area. A category in a given service area is referred to as a product. Bidders will be able to specify the number of licences in each category in each service area (i.e. in each product) that they would like as part of their package. The winning bidders of the generic licences are able to express their preferences for specific frequencies in an assignment stage. By their very nature, categories of generic licences enhance the possibility of substitution. As well, the use of generic licence blocks simplifies the bidding process, as it reduces the possible number of combinations on which bids may be placed.

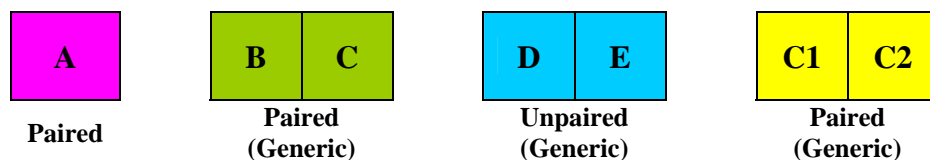
26. For the upcoming 700 MHz auction, Industry Canada is proposing that the following licences be treated as generic licences in each service area:

- blocks B and C in the Lower 700 MHz band (two paired generic licences);
- blocks D and E in the Lower 700 MHz band (two unpaired generic licences); and
- blocks C1 and C2 in the Upper 700 MHz band (two paired generic licences).

Note: Industry Canada is not proposing to include Block A in the same generic category as blocks B and C in the Lower 700 MHz band. There appear to be significant differences in the availability of technology for Block A at present, relative to blocks B and C, thereby making the current value of Block A not comparable.

27. These generic licence categories were determined based on the anticipated substitutability of the blocks. Considerations included frequency location in the band, block size, technology and interference constraints. Table 2 illustrates the four categories that are proposed for each of the 14 Tier 2 service areas. One of the categories includes a single licence block, whereas the other three categories include generic licences.

Table 2 – Categories of licences in each service area



28. It is recognized that contiguous spectrum is preferable to non-contiguous spectrum in terms of technological efficiency. Industry Canada is proposing to design the auction so that if a bidder wins the A licence and one of the B and C licences in a service area, then the bidder will automatically be assigned the A and B licences in that service area. This would guarantee contiguity across these two categories in a service area, which is expected to lead to a more efficient use of the spectrum.

4.2.2 Overview of the CCA Process

29. There are typically two stages in the CCA process: the allocation stage, and if there are generic licences, the assignment stage. The process is shown in Figure 1 of Annex B.

30. In the **allocation stage**, the number of spectrum licences that a bidder wins in each service area is determined. It consists of:

- **clock rounds**, a series of rounds where bidders submit a bid for a package of licences (some of which may be generic) in response to prices announced by Industry Canada. The clock rounds continue until there is no excess demand for any of the licences. This is the price discovery stage of the auction.
- **a supplementary round**, a single round where bidders have the opportunity to make additional bids for packages of licences at prices that they set, subject to limits that are based on their clock round bids.

31. The **assignment stage** is where winning bidders have the opportunity to make additional bids to express their preferences for particular frequency assignments within the generic licences that they have won.

32. The use of the CCA format and, in particular, the use of generic licences, is expected to contribute to a reduction in the length of the auction, in comparison with the length of an SMRA auction. As well, Industry Canada will use activity-based increments in the clock rounds, where bid increments for a product reflect the level of excess demand. This is also expected to shorten the auction duration, as these increments will increase more quickly for products with higher demand.

33. In light of the decisions announced in SMSE-002-12, during all stages of the 700 MHz auction, a spectrum cap of two paired frequency blocks (blocks A, B, C, C1 and C2) will apply to all bidders. Therefore, in each round, no bidder will be able to bid on more than two licences of paired spectrum in each service area.

34. Furthermore, an additional spectrum cap of one paired spectrum block from within blocks B, C, C1 and C2 will apply to all large wireless service providers. Therefore, in each round, no large wireless service provider will be able to bid on more than one of these paired spectrum blocks in each service area.

4.2.3 Proposed Combinatorial Clock Auction Rules

35. The proposed activity and pricing rules for the 700 MHz auction are designed to encourage straightforward bidding and to promote price discovery throughout the auction. These are described below and further elaborated in Annex B.

Activity Rules

36. In previous SMRA auctions, Industry Canada used an eligibility-based activity rule where each licence was assigned a specific number of eligibility points. Bidders were then required to bid actively on a certain number of eligibility points in order to maintain their ability to bid in subsequent rounds. In general, the required level of activity increased through the different stages of the auction, from a minimum of 70% in the first stage to 100% in the final stage. This allowed bidders the flexibility to switch their bids to other licences in response to price changes, thereby mitigating the exposure risk.

37. With the use of an eligibility-based activity rule, a bidder could respond to price increases by bidding on fewer licences, which would result in a decrease of eligibility points in subsequent rounds. As a general rule, eligibility points cannot be increased once they have been reduced. Consequently, a bidder was not able to switch its bid to a package that was larger in terms of eligibility points but relatively less expensive.

38. In the 700 MHz auction, Industry Canada is proposing activity rules in the allocation stage that will afford bidders increased flexibility to bid on their most preferred package while encouraging truthful bidding. The proposed rules will also ensure that bids in the supplementary round are consistent with the preferences expressed in the clock rounds.

Revealed Preference/Eligibility Point Hybrid Activity Rule

39. In the clock rounds, Industry Canada is proposing to use a hybrid activity rule, which includes an eligibility-based activity rule similar to that used in the SMRA, in conjunction with a revealed preference activity rule. A revealed preference activity rule is based on the behaviour of a bidder in the previous rounds.

40. To begin, the required level of activity in every clock round will be 100% given that bidders in a CCA are not faced with an exposure risk. Therefore, in every clock round, bidders will be required to bid on 100% of their eligibility if they wish to maintain the same level of eligibility in subsequent rounds. When a bidder reduces its bid to a smaller package, then its eligibility for the next round will be reduced accordingly.

41. In addition, a revealed preference rule is proposed, which will allow bidders to exceed their eligibility points in order to bid on packages that have become comparatively less expensive. This will afford bidders greater flexibility to fully express their preferences in the clock rounds of the auction, ensuring that the activity rules do not prevent a bidder from bidding on its most preferred package. Further information on the proposed activity rules in the clock rounds can be found in Annex B, Section 8. As well, a detailed example of the proposed revealed preference activity rule is included in Annex C and an algebraic description of the revealed preference rule is included in Annex D.

Revealed Preference Limit

42. In the supplementary round, Industry Canada is proposing to limit bids based on revealed preference with respect to the bids that a bidder submitted in the clock rounds. The rule, referred to as the “revealed preference limit,” encourages truthful bidding throughout the auction, not just in its latter stages. Further information on the proposed revealed preference limit in the supplementary round can be found in Annex B, Section 10.

43. Bid withdrawals were permitted in the SMRA auction format to mitigate the exposure risk inherent in the auction design. Withdrawals are not necessary in the CCA format because bidding is for a package of licences and bidders no longer risk acquiring only some of the licences that they require.

44. All valid bids submitted in the clock rounds and the supplementary round are binding bids and are included in determining the winning packages and base prices after the end of the supplementary round. No bids can be withdrawn.

Pricing Rules

45. In the CCA format, final prices are determined at either the end of the allocation stage, or where generic licences are concerned, at the end of the assignment stage. Base prices are calculated at the end of the allocation stage following the supplementary round, taking into consideration all valid bids from the clock rounds and supplementary round. Assignment prices are determined at the end of the assignment stage, where bidders that have won generic licences in the allocation stage bid for specific assignments. The assignment prices are incremental to the base prices.

46. Two common pricing rule options to calculate the prices to be paid by winning bidders are a first-price rule and a second-price rule. A first-price rule requires winning bidders to pay the full amount of their winning bid. Conversely, a second-price rule requires each winning bidder to pay an amount that is sufficient to ensure that no other bidder, or group of bidders, was prepared to pay more than the winning bidder for the licence(s) in question.

47. Under a first-price rule, the bidder has a strong incentive to bid less than its true value, which can lead to inefficient outcomes. A second-price rule promotes a more efficient outcome by increasing the incentive for bidders to bid their true value. Bidders, knowing that they will only be required to pay the minimum amount necessary to win their package, will have the incentive to bid truthfully during the entire auction.

48. Industry Canada is proposing to use a second-price rule to determine the base price to be paid by winning bidders for packages won at the end of the allocation stage, and for the incremental prices to be paid for specific licences at the end of the assignment stage.

49. There are several approaches to determine second prices within a CCA. Industry Canada proposes to apply bidder-optimal core prices and to use the “nearest Vickrey” approach, which is one of most common approaches used for CCAs. Further information on the proposed pricing rules is provided in Annex E.

4.2.4 Information Disclosure

50. In previous SMRA auctions, Industry Canada made all information regarding the bidding activity of all bidders available after each round. Although this transparency facilitated price discovery, it also increased the potential for anti-competitive opportunities. For the 700 MHz auction, Industry Canada proposes to use anonymous bidding, revealing to each bidder their own bid information from the previous round and their eligibility for the next round. All bidders will be informed of the aggregate demand for each product from the previous round and the price of each product for the next round. At the end of each round, information on the latter would also be made available on Industry Canada’s website.

51. With the use of anonymous bidding, enough information will still be provided to permit price discovery, allowing bidders to make an informed decision regarding their bidding strategy. This means that bidders can focus their efforts on the relationship between their valuation of the licences, pricing and demand information provided rather than on the bidding behaviour of individual competitors. Thus, the potential for anti-competitive behaviour is minimized and the bidding process is simplified.

52. At the end of the allocation stage, bidders will be informed of their own winning packages along with the base price to be paid for their winning package. All bidders will be informed of the number of winning bidders and the total number of licences allocated.

53. Following the end of the assignment stage, participating bidders will be notified of the specific licences that they have won and the assignment prices(s) to be paid. Winning bidders will also be informed of the final prices to be paid, namely the sum of the base price and the assignment price.

54. Industry Canada is proposing to make the following information publicly available following the conclusion of the auction:

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

55. Full disclosure of all bidding information at the end of the auction would allow all interested parties to verify the results of the auction, facilitating greater transparency of the auction results. This may discourage bidders from expressing their true value if they believe such information to be commercially sensitive. However, the proposed activity rule in the supplementary round, namely the revealed preference limit, should reduce this concern. Furthermore, Industry Canada considers that full transparency of the results is important to the public interest.

56. Consistent with past practice, the identity of applicants and qualified bidders would be made available to the public prior to the auction, so that all bidders have knowledge of the identity of the other bidders.

4.2.5 Summary

57. The proposed CCA format has many advantages. The exposure risk is eliminated, anti-competitive behaviour is reduced, substitution among similar licences is enhanced and the auction duration will likely be reduced. The proposed activity rules, which combine both eligibility points and revealed preferences, will provide flexibility for bidders to select their preferred packages as prices change.

58. In order to assist potential bidders in gaining a greater understanding of the proposed auction format and rules, Industry Canada will hold an information session on May 30, 2012. The session will provide an overview of the proposed auction format and rules for the 700 MHz auction.

59. Further details on the logistics and agenda for the information session are available at <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10373.html>.

Industry Canada is seeking comments on its proposal to use the CCA format, as well as the general attributes outlined above, including:

- **the categories of generic licences;**
- **the guarantee of contiguity across blocks A and B in the lower 700 MHz band in a specific service area;**
- **the combined eligibility point and revealed preference activity rule in the clock rounds, and the revealed preference limit in the supplementary round;**
- **the use of a second-price rule; and**
- **the information to be disclosed during, and post-auction.**

5. Bidder Participation — Affiliated and Associated Entities

60. In SMSE-002-12, Decision B3-4, it was indicated that Industry Canada would consult with a view to revising the rules on associated and affiliated entities to provide improved flexibility and clarity.

61. It has been noted that several Canadian service providers have entered into different forms of network and spectrum sharing arrangements, driven by the investment and spectrum efficiencies that such arrangements can bring, particularly in rural areas. However, in previous auctions, parties entering into agreements and arrangements that were deemed to be either affiliated or associated entities were only permitted to participate in the auction process through a single bidder.

62. In support of the stated policy objectives of competition, investment and timely deployment to rural areas, and in light of the current scarcity of spectrum in the 700 MHz band, the high demand for capacity by customers (driven by the use of smart phones and tablets), the high cost of network deployment, particularly in rural areas, as well as the spectrum and network efficiencies that can be achieved through such arrangements, Industry Canada recognizes that changes to the rules should be considered.

63. The intent of the proposed changes is to provide increased flexibility in the treatment of a certain subset of associated entities such that they could be allowed to participate in the auction as separate entities, and have the spectrum cap apply separately to them, as long as this would not have an adverse impact on the integrity of the auction, or the intent of the spectrum caps.

64. ***Proposed Definition of Associated Entities:*** As a basis for participating in the 700 MHz auction, Industry Canada proposes that associated entities be defined as follows:

Any entities that enter into any partnerships, joint ventures, agreements to merge, consortia or any arrangements, agreements or understandings of any kind, either explicit or implicit, relating to the acquisition or use of any spectrum in the 700 MHz band will be treated as Associated Entities. Typical roaming and tower sharing agreements would not cause entities to be deemed associated.

65. Depending on the nature of the association, it may not preclude the ability of the entities to participate separately in the auction or to have the spectrum caps applied individually.

66. ***Auction integrity and transparency:*** In order to ensure auction integrity and transparency, all entities wishing to participate in the auction process will be required to disclose in writing, as part of their application, the names of affiliated and associated entities. It is proposed that a narrative also be submitted, describing all key elements and the nature of the affiliation or association in relation to the acquisition of the spectrum licences being auctioned and, the post-auction relationships of the said entities. It is proposed that this would include arrangements with another potential bidder that relate in any way to the future use of the 700 MHz spectrum directly or indirectly.

67. 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. It is also proposed that agreements such as significant joint equipment purchases 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.

68. The submitted narrative would be made available to other bidders and to the public on Industry Canada's website prior to the auction in order to ensure transparency of the licensing process.

69. ***Eligibility to participate separately in the auction:*** In the past, associated entities were not permitted to participate in an auction separately. It is now proposed that associated entities could be permitted to apply to Industry Canada to participate in the auction separately. The submitted narrative 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. Industry Canada may request additional documents. Any information considered by the applicant to be confidential should be properly marked as such. If Industry Canada deems it necessary to disclose any information marked as confidential, the applicant would be consulted prior to release.

70. ***Eligibility to have caps apply to associated entities separately:*** It is proposed that in addition to the above, associated entities could request that the spectrum caps apply individually. To obtain this approval, entities would be required to demonstrate that they intend to compete separately in the applicable licence area and continue to function as competitors to a level satisfactory to Industry Canada. In making this determination, Industry Canada would consider all relevant factors. Depending on the nature of the agreement, documentation may be required that sets out the details of the association, including copies of all arrangements or agreements, for example agreements related to network architecture and spectrum use and documents related to corporate decision making, marketing and customer information, sales and financing. Assessment criteria may include, but would not be limited to, consideration of the degree to which the entities would offer branded services, pricing and device selection that are unique from the other. For additional information on the application of the spectrum cap for associated entities, refer to the condition of licence entitled "Spectrum Aggregation Limits" in Section 6 of this document.

71. It should be noted that agreements between associated entities may have an impact on obligations to serve rural areas (see Section 6).

72. Bidders are reminded that the provisions of the *Competition Act* apply independently of, and in addition to, the proposed policy.

73. Associated entities wishing to participate in the auction separately would be required to submit their application at least 30 days in advance of the final application deadline to participate in the auction. This would provide Industry Canada 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, and have the cap apply individually, if so requested. Should the request be denied, the associated entities would be required to select which member entity will apply to participate in the auction.

74. ***Definition of Affiliated Entities:*** It is proposed that the definition of affiliated entities remain essentially as it was for the AWS auction, as follows:

An affiliated entity is defined as a person who controls the entity, or who is controlled by the entity or by any person who controls the entity. “Control” means control in any manner that results in control in fact, whether directly through the ownership of securities or indirectly through a trust, agreement or arrangement, the ownership of a body corporate or otherwise. Control in fact is the ongoing power or ability, whether exercised or not, to determine or decide the strategic decision-making activities of an enterprise, or to manage or run the day-to-day operations of an enterprise.

75. Please note that all entities participating in the auction will be subject to the same prohibition of collusion rules, as stated in Section 5.1 – *Prohibition of Collusion*.

Industry Canada is seeking comments on its proposed changes to the definition and rules related to associated entities. Specifically, comments are sought on:

- the types of agreements that should be captured under the definition of associated entities;**
- the level of information to be disclosed to the public;**
- the provision that typical roaming and tower sharing be specifically excluded from the revised definition of associated entities and whether other types of agreements such as the purchase of backhaul capacity should be deemed excluded;**
- the proposal that entities that are deemed associated entities may apply to be treated as separate entities for participation in the auction;**
- the proposal that associated entities may request to have the spectrum caps apply to them separately, based on an analysis of their association and of whether they intend to compete in the same licence service area;**
- the criteria to be considered in determining whether the entities are competing; and**
- the proposal that no changes be made to the affiliated entities rule.**

5.1 Prohibition of Collusion

76. As in previous auctions, in order to ensure the integrity of the bidding process, all applicants will be prohibited from cooperating, collaborating, discussing or negotiating agreements with other bidders regarding the licences being auctioned or the post-auction market structure. This prohibition will be in effect from the deadline to submit applications to participate in the auction until the deadline for the final payment of winning bids.

77. The rules regarding prohibition of collusion used for the AWS auction were essentially stated as follows:

Applicants are prohibited from cooperating, collaborating, discussing or negotiating settlement agreements with competitors, relating to the licences being auctioned or relating to the post-auction market structure, until the deadline for the final payment on winning bids.

The application form to participate in the auction will include a declaration that the applicant will be required to sign certifying that the applicant has not entered into and will not enter into any agreements or arrangements of any kind with any competitor regarding the amount to be bid, bidding strategies or the particular licence(s) on which the applicant or competitors will or will not bid. For the purposes of this certification, “competitor” means any entity, other than the applicant and/or its affiliates or associated entities, which could potentially be a bidder in this auction based on its qualifications, abilities or experience.

78. In order to maintain the integrity of the auction, bidders are prohibited from signalling either publicly or privately, their bidding intentions or post-auction market structure related to spectrum in the 700 MHz band, while the auction is ongoing. 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.

79. Given that Industry Canada is proposing to allow the participation of some associated entities as separate bidders in this auction process, the prohibition of collusion rules are proposed as follows:

From the date of application until the deadline for the final payment on winning bids, each applicant is prohibited from cooperating, collaborating, discussing, negotiating or entering into agreements, arrangements or understandings with any competitors regarding the licences being auctioned, bids or bidding strategies in the auction, or the post-auction market structure. Each applicant is also prohibited from signalling its bidding intentions, either publicly or privately, from the application deadline until the end of the bidding process.

The application form to participate in the auction will include a declaration that the applicant will be required to sign certifying that the applicant has not entered into any agreements, arrangements or understandings of any kind with any competitor, other than those disclosed to Industry Canada, regarding the spectrum licences being auctioned or the post-auction market structure. The applicant must also certify that it will not discuss during the auction, any agreements, arrangements or understandings of any kind with any competitor, including its disclosed associated entities, regarding the spectrum licences being auctioned or the post-auction market structure. For the purposes of this certification, “competitor” means any entity, other than the applicant and/or its affiliates, which could potentially be a bidder in this auction based on its qualifications, abilities or experience.

Should a bidder fail to comply with this prohibition, it may be subject to disqualification from the auction and/or forfeiture penalties.

Industry Canada is seeking comments on the rules prohibiting collusion that would apply to bidders in the 700 MHz auction.

6. Conditions of Licence for Spectrum in the 700 MHz Band

80. Industry Canada proposes that the following conditions apply to all licences issued through the auction process for spectrum in the 700 MHz band. It should be noted that the licence is subject to the relevant provisions in the *Radiocommunication Act* and the *Radiocommunication Regulations*. For example, the Minister continues to have the power to amend the terms and conditions of spectrum licences (paragraph 5(1)(b) of the *Radiocommunication Act*). The Minister may do so for reasons including furtherance of the policy objectives related to the band. Such action would normally only be undertaken after consultation.

81. **Licence Term:** Traditionally, spectrum licences auctioned by Industry Canada have been issued for a 10-year licence term. This duration was deemed to provide enough certainty in the marketplace to secure the investments necessary to acquire spectrum and build related networks. The revised *Framework for Spectrum Auctions in Canada*, published in March 2011, states that Industry Canada is now adopting a flexible approach in determining licence terms (up to 20 years) based on the specific spectrum being offered and subject to a public consultation preceding the specific auction or renewal process.

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

83. The 700 MHz band has excellent propagation characteristics and is considered to be extremely important in the deployment of next generation mobile broadband services in rural areas, and in meeting the increasing demand and network congestion in urban areas. It has already been licensed in the United States and it is unlikely that any technical developments would result in a change to another use that is incompatible with mobile broadband.

84. In light of the above, Industry Canada is proposing that auctioned spectrum licences in the 700 MHz band have a licence term of 20 years. The proposed condition of licence 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.

Industry Canada is seeking comments on its proposal to issue spectrum licences in the 700 MHz band with a 20-year licence term.

85. ***Spectrum Aggregation Limits:*** Where competitive measures have been put in place, such as a limitation on the amount of spectrum held by a licensee, a condition of licence to that effect is typically applied to the licence in question. With respect to spectrum in the 700 MHz band, the competitive measures announced in SMSE-002-12 are:

- **Decision B3-1:** A spectrum cap of two paired frequency blocks in the 700 MHz band (blocks A, B, C, C1 and C2) is applicable to all licensees.
- **Decision B3-2:** A spectrum cap of one paired spectrum block within blocks B, C, C1 and C2 is applicable to all large wireless service providers. Large wireless service providers are defined as companies with 10% or more of the national wireless subscriber market share, or 20% or more of the wireless subscriber market share in the province of the relevant licence area.
- **Decision B3-6:** The spectrum caps put in place for the 700 MHz auction will continue to be in place for five years following licence issuance. Therefore, no transfer of licences or issuance of new licences will be authorized if it allows a licensee to exceed the spectrum cap during this period.

86. The wording for the proposed condition of licence is as follows:

The licensee must comply with the spectrum aggregation limits as follows:

- **A limit of two paired frequency blocks in the 700 MHz band (blocks A, B, C, C1 and C2) is applicable to all licensees.**
- **A spectrum cap of one paired spectrum block within blocks B, C, C1 and C2 is applicable to all large wireless service providers. Large wireless service providers are defined as companies with 10% or more of the national wireless subscriber market share, or 20% or more of the wireless subscriber market share in the province of the relevant licence area.**

The spectrum caps put in place for the 700 MHz auction will continue to be in place for five years following licence issuance. Therefore, no transfer of licences or issuance of new licences will be authorized that allows a licensee to exceed the spectrum caps during this period. Any change in ownership or control granting a right or interest to another licensee in this band may be considered as licence transfer for the purpose of this condition of licence whether or not the licensee name is changed as a result. The licensee must request approval by the Minister of Industry for any change that would have a material effect on its compliance with these spectrum aggregation limits. Such a request must be made in advance for any proposed transactions within its knowledge.

87. As noted in Section 5, associated entities requesting that the spectrum caps be applied individually rather than jointly, must demonstrate to the satisfaction of Industry Canada that they will be competing in the applicable service area.

88. Where licensees establish an agreement to share spectrum such that another entity has control over the use of the spectrum, a subordinate licence is required. This requirement applies to all spectrum sharing arrangements, whether the arrangement is established post-auction or was established and disclosed prior to the auction. Subordinate licences may not count towards the licensee's aggregation limit if the licensees demonstrate to the satisfaction of Industry Canada that they meet the criteria with respect to competing in the applicable service area.

89. At any time, at the request of Industry Canada, the licensee will be required to provide updated information demonstrating ongoing compliance with this condition of licence.

Industry Canada is seeking comments on the proposed wording of the condition of licence related to the spectrum aggregation limits.

90. *Licence Transferability and Divisibility*: In general, licences obtained through an auction may be transferred in whole or in part (either in geographic area or in bandwidth) to a third party, subject to the conditions stated on the licence and other applicable regulatory requirements.

91. As noted above, where competitive measures have been put in place, either to limit the amount of spectrum held by a licensee (spectrum cap), or to restrict the eligibility of access to a specific spectrum band (set-aside), the ability to transfer and divide the licence in question will be similarly restricted. With respect to spectrum in the 700 MHz band, transfers are not permitted where they will result in a licensee exceeding the spectrum aggregation limit.

92. Industry Canada is proposing the following wording for the condition of licence on transferability and divisibility:

The licensee may apply, in writing, to transfer its licence in whole or in part (divisibility), in both the bandwidth and geographic dimensions in accordance with Client Procedures Circular CPC-2-1-23, *Licensing Procedure for Spectrum Licences for Terrestrial Services*, as amended from time to time. Licensees may apply to use a subordinate licensing process.

Industry Canada's approval is required for each proposed subordinate licence or transfer, whether the transfer is in whole or in part. Industry Canada may define a minimum bandwidth and/or geographic dimension (such as the grid cell) for the proposed transfer.

The transferor(s) must provide an attestation and other supporting documentation demonstrating that all conditions, technical or otherwise, of the licence have been met. The transferee(s) must provide an attestation and other supporting documentation demonstrating that it meets the eligibility criteria, including documentation related to associates and affiliates demonstrating that the transfer is in accordance with any spectrum aggregation limits.

Subordinate licences may not count towards the licensee's aggregation limit if the subordinate licensee demonstrates to the satisfaction of Industry Canada that the relevant licensees meet the criteria with respect to competing in the post-auction market (see condition of licence regarding Spectrum Aggregation Limits).

The transferee must satisfy all applicable conditions of licence including, rural deployment and general deployment requirements.

93. Licensees must apply to Industry Canada 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. For further information on these requirements, refer to Client Procedures Circular CPC-2-1-23, *Licensing Procedure for Spectrum Licences for Terrestrial Services*, 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 700 MHz band. Licence transfers may also be subject to the provisions of the *Competition Act*.

94. Generally, a subordinate licence will count towards the spectrum aggregation limit in a service area in addition to licences held directly and those held by associates or affiliates. However, the proposed transferee may apply to have the subordinate licence(s) excluded from the calculation of their holdings for the purposes of the spectrum caps, if it can demonstrate as part of its application that it will compete with any associated entities in the service area. For further information on the application of the spectrum cap as it relates to associated entities which hold subordinate licences, see Section 5 of this document.

Industry Canada is seeking comments on the proposed wording of the condition of licence related to transferability and divisibility.

95. **Eligibility:** Generally, spectrum licences contain an eligibility condition of licence that reads as follows: *The licensee must comply on an ongoing basis with the eligibility criteria for a radiocommunication carrier, including compliance with subsection 10(2) of the Radiocommunication Regulations. The licensee must notify the Minister of Industry of any change which would have a material effect on its eligibility. Such notification must be made in advance for any proposed transaction within its knowledge. For further information, refer to Industry Canada's Client Procedures Circular CPC-2-0-15, Canadian Ownership and Control, as amended from time to time.*

96. On March 14, 2012, the Minister of Industry announced that the *Telecommunications Act* will be amended to lift foreign investment restrictions for telecommunications companies that hold less than a 10-percent share of the total Canadian telecommunications market. Once amendments to the *Telecommunications Act* have been made, Industry Canada will update Client Procedures Circular CPC-2-0-15, *Canadian Ownership and Control*, in order to clarify the effects on spectrum licence holders operating under the *Radiocommunication Act* and *Radiocommunication Regulations*.

97. Given that the amendments are forthcoming, the proposed wording for the condition of licence for spectrum in the 700 MHz band now refers to the “applicable” subsection of the Regulations, as follows:

A licensee operating as a radiocommunication carrier must comply on an ongoing basis with the applicable eligibility criteria in subsection 10(2) of the *Radiocommunication Regulations*. The licensee must notify the Minister of Industry 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.

For further information, refer to Client Procedures Circular CPC-2-0-15, *Canadian Ownership and Control*, as amended from time to time.

Industry Canada is seeking comments on the proposed wording of the condition of licence related to eligibility criteria.

Treatment of Existing Spectrum Users:

98. The proposed wording for the condition of licence is as follows:

The licensee must comply with the displacement policies set out in SMSE-002-12, *Policy and Technical Framework: Mobile Broadband Services (MBS) – 700 MHz Band, Broadband Radio Service (BRS) – 2500 MHz Band*.

Industry Canada is seeking comments on the proposed wording of the condition of licence related to the treatment of existing spectrum users.

99. ***Radio Station Installations:*** Radiocommunication and broadcasting services are important for all Canadians and are used daily by the public, safety and security organizations, government, wireless service providers, broadcasters, utilities and businesses. In order for radiocommunication and broadcasting services to work, antenna systems, including masts, towers and other supporting structures, are required. There is a certain measure of flexibility in the placement of antenna systems which is constrained to some degree by the need to achieve acceptable coverage for the

service area, the availability of sites, technical limitations and safety. In exercising its mandate, Industry Canada believes that it is important that antenna systems be deployed in a manner that considers the local surroundings.

100. Section 5 of the *Radiocommunication Act* states that the Minister may, taking into account all matters that the Minister considers relevant for ensuring the orderly development and efficient operation of radiocommunication in Canada, issue radio authorizations and approve each site on which radio apparatus, including antenna systems, may be located. Furthermore, the Minister may approve the erection of all masts, towers and other antenna-supporting structures. Accordingly, proponents must follow the process outlined in Client Procedures Circular CPC-2-0-03, *Radiocommunication and Broadcasting Antenna Systems*, when installing or modifying an antenna system. Also, the installation of an antenna system or the operation of a currently existing antenna system that is not in accordance with this process may result in its alteration or removal and other sanctions against the operator in accordance with the *Radiocommunication Act*.

101. In accordance with the above, Industry Canada proposes the following wording for this condition of licence:

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

Industry Canada is seeking comments on the proposed wording of the condition of licence related to radio station installations.

102. ***Provision of Technical Information:*** Spectrum licences are issued for a specific geographic area and, as such, associated technical information for each radiocommunication installation is not required for the issuance of a spectrum licence. However, technical information associated with radiocommunication installations covered by the spectrum licence is required by Industry Canada to carry out certain spectrum management responsibilities. To provide this capability, Industry Canada requires information to maintain an up-to-date technical database of radiocommunication installations. Industry Canada therefore proposes that such a condition of licence continue to apply:

103. The proposed wording for the condition of licence is as follows:

When Industry Canada requests technical information on a particular station or network, the licensee must provide the information in accordance with the definitions, criteria, frequency and timelines specified. For further information, refer to Client Procedures Circular CPC-2-1-23, *Licensing Procedure for Spectrum Licences for Terrestrial Services*, as amended from time to time.

Industry Canada is seeking comments on the proposed wording of the condition of licence related to the provision of technical information.

104. ***Compliance with Legislation, Regulation and Other Obligations:*** Licensees are required to abide by the requirements set out for use of the radio frequency spectrum in general and for the specific frequency band being licensed. These requirements are fundamental, and in some cases, they are legislative requirements. There are no significant changes proposed to the wording for this condition of licence:

The licensee is subject to, and must comply with, the *Radiocommunication Act*, the *Radiocommunication Regulations* and the International Telecommunication Union’s *Radio Regulations* pertaining to its licensed radio frequency bands. The licence is issued on condition that the certifications made in relation to this licence are all true and complete in every respect. The licensee must use the assigned spectrum in accordance with the *Canadian Table of Frequency Allocations* and the spectrum policies applicable to these bands, as amended from time to time.

Industry Canada is seeking comments on its proposed condition of licence related to compliance with legislation, regulation and other obligations.

105. ***Technical Considerations, and International and Domestic Coordination:***

Industry Canada will work with the Radio Advisory Board of Canada to develop applicable Radio Standards Specifications (RSS) and Standard Radio System Plans (SRSP) in relation to the 700 MHz band. Spectrum licence holders are also subject to applicable international coordination agreements and arrangements between Canada, the United States and other foreign administrations.

106. Industry Canada proposes the following wording for this condition of licence:

The licensee must comply on an ongoing basis with the technical aspects of the appropriate Radio Standards Specifications and Standard Radio System Plans, as amended from time to time. Where applicable, the licensee must use its best efforts to enter into mutually acceptable sharing agreements that will facilitate 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 with 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 to furnish all necessary technical data for each relevant site.

Industry Canada is seeking comments on the proposed condition of licence related to technical considerations, and international and domestic coordination.

107. ***Lawful Intercept:*** Certain spectrum licences contain a lawful intercept condition of licence that requires the licensee to maintain interception capabilities so that information can be provided when required by a warrant. The current condition of licence reads as follows:

“Licensees using spectrum for circuit-switched 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 of Industry to forbear from enforcing certain assistance capability requirements for a limited period. 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 to the requirement can be expected.”

108. Industry Canada is proposing changes to the lawful intercept condition of licence in order to bring the wording in line with current technologies. The proposed change is to remove the text “circuit-switched voice telephony” from the lawful intercept condition, as networks are no longer limited to circuit-switched technology. This proposed change does not affect existing spectrum licences issued under other licensing processes. Forbearance may be granted where Industry Canada deems it warranted.

109. The condition of licence refers to standards for lawful interception, entitled the Solicitor General’s *Enforcement Standards for Lawful Interception of Telecommunications*. Public Safety Canada is currently responsible for these standards, which were last revised in 1995. Public Safety Canada has informed Industry Canada that it is proposing modifications to the standards. Industry Canada is proposing to simply refer to the requirement to provide for and maintain lawful interception capabilities, in accordance with the enforcement standards in effect at the time of licence issue and as amended from time to time. For further information on proposed changes to the Solicitor General’s Enforcement Standards, please contact Public Safety Canada via the General Enquiries line at 1-800-830-3118.

110. In consideration of the above, the proposed wording of the condition of licence is as follows:

A licensee operating as a service provider using an interconnected radio-based transmission facility for compensation must provide for and maintain lawful interception capabilities as authorized by law and in accordance with the Solicitor

General's Enforcement Standards for Lawful Interception of Telecommunications, as amended from time to time.

The licensee may request the Minister of Industry to forbear from enforcing certain assistance capability requirements for a limited period. 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 to the requirement can be expected.

Industry Canada is seeking comments on the proposed wording of the condition of licence related to lawful intercept requirements.

111. **Research and Development:** Currently, many long-term licences¹¹ are subject to a condition of licence which requires licensees to invest a percentage of their adjusted gross revenues on research and development (R&D). In 2009, Industry Canada initiated DGRB-001-09, *Consultation on Revisions to the Framework for Spectrum Auctions in Canada*, in which comments were sought on the continued need for the R&D condition of licence. The resultant decision paper¹² stated that Industry Canada's decision with regard to the R&D condition of licence would be the subject of a separate paper to be issued at a later date. At this time, no decision has been issued on the R&D condition of licence. Therefore, until such a time as a decision is released, Industry Canada proposes that the R&D condition of licence apply to licences in the 700 MHz band as stated below, but may be amended during the licence term.

112. The proposed wording of this condition of licence is as follows:

The licensee must invest, as a minimum, 2 percent of its adjusted gross revenues resulting from its operations in this spectrum, averaged over the term of the licence, in eligible research and development activities related to telecommunications. Eligible research and development activities are those which meet the definition of scientific research and experimental development adopted in the *Income Tax Act*. Adjusted gross revenues are defined as total service revenues, less inter-carrier payments, bad debts, third party commissions, and provincial and goods and services taxes collected. Businesses with less than \$5 million in annual gross operating revenues are exempt from research and development expenditure requirements, except where they have affiliations with licensees that hold other licences with the research and development

¹¹ Spectrum licences which are subject to the R&D condition of licence include cellular, PCS, AWS, 24 GHz, 38 GHz, 2.3 GHz, 3.5 GHz and Air-Ground Services.

¹² See DGSO-001-11, *Decisions on the Revisions to the Framework for Spectrum Auctions in Canada and Other Related Issues* ([http://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/dgso-001-11decisions-e.pdf/\\$FILE/dgso-001-11decisions-e.pdf](http://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/dgso-001-11decisions-e.pdf/$FILE/dgso-001-11decisions-e.pdf)).

condition of licence and where the total annual gross revenues of the affiliated licensees are greater than \$5 million.

To facilitate compliance with this condition of licence, the licensee should consult Industry Canada’s *Guidelines for Compliance with the Radio Authorization Condition of Licence Relating to Research and Development (GL-03)*.

Industry Canada is seeking comments on the proposed condition of licence related to the research and development requirement.

113. ***Rural Deployment Requirements***: As stated in SMSE-002-12, Industry Canada is implementing a specific condition of licence to promote service deployment in rural areas. A key intent of the licensing policy in the 700 MHz band is that the spectrum be deployed in a timely manner for the benefit of Canadians.

114. Further to Decision B4-2 of SMSE-002-12, a condition of licence will apply to 700 MHz licensees which ensures that those that have access to more than one paired block of spectrum will be subject to a deployment requirement based on their existing High Speed Packet Access (HSPA) network footprint, as follows:

- (1) In each licence area where a licensee holds two or more paired blocks of spectrum in the 700 MHz band, or has access to two or more paired blocks of spectrum in the 700 MHz band through association, that licensee must deploy its 700 MHz spectrum:
 - (a) to cover 90% of the population of its existing HSPA network footprint within five years of the date of the issuance of the 700 MHz licence; and
 - (b) to cover 97% of the population of its existing HSPA network footprint within seven years of the date of the issuance of the 700 MHz licence.
- (2) Coverage provided only through a roaming agreement is not considered to be part of the licensee’s HSPA network footprint.
- (3) Existing HSPA network footprint coverage is the coverage in effect as of the release date of the policy paper SMSE-002-12.¹³

115. Following the release of the SMSE-002-12, HSPA network operators were required to submit information regarding the coverage of their existing HSPA networks, which will be used to assess licensees’ performance against this condition of licence. Operators with joint networks were required to identify which portion of the existing joint network footprint will be attributable to each of the potential 700 MHz licensees.

¹³ See SMSE-002-12 – *Policy and Technical Framework: Mobile Broadband Services (MBS) – 700 MHz Band, Broadband Radio Service (BRS) – 2500 MHz Band* (<http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10121.html>).

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

117. The proposed wording of the condition of licence is as follows:

Where a licensee holds a licence for two or more paired blocks of 700 MHz spectrum in a licence area, or has access to two or more paired blocks of 700 MHz spectrum in a licence area either directly or indirectly, that licensee must deploy 700 MHz spectrum:

- (a) to cover 90% of the population of its HSPA network footprint as of March 2012, within five years of the issuance of the initial 700 MHz licence; and**
- (b) to cover 97% of the population of its HSPA network footprint as of March 2012, within seven years of the issuance of the initial 700 MHz licence.**

118. In interpreting the above-noted condition, Industry Canada proposes that “access to two or more paired blocks of spectrum” would include scenarios where a 700 MHz licensee has an agreement with another licensee in the same service area that provides for the latter to operate some, or all of the spectrum licensed to the primary licensee (e.g. where the licensees are associated and Industry Canada has determined that the spectrum caps will apply individually). In addition agreements where licensees are associated through an agreement that provides the ability to influence the use of the spectrum would count as indirect access. The assessment to determine whether influence over the use of the spectrum exists would be based on a review of the same documents set out in Section 5, paragraph 70. Industry Canada may also consider the nature of the relationship between the two parties.

119. Industry Canada would not consider tower and site sharing as agreements that provide “access” for this condition of licence.

120. Furthermore, typical roaming agreements would not be considered as providing “access to two or more paired blocks of spectrum” for the purpose of this condition of licence, as typical roaming agreements are generally restricted to accessing capacity on the host network only.

Industry Canada is seeking comments on the application of the proposed wording of the licence condition related to rural deployment requirements. Specifically, comments are sought on the assessment of “access to two or more paired blocks of spectrum” for the purposes of this condition of licence.

121. ***General Deployment Requirement:*** In accordance with SMSE-002-12, a general deployment requirement will also apply to licensees in the 700 MHz band. Decision B3-5 states that: *A general rollout obligation applicable to all 700 MHz commercial licences will apply. Industry Canada will consult on the details of the general deployment requirement (e.g. population coverage and time frame).*

122. This condition will apply to all 700 MHz licensees, regardless of the number of blocks that they hold. The objective of this general rollout requirement is to ensure that the 700 MHz spectrum, a highly valued and limited public resource, is deployed in a timely manner. As well, such a condition will serve to deter the acquisition of spectrum licences by speculators and those whose intent is to prevent access to the spectrum by their competitors.

123. Similar conditions of licence have been applied to previously auctioned spectrum licences in order to encourage the deployment of systems and to dissuade speculative spectrum acquisition. The intent is to encourage either the deployment of spectrum or the transfer of the spectrum licence where another entity may have a use for it. Prior to the AWS auction, deployment was required to 50% of the population in the licence area or a level acceptable to Industry Canada. In the AWS auction, different levels were set for each licence area based on the population of the major urban centres for that particular licence area. It is proposed that the AWS levels be used as deployment requirements for the 700 MHz licences. It is further proposed that these levels be required within 10 years of the licence issuance to allow market forces to determine the best pace of deployment, while providing an opportunity to intervene if the spectrum is left unused for an extended period of time.

124. Where a licence is transferred during the initial 10 years, the requirement for the new licensee to deploy will continue to be based on the initial licence issuance date.

125. The proposed wording of the condition of licence is as follows:

Licensees will be required to demonstrate to the Minister of Industry that their spectrum has been put to use, as specified in the table below, within 10 years of the initial issuance of the licence.

Table 3 – Proposed General Deployment Requirements

Tier 2	Service Area Name	Minimum Population Coverage*
2-01	Newfoundland and Labrador	30%
2-02	Nova Scotia and P.E.I.	30%
2-03	New Brunswick	40%
2-04	Eastern Quebec	50%
2-05	Southern Quebec	50%
2-06	Eastern Ontario and Outaouais	50%
2-07	Northern Quebec	30%
2-08	Southern Ontario	50%
2-09	Northern Ontario	50%
2-10	Manitoba	50%
2-11	Saskatchewan	40%
2-12	Alberta	50%
2-13	British Columbia	50%
2-14	Yukon, NWT and Nunavut	20%

* Based on most recent census information available at the time of assessment.

Industry Canada is seeking comments on the application of the general deployment condition of licence as stated above. Specifically, comments are sought on:

- **the population coverage, as specified in Table 3, for each licence service area; and**
- **the time frame proposed whereby the requirement must be met.**

126. **Mandatory Antenna Tower and Site Sharing:** Industry Canada is seeking input from stakeholders on the implementation of changes proposed to the mandatory antenna tower and site sharing conditions of licence through a separate process announced through *Canada Gazette* notice DGSO-001-12.¹⁴ Stakeholders interested in the 700 MHz licensing process are encouraged to participate in that consultation process, as changes will affect the 700 MHz licensees. The proposed wording of the condition of licence is as follows:

Licensees 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.

Industry Canada is seeking comments on the proposed wording of the condition of licence related to mandatory antenna tower and site sharing. Comments on the specifics of the requirements should be submitted through the process announced through *Canada Gazette* notice DGSO-001-12.

127. **Mandatory Roaming:** Industry Canada is seeking input from stakeholders on the implementation of changes proposed to the mandatory roaming condition of licence through a separate process announced through *Canada Gazette* notice DGSO-001-12.¹⁵ Stakeholders interested in the 700 MHz licensing process are encouraged to participate in that consultation process, as changes may affect the 700 MHz licensees. The related decisions, including the applicability of the mandatory roaming condition to the 700 MHz band, will be announced separately. If the condition is applied, the proposed wording is as follows:

The licensee must comply with the mandatory 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.

¹⁴ See *Canada Gazette* notice DGSO-001-12 – *Proposed Revisions to the Frameworks for Mandatory Roaming and Antenna Tower and Site Sharing* (<http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10251.html>).

¹⁵ Ibid.

Industry Canada is seeking comments on the proposed wording of the condition of licence related to mandatory roaming. Comments on the specifics of the requirements should be submitted through the process announced in *Canada Gazette* notice DGSO-001-12.

128. **Annual Report:** Currently, spectrum licences include a requirement to submit an annual report to Industry Canada to provide some basic information on spectrum use and existing company reports. This provides valuable information without requiring extensive report generation by the licensees. It is proposed that this requirement apply to 700 MHz licensees.

129. The proposed wording of the condition of licence is as follows:

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 report of the research and development expenditures for licensees operating as radiocommunication carriers as set out in these conditions of licence.

Industry Canada reserves the right to request an audited statement of research and development expenditures with an accompanying auditor's report;

- supporting financial statements where licensees are claiming an exemption based on an annual gross revenue of less than \$5 million; and
- a copy of any existing corporate annual report for the licensee's fiscal year with respect to the authorization.

130. 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. 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 reasons including the analysis of each licensee's individual performance against its conditions of licence, and to monitor the effectiveness of these conditions in meeting the policy objectives of the band and Industry Canada's intent that the spectrum be deployed in a timely manner for the benefit of Canadians. Confidential information provided will be treated in accordance with subsection 20(1) of the *Access to Information Act*.

Industry Canada is seeking comments on the proposed condition of licence related to the requirement for annual reporting.

7. Auction Process

131. The following section outlines the general process for submitting an application to participate in the 700 MHz auction, as well as the general requirements and rules that apply prior to, during and post-auction.

7.1 Application to Participate

132. To participate in an auction, all applicants must submit a completed application form, along with a financial deposit, details of the applicant's beneficial ownership, information on any affiliations and associations as discussed in Section 5 of this document, and other corporate documentation as required. Industry Canada will make the relevant information available to the public prior to the auction, so that all bidders have knowledge of the identity of the other bidders.

7.2 Opening Bids

133. Opening bids are the prices for the spectrum licences at the start of the auction, and the minimum that will be accepted for each licence. The proposed opening bid prices can be found in Table 4 below.

134. The determination of the proposed 700 MHz opening bid prices takes into account the results of past Canadian auctions and reflects the relative value of the licences in the different service areas. As a minimum accepted price, the existing Cellular and PCS annual fees, adjusted to account for a licence term of 20 years using a 14% discount rate,¹⁶ is used. The opening bid prices are rounded to the nearest thousand dollars.

135. With respect to the paired spectrum, nine of the 14 service areas have opening bids that are based on the minimum accepted price level. Three of the remaining five service areas (Eastern Ontario and Outaouais, Alberta and British Columbia) are 1.2 times this price level, whereas the two remaining service areas (Southern Ontario and Southern Quebec) are 2.6 times the minimum price level.

136. Given the current uncertainty with respect to the use and technology associated with the unpaired blocks D and E, their opening bid prices are also based on the minimum accepted price.

137. Bids at or above the proposed opening bid prices will ensure that Canadians obtain a fair return for the use of this spectrum and that, at a minimum, the revenue received will be comparable to the returns currently being received for similar spectrum resources.

138. The total amount of the proposed opening bids for all spectrum blocks is **\$897,324,000**.

¹⁶ To determine the discount rate, Industry Canada considered the pre-tax nominal discount rates used by industry, which are available at www.crtc.gc.ca. The latest regulatory filings from Bell, Rogers, TELUS, MTS and SaskTel indicate that these range from 11% to 14%. The Department chose the conservative discount rate of 14%.

Table 4 – Proposed Opening Bid Prices

Service Area #	Service Area Name	700 MHz Opening Bids			
		Paired Blocks A, B, C, C1 and C2		Unpaired Blocks D and E	
		\$/MHz/pop	Opening bid (\$)	\$/MHz/pop	Opening bid (\$)
2-01	Newfoundland and Labrador	0.265	\$1,364,000	0.265	\$682,000
2-02	Nova Scotia and P.E.I.	0.265	2,814,000	0.265	1,407,000
2-03	New Brunswick	0.265	1,987,000	0.265	994,000
2-04	Eastern Quebec	0.265	4,421,000	0.265	2,211,000
2-05	Southern Quebec	0.687	39,042,000	0.265	7,530,000
2-06	Eastern Ontario and Outaouais	0.327	7,677,000	0.265	3,111,000
2-07	Northern Quebec	0.265	505,000	0.265	253,000
2-08	Southern Ontario	0.687	69,324,000	0.265	13,370,000
2-09	Northern Ontario	0.265	2,053,000	0.265	1,027,000
2-10	Manitoba	0.265	3,198,000	0.265	1,599,000
2-11	Saskatchewan	0.265	2,729,000	0.265	1,365,000
2-12	Alberta	0.327	11,936,000	0.265	4,836,000
2-13	British Columbia	0.327	14,388,000	0.265	5,830,000
2-14	Yukon, NWT and Nunavut	0.265	284,000	0.265	142,000
	Total per block		\$161,722,000		\$44,357,000
	Total all blocks				\$897,324,000

Note: Opening bids have been calculated based on paired blocks of 5+5 MHz and unpaired blocks of 5 MHz, irrespective of whether the paired block size is 5+5 MHz or 6+6 MHz, or that the unpaired block size is of 6 MHz.

Industry Canada is seeking comments on the proposed opening bids as presented in Table 4.

7.3 Proposed Eligibility Points for the 700 MHz Spectrum Auction

139. The proposed eligibility points associated with the licences being made available in the 700 MHz auction are based on the population per service area, bandwidth per block and the estimated value of the spectrum. The population data below are based on Statistics Canada's 2011 census.

140. Proposed points per service area for paired and unpaired spectrum in the 700 MHz band are listed in Table 5. One eligibility point has been assigned for each 5 MHz of spectrum per 100,000 in population count in a service area rounded to the nearest 100,000 population for the majority of service areas. The five service areas of Southern Quebec, Eastern Ontario and Outaouais, Southern Ontario, Alberta and British Columbia are the exception. For these five service areas, the eligibility points per paired spectrum block have been adjusted in proportion to the opening bid prices.

141. The equivalent of a national licence, 14 service areas covering the country, comprised of one block of paired spectrum would have 1,220 eligibility points associated with it; the equivalent of a national licence of one block of unpaired spectrum would have 335 eligibility points associated with it.

Table 5 – Proposed Eligibility Points for the 700 MHz Band

Service Area #	Service Area Name	Population	Eligibility Points per Paired Blocks (A, B, C, C1 and C2)	Eligibility Points per Unpaired Blocks (D and E)
2-01	Newfoundland and Labrador	514,641	10	5
2-02	Nova Scotia and P.E.I.	1,061,846	21	11
2-03	New Brunswick	749,942	15	7
2-04	Eastern Quebec	1,668,394	33	17
2-05	Southern Quebec	5,683,036	295	57
2-06	Eastern Ontario and Outaouais	2,347,808	58	23
2-07	Northern Quebec	190,605	4	2
2-08	Southern Ontario	10,090,766	523	101
2-09	Northern Ontario	774,775	15	8
2-10	Manitoba	1,206,968	24	12
2-11	Saskatchewan	1,029,812	21	10
2-12	Alberta	3,650,167	90	37
2-13	British Columbia	4,399,939	109	44
2-14	Yukon, NWT and Nunavut	107,215	2	1
Total		33,475,914	1,220	335

Note: Eligibility points have been calculated based on paired blocks of 5+5 MHz and unpaired blocks of 5 MHz, irrespective of whether the paired block size is 5+5 MHz or 6+6 MHz, or that the unpaired block size is of 6 MHz.

Industry Canada is seeking comments on the proposed eligibility points for spectrum licences in the 700 MHz band, as outlined in Table 5 above.

7.4 Pre-auction Deposits

142. In order to enhance the integrity of the auction, Industry Canada requires that all bidders submit a pre-auction financial deposit with their auction application. The deposit is to be in the form of a certified cheque or money order payable to the Receiver General for Canada, or an irrevocable standby letter of credit.

143. Similar to previous auctions, Industry Canada proposes to determine the value of the pre-auction financial deposit based on the licences on which the applicant wishes to be eligible to bid. Each licence has been assigned a specific number of eligibility points that are approximately proportionate to the population covered by the licence, as demonstrated in Table 5 above. For spectrum licences to be auctioned in the 700 MHz band, it is proposed that the financial deposit be equal to \$130,000 per eligibility point.

144. An individual bidder requesting to be eligible to bid on the equivalent of one national paired block would have to submit a deposit covering 1,220 points, which would equate to \$158,600,000 (i.e. \$130,000 x 1,220). 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 Industry Canada 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.

Industry Canada is seeking comments on the proposed pre-auction deposits as outlined above.

7.5 Bid Payment and Forfeiture Penalties

145. Within 10 business days following the close of the auction, each provisional licence winner will be required to submit 20 percent (20%) of its winning bids. This payment will be non-refundable. The remaining portion of the winning bids will be due within 30 business days of the auction's close.

146. Following the conclusion of the auction, winning bidders that fail to comply with the specified payment schedule or fail to come into compliance with the eligibility requirements of the *Radiocommunication Regulations*, will forfeit their right to the licence. Furthermore, non-compliant bidders will be subject to a penalty in the amount of the difference between the forfeited bid and the eventual selling price of the licence (determined by a subsequent licensing process) if the eventual selling price is lower than the forfeited bid.

8. Bidder Training and Support

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

148. A mock auction will be held, likely during the week prior to the start of the auction, in order to allow qualified bidders to better familiarize themselves with the auction system.

149. In order to assist potential bidders in gaining a greater understanding of the proposed auction format and rules, Industry Canada will hold an information session on May 30, 2012. The session will provide an overview of the proposed auction format and rules for the 700 MHz auction.

150. Further details on the logistics and agenda for the information session are available at <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10373.html>.

9. Post-auction Licensing Process for Unassigned Licences

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

10. Licence Renewal Process

152. Following the end of the initial licence term, licensees will have a high expectation of renewal. New licences will be issued for a subsequent term through a formal renewal process unless the Minister determines that 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. In the absence of the previously outlined determinations, the renewal process facilitates the continued provision of services by existing licensees.

153. As part of the licence renewal process, the Minister of Industry 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.

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

155. For long-term spectrum licences, Industry Canada's assessment of a licensee's eligibility towards a subsequent licence term will generally include, among other factors, a review of the licensee's continued compliance with all conditions of licence, including any deployment requirements, a scan of the general environment (e.g. use of the band by other licensees and international developments) and a review of the demand for spectrum from other parties.

156. It is proposed that the renewal process include a public consultation process that would commence approximately two years prior to the end of the licence term wherein the above-noted issues will be discussed.

Industry Canada is seeking comments on the proposed renewal process for spectrum licences in the 700 MHz band.

11. Clarification Questions Process

157. As done in previous auctions, following a decision on the questions raised in this consultation paper, Industry Canada will accept written questions soliciting clarification of the rules and policies set out in the decision paper for a limited period of time, which will be specified in the final licensing framework. Written questions, submitted by the deadline, and Industry Canada's responses will be made public on Industry Canada's website.

12. Submitting Comments

158. Respondents are requested to provide their comments in electronic format (WordPerfect, Microsoft Word or Adobe PDF) to the following e-mail address: spectrum.auctions@ic.gc.ca.

159. Written submissions should be addressed to the Manager, Spectrum Auctions, DGSO, Industry Canada, 300 Slater Street, Ottawa, Ontario K1A 0C8.

160. All submissions should cite the *Canada Gazette*, Part I, the publication date, the title and the notice reference number (DGSO-002-12). Parties should submit their comments no later than June 25, 2012, to ensure consideration. Soon after the close of the comment period, all comments received will be posted on Industry Canada's Spectrum Management and Telecommunications website at <http://www.ic.gc.ca/spectrum>.

161. Industry Canada will also provide interested parties with the opportunity to reply to comments from other parties. Reply comments will be accepted until July 25, 2012.

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

13. Obtaining Copies

163. All spectrum-related documents referred to in this paper are available on Industry Canada's Spectrum Management and Telecommunications website at <http://www.ic.gc.ca/spectrum>.

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

Manager, Spectrum Auctions
Spectrum Management Operations Branch
Industry Canada
300 Slater Street
Ottawa, Ontario K1A 0C8
Telephone: 613-990-8881
Fax: 613-952-2708
E-mail: spectrum.auctions@ic.gc.ca

Annex A – Glossary

Term	Definition
Activity rule	A rule that limits what bids a bidder can make in subsequent rounds of a multiple round auction. The activity rules are intended to avoid bid sniping and to encourage truthful bidding.
Aggregate demand	The total number of bids for a product.
Allocation stage	A stage of the auction in which the number of spectrum licences that a bidder wins in each service area, as well as the base price for these licences is determined.
Assignment price	The price for specific licences that a winning bidder has won in the assignment stage.
Assignment stage	A stage of the auction in which bidders that have won generic licences are assigned specific licences.
Base price	The price for a package of licences that a winning bidder has won in the allocation stage. The base price is calculated at the end of the allocation stage. It does not include the assignment price.
Bid amount	The price that a bidder bids for a particular licence or package of licences.
Bid shading	The strategy of bidding below one's valuation, typically as a way to improve profits in first-price auctions.
Bid sniping	The tendency for a bidder to wait until the last possible opportunity to place a serious bid. Auctions often have activity rules in place to prevent bid sniping.
Category	A spectrum block or group of spectrum blocks with similar properties. A category can include a single licence for each service area or a group of generic licences for each service area.
Clock price	A price for a product in a clock round.
Clock round	A round in the allocation stage of the auction in which bidders can submit a bid for a single package of licences in response to prices announced by Industry Canada.
Complementary goods	X and Y are complementary goods if the demand for X decreases when the price of Y increases. Complementary goods are typically purchased together and are more valuable together than they are apart (the sum is greater than the parts). The complementarity may be strong or weak. The level of complementarity between goods is important in designing an auction.
Demand reduction	A situation where a bidder reduces its demand to keep prices low.
Efficient	The assignment of the licences to the bidders that value them the most.

Term	Definition
assignment/outcome	
Eligibility-based activity rule	An activity rule based on eligibility points where a bidder cannot bid for a package of licences for which the sum of the eligibility points for these licences exceeds the bidder's current eligibility points. A bidder's initial level of eligibility is based on its pre-auction financial deposit. In subsequent rounds, its number of eligibility points is set by the bids placed in the previous round (and the activity percentage for that round).
Eligibility points	Each licence is assigned a certain number of eligibility points that are related to its population, bandwidth and estimated value. They are first used in the determination of the pre-auction deposit, and then for the eligibility-based activity rule. A bidder's initial eligibility points define the upper limit of licences for which the bidder can bid (based on the sum of bidding points associated with the licences in its bid).
Eligibility-reducing round	A clock round in which the number of eligibility points associated with a bid is less than the bidder's eligibility. In subsequent rounds, the bidder's eligibility is reduced.
Excess demand	The extent to which the aggregate demand exceeds the number of licences available.
Exposure risk	The risk of winning only some licences in a collection of licences that a bidder wants. This may occur when bids are treated individually instead of being treated as a package.
Final clock package	The package that the bidder bid on in the final clock round.
First-price rule	A pricing rule which requires winning bidders to pay the full amount of their winning bid.
Gaming or game playing	Bidding in an auction in a way that does not truthfully represent the bidder's true valuation of the spectrum, but may increase the bidder's chances of a favourable outcome. Examples of gaming include demand reduction, parking and tacit collusion.
Generic licences	Licences that are similar enough and of comparable value such that they can be offered together in a single category. Bidders may then express a demand for a number of generic licences at a particular price.
Lost licence	As part of a tie resolution mechanism in the allocation stage, a licence that was included in a bidder's final clock package, but that is not included in an alternate package that could be assigned to the bidder.
Package bid	A package bid is a bid on a set of licences.
Parking	A strategy in which bidders bid on licences that they do not expect to win simply to maintain greater eligibility for later in the auction.
Pre-auction financial	A pre-auction financial deposit that Industry Canada requires all bidders to

Term	Definition
deposit	submit with their application to participate in the auction. The deposits are based on the licences on which the applicant wishes to be eligible to bid.
Price discovery	A feature of multiple-round auctions in which information about bidder demands and prices is reported to bidders, giving them the opportunity to adjust subsequent bids based on the information.
Pricing rule	The rule that determines the price paid by the bidder.
Product	A category in a given service area.
Revealed preference activity rule	An activity rule based on prices and bidding activity in previous rounds. The rule allows a bidder to shift toward larger packages, in terms of associated eligibility points that have become relatively less expensive.
Second-price rule	A pricing rule that requires winning bidders to pay an amount that is sufficient to ensure that no other bidder, or group of bidders, was prepared to pay more than the winning bidders for the licence(s) in question.
Service area	<p>Industry Canada has established four tiers of service areas, which it uses for competitive licensing. These areas cover the entire geography of Canada and are based on Statistics Canada’s Census Divisions and Subdivisions. The definition of the service areas within these tiers and accompanying maps and data tables are available on Industry Canada’s website. See Service Areas for Competitive Licensing at http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/h_sf01627.html.</p> <p>For the 700 MHz auction, licences will be auctioned using Tier 2 service areas for all frequency blocks.</p>
Specific licence	Licences that are treated individually, each with its own characteristics. Specific licences are appropriate when each licence has unique characteristics that determine its value.
Substitute goods	X and Y are substitute goods if the demand for X increases when the price of Y increases. Consequently, a bidder may wish to switch its bid from the more expensive good (Y) to the less expensive good (X) when the price of Y increases, as the two goods are deemed similar enough.
Substitution	The act of shifting demands across products or packages in response to price changes, increasing the demand of the product that has become relatively more attractive as a result of the price change.
Supplementary bid	A bid placed for a single package in the supplementary round.
Supplementary round	A single round that occurs after the clock rounds end in a combinatorial clock auction (CCA). Bidders are able to bid on multiple packages in the supplementary round, either submitting bids for new packages or improving their bids for packages that they bid for in the clock rounds.
Tacit collusion	Cooperative behaviour among bidders whereby they do not engage in any explicit communication and do not enter into any explicit agreement, but in

Term	Definition
	some manner attempt to coordinate on a better joint outcome than would be attained by purely competitive bidders.
Valid bid	A bid that is accepted by the auction system.
Winner determination	The process of determining winning bids and prices to be paid using an algorithm.

Annex B – The Combinatorial Clock Auction (CCA) Format

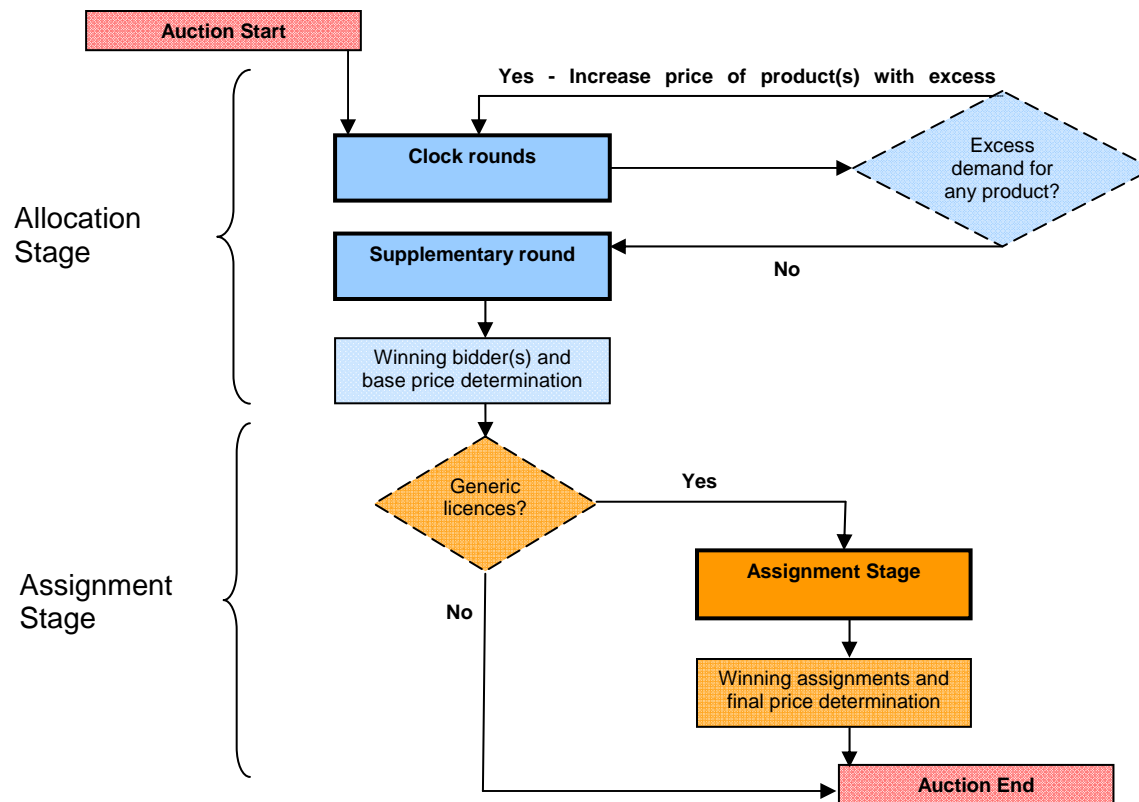
1. Industry Canada is proposing to use a combinatorial clock auction (CCA) format for the 700 MHz band. A CCA is a bidding process that includes a price discovery stage, similar to the SMRA auction format. However, the CCA format also has attributes which remove or reduce some design concerns associated with the SMRA format. In particular, in a CCA, bidders are able to bid for packages of licences instead of individual ones, 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 and the complementarities that exist between these licences.

2. Other attributes are being proposed for the 700 MHz auction, such as the use of generic licences and anonymous bidding. Generic licences are blocks of spectrum that are similar in terms of frequency location in the band, block size, technology and interference constraints and are of comparable value, such that they can be grouped together in a “single category” for bidding purposes in the auction. The use of generic licences will decrease bidding complexity by reducing the number of categories available to bid on in the auction, and will enhance substitution among licences. The use of anonymous bidding will reduce the potential for gaming strategies. Pricing rules and activity rules that encourage truthful bidding throughout the auction process, i.e. bidding in a manner that is consistent with how a bidder truly values the package, will further improve the process.

1. Overview of the CCA

3. A CCA is comprised of two stages, the allocation stage and the assignment stage (Figure 1). In the allocation stage, the number of spectrum licences that a bidder will win in each service area is determined, as well as the base price to be paid by each winning bidder. 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 1: CCA Process



2. The Allocation Stage

4. The allocation stage of the auction determines the winning bidders and the number of licence blocks that they have won. The allocation stage is divided into two phases: the clock rounds and the supplementary round. All valid bids submitted during both phases of the allocation stage are used to determine the winning packages and base prices.

5. 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 changes in prices accordingly, shifting their bids to licences that continue to be consistent with their business objectives.

6. During each clock round, bidders are only able to bid on 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 bids that they placed in the clock rounds and/or to submit bids that they were eligible to bid on but unable to submit in the clock rounds.

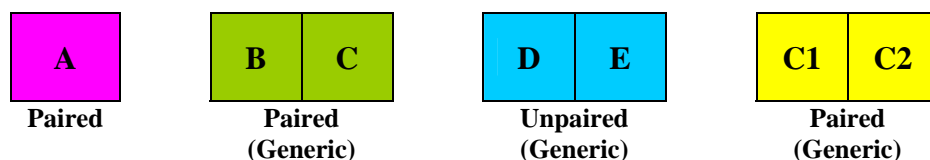
7. There is a spectrum cap of two blocks of paired spectrum in each service area. Therefore, bidders will be unable to bid on more than two licences of paired spectrum in each service area. Large wireless service providers are further limited in that they can only bid on one paired licence in each service area among Blocks B, C, C1 and C2. This cap on large wireless service providers, however, does not include Block A. The auction software will not allow bidders to submit a bid that exceeds their spectrum cap(s).

3. Clock Rounds

8. The allocation stage begins with the clock rounds. Licences or sets of generic licences (substitutable licences of comparable value) are predefined prior to the auction, and are separate categories in each service area in the auction.

9. For the 700 MHz auction, Industry Canada is proposing four categories of licences in each of the 14 service areas:

- Block A in the Lower 700 MHz band (one licence of 6+6 MHz)
- Blocks B and C in the Lower 700 MHz band (two generic licences of 6+6 MHz)
- Blocks D and E in the Lower 700 MHz band (two generic licences of 6 MHz)
- Blocks C1 and C2 in the Upper 700 MHz band (two generic licences of 5+5 MHz)



10. A category in a given service area is referred to as a product. Given the proposal of four categories of licences in each of the 14 service areas, 56 products (4x14) are proposed for the 700 MHz auction.

11. The licences are auctioned simultaneously over multiple clock rounds. In each round and for each product, bidders indicate the number of licences in each product on which they would like to bid given the prevailing prices. For a product in any of the categories containing two generic licences, the bid is “0,” “1” or “2.” For a product in the Block A category, which contains only one licence, the bid is “0” or “1.” 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.

12. When there is excess demand for a product, its price increases in the next round. There is excess demand for a product when the number of bids exceeds the number of licences available.

13. To remain in the auction, a bidder must submit a valid bid for at least one licence in the first clock round. This bid cannot be withdrawn and will be part of the bids considered in determining the assignment of licences at the end of the allocation stage. All valid bids submitted during the clock rounds are binding and will be considered in determining both winning packages and base prices after the supplementary round ends.

14. Bidding remains open on all products until there is no excess demand for any of the products in the clock rounds.

4. Conclusion of Bidding in the Clock Rounds

15. The clock rounds end when there is a round in which there is no excess demand for any of the products. 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, Industry Canada will announce that the clock rounds have ended and that the auction will proceed to the supplementary round (see Section 9).

16. In the final clock round, all licences may be tentatively allocated. Conversely, there may be some unallocated licences in the final clock round due to a licence never having received a bid, and/or bidders reducing or substituting their demands in any clock round, including the final clock round.

17. If all of the licences are tentatively allocated, then the bids placed in the final clock round are the provisional winning bids. If there are still some unallocated licences, a bidder can guarantee that it will win its final clock package by submitting a supplementary bid that increases the dollar amount of its final clock package bid by **at least** the final clock price of the unallocated licences **less the opening bid prices of the unallocated licences. This guarantee 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.**

5. Information in the Clock Rounds

18. At the beginning of each clock round, bidders have access to sufficient information to permit price discovery and inform their bidding strategy. This information includes their own bids from the previous round and the number of eligibility points that they will have in the next round, as well as the aggregate demand for each product from the previous round, and the prices for each product in the next round. Bidders are not informed about the individual bids submitted by other bidders or the remaining eligibility of other bidders. This should address some of the concerns raised during previous auctions regarding the potential for gaming.

6. Bid Increments

19. Industry Canada is consulting on the opening bid amounts for each of the licences being auctioned. The opening bid amounts being proposed can be found in Table 4, Section 7.2 of the main document. In the first clock round, the price for each licence is equal to the decided upon opening bid price to be stated in the final licensing document.

20. During subsequent clock rounds, if there is excess demand for a given product, the prices for the given product increase in the next round. Industry Canada will use activity-based increments as a mechanism to determine the bid increments. The increment for each product is based on the excess demand for the product during the previous round. Products that generate greater excess

demand are subject to a larger bid increment than products that generate less excess demand, all other things being equal. Bid increments increase more quickly for products with higher demand, potentially shortening the length of the auction. If there is no excess demand, the price for the product does not increase in the next round.

21. Industry Canada will decide on the bid increments for the 700 MHz auction. Details concerning the calculation of bid increments will be included in the final licensing framework.

7. Eligibility Points

22. Each of the 98 licences has been assigned a specific number of eligibility points (points) that are related to the population covered by the licence, its bandwidth and the estimated value of the spectrum. Generally, one point has been assigned per 5 MHz of spectrum per 100,000 in population count. The five service areas of Southern Quebec, Eastern Ontario and Outaouais, Southern Ontario, Alberta and British Columbia are the exception. For these five service areas, the eligibility points per paired spectrum block have been adjusted in proportion to the opening bid prices. Section 7.3 of the main document lists the proposed eligibility points associated with the paired and unpaired blocks of spectrum being auctioned, as well as the population of their respective service areas.

23. In their application, each applicant must indicate the total number of “points” worth of licences on which they wish to bid. This number defines a bidder’s initial level of eligibility points and hence, the maximum number of licences a bidder is eligible to bid on at the start of the auction. Eligibility points are also used to determine the financial deposit that must be submitted with the application.

24. Bidder eligibility points cannot be increased once the auction has started.

8. Activity Rules in the Clock Rounds

25. Activity rules have been established to encourage truthful bidding throughout the clock rounds. This facilitates the price discovery process, allowing bidders to make changes to their bidding strategies dynamically throughout the auction, in response to increasing prices. The activity rules discourage a bidder from misrepresenting its true demand, as doing so will limit the bidder’s ability to bid on what it really wants later in the auction.

26. The activity rules in the clock rounds are comprised of an eligibility point rule and a revealed preference rule. The two rules work in combination to accommodate their relative shortcomings. The motivation for using both rules is to ensure that the activity rules do not prohibit bidders from bidding on their most preferred package.

27. The eligibility point rule is similar to the rule that has been used in previous SMRA auctions. Bidders begin each round with a set number of eligibility points and these determine the maximum activity level for that round. For example, a bidder with 100 eligibility points can bid on licences whose total sum of associated points is 100 or less.

28. The eligibility point rule considers the size of the package that the bidder is bidding on, where size is the sum of the eligibility points for each licence in the package. The eligibility point activity rule requires bidders to bid on packages of the same size or smaller as prices rise. When a bidder switches to a package that is smaller than the package it has previously bid on, (that is, has fewer eligibility points worth of licences), its eligibility is reduced. A round in which a bidder's eligibility is reduced is called an *eligibility-reducing round*. These rounds play a special role in the proposed activity rules of the 700 MHz auction.

29. In Round 1, a bidder's eligibility is established by its pre-auction financial deposit submitted at the time of application. In subsequent rounds, a bidder's eligibility is determined by its activity level in the previous round. Therefore, if a bidder wishes to maintain the same eligibility level as in the previous round, its activity level must correspond to the same number of eligibility points in each round. A bidder's eligibility points can never increase.

30. If a bidder falls short of the required activity level in any round, its eligibility point level is reduced accordingly, so that the total points worth of licences on which it can bid in the next round are limited in relation to its actual activity level in the current round. For example, consider an eligibility point rule where the activity level is 100%. If a bidder starts the round with 100 eligibility points but bids on licences worth only 80 eligibility points, in the subsequent round that bidder's eligibility will drop to 80 points. The bidder's eligibility remains at 80 points until a round in which it bids on a package worth fewer than 80 points, at which time its eligibility would be reduced accordingly.

31. However, there are some shortcomings with using only the eligibility point rule. Price discovery might be lessened, as there is an incentive for bidders to choose only larger packages when prices are low, rather than a package that may work better for them, so that they maintain a higher number of eligibility points for later in the auction. Furthermore, an eligibility point 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 rule would prevent the bidder from bidding on its most preferred package.

32. A revealed preference rule would lessen these problems, as it allows bidders to exceed their eligibility points in order to bid on packages that have become comparatively less expensive. Revealed preference refers to the information that a bidder discloses regarding its inclination toward one package versus another. In particular, if a bidder chooses one package over another given a certain price differential between the two packages, then the bidder should always choose the same package given the same price differential. This rule would afford bidders greater flexibility to fully express their preferences in the clock rounds of the auction, ensuring that activity rules do not prevent a bidder from bidding on its most preferred package.

33. For example, suppose that a bidder desires either a smaller package, X, or a larger package, Y, but not both. At the current prices, X is preferred, but in subsequent rounds, the prices for the licences in X increase much faster than the prices for the licences in Y. As a result, the bidder prefers Y to X at the new prices. The revealed preference rule allows the bidder to switch from X to Y because Y is now the better value. In contrast, the eligibility point rule would not allow the

switch because Y is larger than X. This example illustrates the problem with using the eligibility point rule exclusively and the advantage of using the eligibility point rule in combination with the revealed preference rule.

Revealed Preference/Eligibility Point Hybrid Activity Rule

34. A revealed preference/eligibility point hybrid activity rule is being proposed for each clock round. It comprises both an eligibility point rule and a revealed preference rule.

35. The proposed eligibility point activity requirement for the 700 MHz auction is 100%. Specifically, in each round, a bidder is required to bid on licences whose total sum of associated points is equal to 100% of their eligibility points if they wish to maintain that eligibility level in the subsequent round.

36. The bidder can always place a bid for any package that is within its current eligibility. However, as prices increase, a bidder's eligibility is generally reduced. There may be a point in the auction where the bidder wishes to switch to another package that is larger, but is relatively less expensive. With the revealed preference rule, in any round, the bidder can bid on a larger package than would be permitted by the bidder's current eligibility provided that the package satisfies the revealed preference rule with respect to each prior eligibility-reducing round.

37. However, bidding on a larger package will not increase the bidder's eligibility in subsequent rounds. Furthermore, a bidder will be unable to bid on a package with associated eligibility points that exceeds its initial eligibility. For an algebraic description of the revealed preference rule in the clock rounds, see Annex D. For an example of the revealed preference rule in the clock rounds, refer to Annex C.

38. The combination of the two activity rules will allow a bidder to bid on its most preferred package in every clock round. A bidder can continue to bid just as it would under the eligibility point rule. The only difference is that the bidder is given some extra flexibility to bid on a larger package provided that the bid on the larger package satisfies revealed preference, i.e. the bid involves a switch to a package that has become relatively less expensive.

39. As a result, price discovery is improved and the final clock allocation becomes a better predictor of the auction outcome.

9. Supplementary Round

40. The second phase of the allocation stage is the supplementary round. The supplementary round is a single round process, in which bidders have the opportunity to place additional bids for packages, subject to constraints that are based on the bids that they placed in the clock rounds (Section 10 of Annex B). These additional bids could be used to improve bids on packages previously submitted in the clock rounds and/or to submit bids for which they were eligible to bid on, but unable to in the clock rounds.

41. In the clock rounds, a bidder is allowed to bid on only one package of licences per round. As there may be other packages that a bidder would be interested in winning, the supplementary round provides bidders with an opportunity to submit bids on multiple packages that they were willing and eligible to bid on in the clock rounds, but did not necessarily bid on.

42. If there are licences that remain unallocated at the end of the clock rounds, the supplementary round provides bidders with the opportunity to win some or all of the unallocated licences. Bidders also have the opportunity to guarantee that they win their final clock package by submitting a supplementary bid that increases the dollar amount of their final clock package by **at least** the value of the unallocated licences as evaluated at the final clock prices **less the opening bid prices of the unallocated licences. This guarantee 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.**

43. If all of the licences are allocated at the end of the clock stage, then the supplementary round will not affect the final clock allocation. However, the supplementary round provides an opportunity for bidders to be reassured that they themselves were not prepared to pay more than the winning bidders for the licences in question.

10. Activity Rules in the Supplementary Round

44. Activity rules in the supplementary round encourage truthful bidding throughout the allocation stage of the auction, not just in the latter stages. The proposed activity rules ensure that supplementary bids are consistent with bids from the previous rounds.

45. Any bidder that placed at least one valid bid in the clock rounds may submit bids in the supplementary round. A bidder is not required to submit bids in the supplementary round if it does not so desire.

46. All licences are available for bidding in the supplementary round so that bidders can improve on bids submitted during the clock rounds, or submit bids for packages of licences not expressed in the clock rounds.

47. A bidder can only make one supplementary bid for a given package of licences. A bidder can submit supplementary bids for up to 500 different packages.

48. The bid amount for a supplementary bid must be at least the sum of the opening bid prices for all the licences included in the package. Furthermore, if a bidder submitted a bid for a certain package in the clock rounds, the supplementary bid amount must be at least the bidder's highest bid for that package.

Revealed Preference Limit

49. Each bid in the supplementary round must satisfy the following revealed preference limit activity rule.

50. *Revealed Preference Limit*: 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. All other supplementary bids must satisfy revealed preference with respect to the final clock round, regardless of whether the supplementary bid package is larger or smaller than the final clock package.

51. In addition, supplementary bids for packages that are larger than the final clock package, as measured by eligibility points, must satisfy revealed preference with respect to each eligibility-reducing round, beginning with the last round in which the bidder had sufficient eligibility to bid on the package. The application of the revealed preference limit to limit bids on packages larger than the final clock package could have the effect of creating a chain of constraints on the dollar amount of a supplementary bid relative to the dollar amount of other supplementary bids submitted by the bidder.

52. There is an exception to the above. A supplementary bid for a package comprised solely of the bidder's final clock package plus some or all of the unallocated licences only needs to satisfy revealed preference with respect to the final clock round. This is to provide bidders with additional flexibility in bidding on licences that are unallocated as of the final clock round. By relaxing the constraints on bids for such packages, the probability of awarding unallocated licences can be improved without reducing the probability that any bidder receives its final clock package.

53. These activity rules guarantee that the final clock allocation will not change if there are no unallocated licences. Each winner is guaranteed to win its final clock package without making any supplementary bids. If there are unallocated licences, each winner is guaranteed to win its final clock package by submitting a supplementary bid that increases the dollar amount of its final clock package by **at least** the value of the unallocated licences as evaluated at the final clock prices **less the opening bid prices of the unallocated licences. This guarantee 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.**

54. The revealed preference limit with respect to the final clock package provides the bidder with an incentive to bid on the most preferred package throughout the clock rounds. This is because supplementary bids are limited by bids submitted in the clock rounds. Given that the bidder does not know which round will be the final clock round, the bidder will be motivated to always bid truthfully to improve its chance of winning its most preferred package, otherwise the bidder will be constrained in the supplementary round.

55. Industry Canada will decide on the process for submitting supplementary bids. Details concerning the process will be included in the final licensing framework.

11. Determining the Winning Packages in the Allocation Stage

56. All valid bids received from bidders in the clock rounds and the supplementary round are considered for the determination of winning packages. In addition, 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. This process will act as though Industry Canada is a bidder in the auction, placing a bid on every licence at the opening bid price. The inclusion of 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.

57. An algorithm will be used to identify the highest value combination of valid bids with each bidder winning at most one of its packages. If there is only one combination of bids that meets the criterion, this will be the winning outcome that determines the winning packages and winning bidders.

58. If there is more than one set of valid bids having the equal highest value, the tie will be resolved, first, 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 to select an assignment that is the most similar to the final clock allocation.

59. If there is still a tie, the second tie-breaking rule is to select the combination of valid bids which includes the greatest quantity of spectrum, measured in terms of eligibility points. **Note:** 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.

60. Industry Canada will decide how best to validate the results following the use of the algorithm. Further details will be included in the final licensing framework. This will include details of the algorithm to be used and also how Industry Canada intends to validate the results following the use of this applicable algorithm.

12. Determining the Base Price in the Allocation Stage

61. The base price is the minimum amount that the 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 in the assignment stage should there be generic licences included in the winning allocation stage package. The base price is determined using all valid bids submitted by all bidders during the allocation stage.

62. Industry Canada is proposing to use a second-price rule to calculate the base prices such that winning bidders, individually and collectively, will pay the lowest amount that they could have bid on their package of licences and still have won. In other words, a winning bidder 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 is typically less than 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.

63. Industry Canada is proposing to apply bidder-optimal core prices and to use the “nearest Vickrey” approach to determine the base prices. Further information on the determination of base prices can be found in Annex E.

13. Information at the end of the Allocation Stage

64. At this point, bidders will know with certainty the number of licences that they have won; however, where there are generic licences, they will not necessarily know the specific licences that they have won.

65. At the end of the allocation stage, bidders will be informed of their own winning packages, along with the base price to be paid for each package. All bidders will be informed of the number of winning bidders and the total number of licences allocated.

14. The Assignment Stage

66. As there are generic licences, 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.

67. Industry Canada is proposing to run three sequential assignment rounds (i.e. one for each category of generic licences): blocks B and C; blocks D and E; and blocks C1 and C2. This is to allow bidders that have won licences in the same category of generic licences across multiple service areas to express their preference for particular licences.

68. In each assignment round, winning bidders are allowed to submit top-up bids for the specific licence(s) that they most prefer in each service area, using a single round process for each category. This bid reflects the incremental value that the bidders place on winning these particular frequency blocks.

69. 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 won. Each winning bidder has both a right and an obligation to purchase one of the licences in each category presented to it in the assignment round(s). For example, in the 700 MHz auction, if two bidders each won a licence in the C1 and C2 category in a given service area, then each would have an opportunity to submit an additional bid for either the C1 or the C2 licence, depending on its preferred assignment. However, if one of the two bidders did not have a preference between the two licences, it would not have to submit assignment bids.

70. An algorithm will be used to identify the combination of specific assignments of licences that result in the highest bid amount subject to the proposed assignment stage restriction (Section 15). 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.

71. 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).

72. The additional amount paid for the assignment of specific licences, known as the assignment price, is calculated for a package of licences within one category, not the individual licences. In general, given the pricing rules, the assignment price for each winning assignment stage bid will be equal to or less than the corresponding winning bid amount; however, it is likely that it will be less than the winning bid amount and could even be zero.

73. Industry Canada is proposing to apply bidder-optimal core prices and to use a “nearest Vickrey” approach to determine assignment prices. Further information on the determination of assignment prices can be found in Annex E.

15. Restrictions in the Assignment Stage

74. Industry Canada is proposing that the assignment option be limited such that where a bidder wins Block A and one of blocks B and C in a given service area, then the bidder will automatically be assigned blocks A and B.

75. Industry Canada will decide on the process for submitting assignment bids. Details concerning the process for submitting bids in the assignment stage will be included in the final licensing framework.

16. Final Price

76. Following the determination of the winning assignment bids, Industry Canada will then determine the final price to be paid by each winning bidder. The final price to be paid by a winning bidder is equal to the base price plus any associated assignment prices for a bidder’s winning package.

17. Information at the end of the Assignment Stage

77. Following the end of the assignment stage, all bidders will be notified of the winning bidders and the specific package of licences that they have won, as well as the final price to be paid by each winning bidder.

18. Information at the end of the Auction

78. Industry Canada is proposing to make the following information publicly available following the conclusion of the auction:

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

Annex C – Example of the Proposed Activity Rules

1. For the purposes of this example, only a single service area and two categories within the 700 MHz band will be considered: blocks C1/C2 and blocks D/E. Within the given service area, suppose that each C1/C2 licence has an eligibility of 50 points, whereas each D/E licence has an eligibility of 25 points.
2. A single bidder, Bidder A, will also be considered. Bidder A would like to obtain two licences of C1/C2. This package will be denoted as (2, 0). However, if the price of the package with two licences of C1/C2 exceeds the price of a package with one C1/C2 licence and one D/E licence by more than \$500,000, then Bidder A would prefer a package with one C1/C2 licence and one D/E licence, denoted as package (1, 1).
3. Eventually, if the prices become too high, Bidder A will be unable to afford two licences and will need to reduce its demand to one licence. In this case, Bidder A again prefers one licence from C1/C2, but will switch to one D/E licence if the price of one C1/C2 licence, denoted as package (1, 0), exceeds the price of one D/E licence, denoted as package (0, 1) by more than \$500,000.
4. Bidder A’s total budget is \$2,800,000. If the price of obtaining two licences becomes greater than this, Bidder A must reduce its demand to one licence.

Round 1

5. In Round 1, the opening bid prices are announced; the opening bid price for C1/C2 is \$1,000,000 per licence, and for D/E, it is \$600,000 per licence. The price of a package with two C1/C2 licences is \$2,000,000, whereas the price of a package with one C1/C2 licence and one D/E licence is \$1,600,000 (a price difference of \$400,000). As Bidder A prefers two C1/C2 licences unless the price difference is greater than \$500,000, Bidder A will bid for two C1/C2 licences, package (2, 0):

Category	Price	Bid	Eligibility Points
C1/C2	\$1,000,000	2	100
D/E	\$600,000	0	0
Total Package	\$2,000,000	(2, 0)	100

Round 2

6. In Round 1, several other bidders shared Bidder A’s preference for C1/C2, whereas few bidders bid on D/E. As a result, the prices in Round 2 are \$1,200,000 for C1/C2 and \$650,000 for D/E. The price for a package with two C1/C2 licences is \$2,400,000, whereas the price for a package with one C1/C2 licence and one D/E licence is \$1,850,000 (a price difference of \$550,000). As Bidder A prefers one C1/C2 licence and one D/E licence when the price difference is greater than \$500,000, Bidder A now bids on one licence of each category, package (1, 1), thereby reducing eligibility from 100 to 75 points.

Category	Price	Bid	Eligibility Points
C1/C2	\$1,200,000	1	50
D/E	\$650,000	1	25
Total Package	\$1,850,000	(1, 1)	75

Round 3

7. In Round 2, the low price of D/E caused many bidders to switch demand to that category. As a result, the price of D/E increased at a faster rate than the price of C1/C2. The Round 3 prices are \$1,250,000 for C1/C2 and \$800,000 for D/E. The price for a package with two C1/C2 licences is \$2,500,000, whereas the price for a package with one C1/C2 licence and one D/E licence is \$2,050,000. This price difference is only \$450,000, so Bidder A would prefer to switch back to bidding on two C1/C2 licences, package (2, 0).

8. Using only an eligibility point activity rule, switching back at this point would be impossible because Bidder A would no longer have enough eligibility to bid for a package worth 100 points. This limitation could have the effect of creating a disincentive for Bidder A to bid on its most favourable package in Round 2. Bidder A would have needed to bid on a less profitable package in order to maintain its eligibility for as many rounds of the auction as possible.

9. With a revealed preference/eligibility point hybrid activity rule, however, Bidder A is free to switch back as long as the package satisfies revealed preference with respect to each prior eligibility point reducing round:

Category	Price	Bid	Eligibility Points
C1/C2	\$1,250,000	2	100
D/E	\$800,000	0	0
Total Package	\$2,500,000	(2, 0)	100 (Eligibility is 75)

10. In order to place a bid with eligibility points greater than its current eligibility (75 points), Bidder A must meet the revealed preference constraint with respect to each prior eligibility-reducing round. In this case, the only eligibility-reducing round is Round 2, where Bidder A decreased its eligibility from 100 points to 75 points. In other words, in order for Bidder A to be able to switch its bid from (1, 1) to (2, 0), the (2, 0) package had to become relatively cheaper than the (1, 1) package. Mathematically, the revealed preference constraint is stated as follows, where R refers to the round:

$$\begin{aligned}
 &(\text{Price of } (2, 0) \text{ in } R3) - (\text{Price of } (2, 0) \text{ in } R2) \leq (\text{Price of } (1, 1) \text{ in } R3) - (\text{Price of } (1, 1) \text{ in } R2) \\
 &(\$2,500,000 - \$2,400,000) \leq (\$2,050,000 - \$1,850,000) \\
 &\$100,000 \leq \$200,000
 \end{aligned}$$

11. The price of package (2, 0) increased by \$100,000 from Round 2 to Round 3, whereas the price of package (1, 1) increased by \$200,000. Therefore, the constraint is satisfied and Bidder A is permitted to place the bid for the package (2, 0).

Round 4

12. In Round 4, the price of C1/C2 increases to \$1,400,000, whereas the price of D/E increases to \$1,000,000. The price for a package with two C1/C2 licences is \$2,800,000, whereas the price for a package with one C1/C2 licence and one D/E licence is \$2,400,000. This price difference is only \$400,000 so Bidder A prefers the same package as in Round 3:

Category	Price	Bid	Eligibility Points
C1/C2	\$1,400,000	2	100
D/E	\$1,000,000	0	0
Total Package	\$2,800,000	(2, 0)	100 (Eligibility is 75)

13. Bidder A's eligibility is still only equal to 75, so it must meet the revealed preference constraint in order to place this bid. As before, the requirement is that the (2, 0) package needs to be relatively cheaper than the (1, 1) package (as compared to Round 2):

$$\begin{aligned}
 & (Price\ of\ (2, 0)\ in\ R4) - (Price\ of\ (2, 0)\ in\ R2) \leq (Price\ of\ (1, 1)\ in\ R4) - (Price\ of\ (1, 1)\ in\ R2) \\
 & (\$2,800,000 - \$2,400,000) \leq (\$2,400,000 - \$1,850,000) \\
 & \$400,000 \leq \$550,000
 \end{aligned}$$

14. This constraint continues to be satisfied, that is, the price of the package (2, 0) increased by \$400,000 which is no more than the increase in the price of the package (1, 1) from Round 2 to the current round, Round 4, which is \$550,000. Bidder A is permitted to place this bid for the package (2, 0).

Round 5

15. In Round 5, the price continues to increase on both categories, with C1/C2 at \$1,650,000 and D/E at \$1,200,000. As a result, both two-licence combinations, (2, 0) and (1,1) now exceed Bidder A's budget of \$2,800,000. Bidder A must decrease its demand to one licence. As the price of C1/C2 (\$1,650,000) is \$450,000 greater than the price of D/E (\$1,200,000), Bidder A places a bid for one C1/C2 licence, package (1, 0), given that Bidder A prefers one C1/C2 licence when the price of one C1/C2 licence exceeds the price of one D/E licence by less than \$500,000.

16. This bid further reduces Bidder A's eligibility to 50 points. Bidder A is within its eligibility of 75 points, so there are no revealed preference constraints on this bid.

Category	Price	Bid	Eligibility Points
C1/C2	\$1,650,000	1	50
D/E	\$1,200,000	0	0
Total Package	\$1,650,000	(1, 0)	50

Round 6

17. In Round 6, the price on C1/C2 increases at a faster rate, increasing the price difference to \$550,000, which is greater than the \$500,000 threshold. Bidder A thus switches its bid to one D/E licence, package (0, 1) as Bidder A prefers one D/E licence when the price of one C1/C2 licence exceeds the price of one D/E licence by more than \$500,000. This bid further reduces Bidder A's eligibility to 25 points:

Category	Price	Bid	Eligibility Points
C1/C2	\$1,800,000	0	0
D/E	\$1,250,000	1	25
Total Package	\$1,250,000	(0, 1)	25

Round 7

18. In Round 7, the price on D/E increases at a faster rate than C1/C2. At Round 7 prices, Bidder A prefers one C1/C2 licence, as the price of one C1/C2 licence exceeds the price of one D/E licence by less than \$500,000, causing Bidder A to again desire to switch:

Category	Price	Bid	Eligibility Points
C1/C2	\$1,850,000	1	50
D/E	\$1,400,000	0	0
Total Package	\$1,850,000	(1, 0)	50 (Eligibility is 25)

19. In order to place this bid, Bidder A must satisfy revealed preference with respect to every round in which it has reduced its eligibility. Bidder A reduced its eligibility in Round 2, Round 5 and Round 6. It is helpful to summarize the prices and bids placed up to this point:

Category	Price						
	Round 1	Round 2	Round 3	Round 4	Round 5	Round 6	Round 7
C1/C2	\$1,000,000	\$1,200,000	\$1,250,000	\$1,400,000	\$1,650,000	\$1,800,000	\$1,850,000
D/E	\$600,000	\$650,000	\$800,000	\$1,000,000	\$1,200,000	\$1,250,000	\$1,400,000
Bid	(2, 0)	(1, 1)	(2, 0)	(2, 0)	(1, 0)	(0, 1)	

20. The constraints are as follows:

Constraint with respect to Round 2

$$\begin{aligned}
 &(\text{Price of } (1, 0) \text{ in } R7) - (\text{Price of } (1, 0) \text{ in } R2) \leq (\text{Price of } (1, 1) \text{ in } R7) - (\text{Price of } (1, 1) \text{ in } R2) \\
 &(\$1,850,000 - \$1,200,000) \leq (\$3,250,000 - \$1,850,000) \\
 &\$650,000 \leq \$1,400,000
 \end{aligned}$$

21. The price of the package (1, 0) increased by \$650,000 from Round 2 to the current round, Round 7, which is no more than the increase in the price of package (1, 1), \$1,400,000, where package (1, 1) is the package that Bidder A bid on in Round 2.

Constraint with respect to Round 5

$$\begin{aligned} (\text{Price of } (1, 0) \text{ in } R7) - (\text{Price of } (1, 0) \text{ in } R5) &\leq (\text{Price of } (1, 0) \text{ in } R7) - (\text{Price of } (1, 0) \text{ in } R5) \\ (\$1,850,000 - \$1,650,000) &\leq (\$1,850,000 - \$1,650,000) \\ \$200,000 &\leq \$200,000 \end{aligned}$$

22. The price of the package (1, 0) increased by \$200,000 from Round 5 to the current round, Round 7, which is no more than the increase in the price of the package (1, 0), where the package (1, 0) is the package that Bidder A bid on in Round 5.

Constraint with respect to Round 6

$$\begin{aligned} (\text{Price of } (1, 0) \text{ in } R7) - (\text{Price of } (1, 0) \text{ in } R6) &\leq (\text{Price of } (0, 1) \text{ in } R7) - (\text{Price of } (0, 1) \text{ in } R6) \\ (\$1,850,000 - \$1,800,000) &\leq (\$1,400,000 - \$1,250,000) \\ \$50,000 &\leq \$150,000 \end{aligned}$$

23. The price of the package (1, 0) increased by \$50,000 from Round 6 to the current round, Round 7, which is no more than the increase in the price of the package (0, 1), where the package (0, 1) is the package that Bidder A bid on in Round 6.

24. All three revealed preference constraints are satisfied, so Bidder A is permitted to place this bid.

Supplementary Round

25. In the bidding of Round 7, the aggregate demand drops sufficiently that the clock rounds conclude, making Round 7 the final clock round. Bidder A is in the position of having a final clock package of one C1/C2 licence. Note that if there had only been an eligibility point activity rule in the clock stage, Bidder A would likely have, instead, a final clock package of one D/E licence, a less desirable package.

26. With the revealed preference limit, Bidder A is now guaranteed to win its final clock package if all licences are sold in the clock rounds of the auction. If there are some unallocated licences in the final clock round, Bidder A can still guarantee winning its final clock package by submitting a bid, increasing the dollar amount by **at least** the final clock price of those unallocated licences **less the opening bid prices of the unallocated licences. This guarantee 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.**

27. Now, suppose that Bidder A wishes to increase its bid on the package (1, 1) (i.e. one C1/C2 licence and one D/E licence) to its maximum budget of \$2,800,000. This package is larger than Bidder A's final clock package in terms of eligibility points. Therefore, Bidder A must satisfy revealed preference with respect to its final clock package, as well as with respect to each eligibility-reducing round beginning with the last round in which Bidder A had sufficient eligibility to bid on the package (1, 1), i.e. beginning with Round 5. Therefore, Bidder A's supplementary bid for the package (1, 1) must meet the revealed preference conditions with respect to Round 5, Round 6 and Round 7.

28. The revealed preference constraints are as follows, starting with the final clock package constraint:

Revealed preference with respect to the final clock package

$$\begin{aligned} (\text{Sup Bid on } (1, 1)) - (\text{Price of } (1, 1) \text{ in R7}) &\leq (\text{Highest Bid on } (1, 0)) - (\text{Price of } (1, 0) \text{ in R7}) \\ (\text{Sup Bid on } (1, 1)) &\leq (\text{Highest Bid on } (1, 0)) + (\text{Price of } (1, 1) \text{ in R7}) - (\text{Price of } (1, 0) \text{ in R7}) \\ (\text{Sup Bid on } (1, 1)) &\leq \$1,850,000 + \$3,250,000 - \$1,850,000 \\ (\text{Sup Bid on } (1, 1)) &\leq \$3,250,000 \end{aligned}$$

Revealed preference with respect to Round 6

$$\begin{aligned} (\text{Sup Bid on } (1, 1)) - (\text{Price of } (1, 1) \text{ in R6}) &\leq (\text{Highest Bid on } (0, 1)) - (\text{Price of } (0, 1) \text{ in R6}) \\ (\text{Sup Bid on } (1, 1)) &\leq (\text{Highest Bid on } (0, 1)) + (\text{Price of } (1, 1) \text{ in R6}) - (\text{Price of } (0, 1) \text{ in R6}) \\ (\text{Sup Bid on } (1, 1)) &\leq \$1,250,000 + \$3,050,000 - \$1,250,000 \\ (\text{Sup Bid on } (1, 1)) &\leq \$3,050,000 \end{aligned}$$

Revealed preference with respect to Round 5

$$\begin{aligned} (\text{Sup Bid on } (1, 1)) - (\text{Price of } (1, 1) \text{ in R5}) &\leq (\text{Highest Bid on } (1, 0)) - (\text{Price of } (1, 0) \text{ in R5}) \\ (\text{Sup Bid on } (1, 1)) &\leq (\text{Highest Bid on } (1, 0)) + (\text{Price of } (1, 1) \text{ in R5}) - (\text{Price of } (1, 0) \text{ in R5}) \\ (\text{Sup Bid on } (1, 1)) &\leq \$1,850,000 + \$2,850,000 - \$1,650,000 \\ (\text{Sup Bid on } (1, 1)) &\leq \$3,050,000 \end{aligned}$$

29. Thus, Bidder A's supplementary bid on the (1, 1) package is most constrained by the revealed preference constraints relative to rounds 5 and 6. In this case, the constraining amount is \$3,050,000, allowing Bidder A to place the \$2,800,000 bid.

Revealed Preference Constraints for the (0, 1) Package

30. The (0, 1) package is also subject to revealed preference constraints. These are based on the packages in each eligibility reducing round beginning with the last round in which Bidder A had sufficient eligibility to bid on the (0, 1) package, as well as in the final clock round. In this example, the last round in which Bidder A had sufficient eligibility to bid on the (0, 1) package was Round 7, which is also the final clock round. So, the only constraint on the bid for the (0, 1) package is:

$$\begin{aligned} & (\text{Sup Bid on } (0, 1)) - (\text{Price of } (0, 1) \text{ in } R7) \leq (\text{Highest Bid on } (1, 0)) - (\text{Price of } (1, 0) \text{ in } R7) \\ & (\text{Sup Bid on } (0, 1)) \leq (\text{Highest Bid on } (1, 0)) + (\text{Price of } (0, 1) \text{ in } R7) - (\text{Price of } (1, 0) \text{ in } R7) \\ & \quad (\text{Sup Bid on } (0, 1)) \leq \$1,850,000 + (\$1,400,000 - \$1,850,000) \\ & \quad (\text{Sup Bid on } (0, 1)) \leq \$1,400,000 \end{aligned}$$

31. So, without any supplementary bids placed on the final clock package, the highest supplementary bid that Bidder A can place on the (0, 1) package is \$1,400,000 because Bidder A bid \$1,850,000 for (1, 0) in the final clock round. However, if for example Bidder A places a supplementary bid on its final clock package of \$2,300,000, then Bidder A may also place a supplementary bid on the (0, 1) package of up to \$1,850,000.

Annex D – Algebraic Description of Proposed Revealed Preference Activity Rules in the Clock Rounds and the Supplementary Round

Revealed Preference in the Clock Rounds

The activity rule in the clock rounds allows for a bidder to always be able to place a bid on any package that is within the bidder’s current eligibility. As well, in any round, the bidder can bid on a larger package than would be permitted by the bidder’s current eligibility provided that the package satisfies revealed preference with respect to each prior eligibility-reducing round. However, bidding on a larger package does not increase the bidder’s eligibility in subsequent rounds. A bidder will never be allowed to place a bid on a package that exceeds its initial eligibility.

A product refers to a particular category in a given service area. Industry Canada is proposing 56 products in the 700 MHz auction. The 56 products represent the four categories of licences, block A, blocks B and C, blocks D and E and blocks C1 and C2 in each of the 14 Tier 2 service areas.

1. A package in clock round t satisfies revealed preference with respect to an earlier clock round s for a given bidder if the bidder’s package Q_t has become relatively less expensive than the package on which the bidder bid in clock round s , Q_s , as the clock prices have progressed from the clock prices in clock round s to the clock prices in clock round t . Algebraically, the revealed preference constraint is the condition that:

$$\sum_{i=1}^m (Q_{t,i} \times (P_{t,i} - P_{s,i})) \leq \sum_{i=1}^m (Q_{s,i} \times (P_{t,i} - P_{s,i}))$$

where:

- “ i ” indexes the products;
- “ m ” is the number of products, where the maximum number of products proposed for the 700 MHz auction is 56;
- $Q_{t,i}$ is the quantity of the i^{th} product bid in clock round t ;
- $Q_{s,i}$ is the quantity of the i^{th} product bid in clock round s ;
- $P_{t,i}$ is the clock price of the i^{th} product bid in clock round t ; and
- $P_{s,i}$ is the clock price of the i^{th} product bid in clock round s .

2. A bidder’s package, Q_t , of clock round t is consistent with revealed preference in the clock rounds if it satisfies the revealed preference constraint with respect to all eligibility-reducing rounds prior to clock round t for the given bidder.

Revealed Preference in the Supplementary Round

There is no limit on the supplementary bid amount for the final clock package. The activity rule in the supplementary round states that all supplementary bids must satisfy the revealed preference limit with respect to the final clock round regardless of whether the supplementary bid package is larger or smaller than the final clock package.

In addition, supplementary bids on packages that are larger than the final clock package must satisfy the revealed preference limit with respect to each eligibility-reducing round, beginning with the last round in which the bidder had sufficient eligibility to bid on the package, unless the increase in package size is due to placing bids on unallocated licences, where unallocated licences are those that are unsold or categories where supply is greater than aggregate demand in the final clock round.

3. Let Q denote the package on which the bidder wishes to place a supplementary bid. Let Q_s denote the package on which the bidder bid in clock round s and let B_s denote the bidder's highest dollar amount bid in the auction for package Q_s , whether the highest dollar amount was placed in a clock round or a supplementary round.
4. A supplementary bid, B , for the package Q satisfies the revealed preference limit with respect to a clock round s , if B is less than or equal to the highest dollar amount bid on the package bid in clock round s , *that is*, B_s plus the price difference in the respective packages, Q and Q_s , using the clock prices of clock round s . Algebraically, the revealed preference limit is the condition that:

$$B \leq B_s + \sum_{i=1}^m (P_{s,i} \times (Q_i - Q_{s,i}))$$

where:

- “ i ” indexes the products;
- “ m ” is the number of products;
- Q_i is the quantity of the i^{th} product in the package Q ;
- $Q_{s,i}$ is the quantity of the i^{th} product in the package Q_s of clock round s ;
- $P_{s,i}$ is the clock price of the i^{th} product in clock round s ;
- B is the dollar amount of the supplementary bid for the package Q ; and
- B_s is the highest dollar amount bid on package Q_s either in a clock round or in the supplementary round.

5. In addition, for supplementary bid package Q , let $T(Q)$ denote the last clock round in which the bidder's eligibility was at least the number of eligibility points associated with the package Q .

6. A given bidder's collection of supplementary bids is consistent with the revealed preference limit if the supplementary bid for the package Q , with a dollar amount, B , for the given bidder satisfies the following conditions:
 - (a) for a package Q , comprising the entire final clock package plus any or all licences that are provisionally unallocated to any bidder in the final clock round, the dollar amount, B , must satisfy the revealed preference limit, as specified in paragraph 4, with respect to the final clock round only; note that this places no constraint on the dollar amount of a supplementary bid for the final clock package;
 - (b) for any package Q , comprising other than the entire final clock package plus any or all licences that are provisionally unallocated to any bidder in the final clock round, the dollar amount B must satisfy the revealed preference limit, as specified in paragraph 4 with respect to the final clock round and with respect to every eligibility-reducing round equal to $T(Q)$ or later.
7. Note that, in the application of paragraph 4, the package Q_s 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.
8. See Annex C for an example of the revealed preference activity rules.

Annex E – Proposed Pricing Rule

1. Prices are determined at two points in the auction: first at the end of the allocation stage to determine the base prices, which are the minimum that winning bidders will pay for their winning packages; and second, at the end of the assignment stage to determine the incremental payments for specific licences, known as assignment prices. Industry Canada is proposing to use a second-price rule to determine the prices to be paid by winning bidders. More specifically, Industry Canada proposes to apply bidder-optimal core prices and to 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

2. 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.
3. Industry Canada is proposing the use of 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.
4. The Vickrey price for each winning Bidder J is calculated as follows. First, determine the maximum bid value that can be achieved with all of Bidder J’s bids removed. This is found by solving the winner determination problem (see Annex B) with Bidder J’s bids removed. Next, take the sum of the winning allocation stage bids for all bidders other than Bidder J. The Vickrey price for Bidder J is defined to be the maximum bid value with Bidder J’s bids removed minus the sum of the winning allocation stage bids for all bidders other than Bidder J.
5. 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 proportionate to the size of the bidder’s package as measured by the bidder’s winning package evaluated at the opening bid prices.
6. 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 bids.

- (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 fulfil the first and second condition, the set(s) of base prices that minimize(s) the sum of base prices across winning bidders is selected. If there is only one set of base prices satisfying these three conditions, this 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 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.
7. 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.
8. A software algorithm will be used to determine the set of base prices that meets the conditions outlined above.
9. The following is an example of how base prices are calculated. This example is based on the 2012 *Spectrum Auction Design* paper by P. Cramton (<http://www.cramton.umd.edu/papers2005-2009/cramton-spectrum-auction-design.pdf>).

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 2.

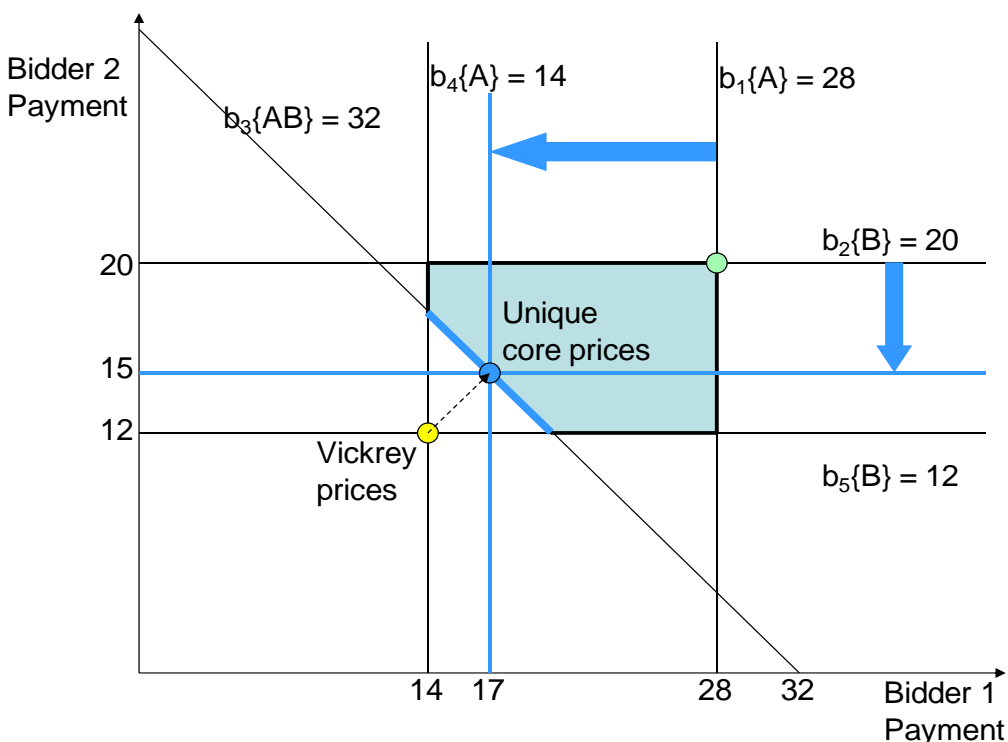
In this example, the highest value combination of bids would assign licence A to Bidder 1 and licence B to Bidder 2, generating \$48 in value. There is no other assignment of the licences that yields a higher value.

To calculate the Vickrey price for Bidder 1, Bidder 1’s bid is removed. The best assignment without Bidder 1 assigns licence A to Bidder 4 at \$14 and licence B to Bidder 2 at \$20, resulting in \$34. The sum of the winning bids for all bidders other than Bidder 1 is \$20 (\$48 – \$28). Thus, the Vickrey price for Bidder 1 is \$14 (\$34 – \$20). Similarly, if Bidder 2’s bid is removed, then the best assignment is to assign licence A to Bidder 1 and licence B to Bidder 5, resulting in a value of \$40. The sum of the winning bids for all bidders other than Bidder 2 is \$28 (\$48 – \$20). Thus, the Vickrey price for Bidder 2 winning B is \$12 (\$40 – \$28).

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 2, 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.

The problem is that 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), 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. That is, Bidder 1 and Bidder 2 must pay, collectively, at least \$32.

Figure 2 - Example of Calculating Base Prices



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. 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 2. 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, 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

10. Industry Canada is proposing to run three sequential assignment rounds, if necessary, one for each category of generic licences, blocks B and C, blocks D and E and blocks C1 and C2. This is to allow bidders that have won licences in the same category of generic licences across multiple service areas to have the opportunity to express their preference for particular licences.
11. For each category that includes two generic licences, that is, blocks B and C, blocks D and E and blocks C1 and C2, assignment prices will be determined from the set of assignment stage bids for the category of licences. The assignment bid is essentially a package bid for the locations of all licences within a category.
12. Industry Canada is proposing to use a second-price rule to calculate assignment prices. The assignment price is attributable to the entire collection of licences within a category and is not separable between given service areas. For example, if a bidder wins one B/C licence nationwide in the B/C assignment round, the bidder is able to submit a single bid to be assigned the same licence in every service area. In this case, the assignment price is for the group of licences rather than the specific licence in each service area.
13. For the purpose of calculating assignment prices, the Vickrey price for each winning bidder is defined as follows. First, determine the maximum bid value that can be achieved when all of Bidder J's bids are replaced by bids with dollar amounts of zero. This is found by solving the winning assignment bid problem with Bidder J's bids replaced by bids of zero amounts, indicating that the bidder does not have a preference. Then the Vickrey price for Bidder J is defined to be the maximum bid value with Bidder J's bids replaced by bids of zero amounts minus the sum of the winning assignment bids for all bidders other than Bidder J.
14. The assignment stage prices for each winning assignment bid 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 alternative combination of valid assignment bids that sum to more than the winning assignment bids. 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 that minimize(s) the sum of assignment prices across winning assignment stage bids is 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 evaluated at the opening prices. This approach for selecting among sets of assignment prices that minimize the sum of assignment prices across winning assignment bids is referred to as the "nearest Vickrey" approach.
15. A software algorithm will be used to determine the set of assignment prices that meet the conditions outlined above.