



Industry
Canada

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Canada

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Spectrum Management and Telecommunications Policy

Framework for Spectrum Auctions in Canada

Canada

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Framework Summary

- Any auction will be preceded by a full public consultation, with bidders having the fullest possible knowledge prior to the auction.
- Consultations on the bandwidth and geographic dimensions of licences will be undertaken prior to any auction. Licence areas will be based on Statistics Canada Census Divisions and Subdivisions.
- Licensees will be given the maximum possible flexibility in their choice of service offerings and technologies, with limits generally only for interference management purposes.
- Licensees will be allowed to transfer and subdivide their licences to eligible third parties.
- Licences will be assigned for an initial 10-year term, with the expectation of renewal for subsequent 10-year terms.
- The government will continue to possess all sovereign rights necessary to implement any required reallocation at any time, as per section 40 of the *Radiocommunication Regulations*. Any reallocation would only take place after full consultation.
- Payment of winning bids will be required in a lump sum amount at the auction's close.
- Auction results will not be used to recalibrate (up or down) the fees of incumbent licensees with similar spectrum.

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1. Introduction

In February 1996, Industry Canada announced its intention to introduce the use of spectrum auctions where reliance on market forces to select licensees is in the public interest.¹ Auctions offer a number of advantages, such as the ability to promote economically efficient use of spectrum, openness and objectivity as an assignment mechanism, procedural efficiency, and the ability to return appropriate compensation to Canadian taxpayers for the use of a public resource.²

The *Radiocommunication Act* was amended in June 1996 to give the Minister of Industry the explicit authority to use spectrum auctions. In August 1997, Industry Canada initiated a public consultation process on auction implementation issues with the publication of *Canada Gazette* Notice DGRB-003-97 announcing the availability of a document entitled *Consultation on Issues Related to Spectrum Auctioning*.³ Forty-two written responses were received and additional input was gathered through a number of round-table meetings held across Canada in September and October of 1997. The department wishes to express its sincere thanks to all those who took the time to forward their views in written submissions and/or via participation at the round-table discussions.

After reviewing the input received and analysing other administrations' spectrum auction experiences, the department is now in a position to outline the general framework that it expects to follow for any specific spectrum auction that may be held in the future. All future spectrum auctions will be preceded by a public consultation phase. At that time, views will be sought concerning the need for changes to this general framework. The department's anticipated approaches to the various issues outlined in the consultation paper are laid out in the remainder of this document.

2. The Application of Auctions

There are three broad conditions to be met in determining whether any particular spectrum authorizations could be assigned via an auction. Auctions may be used as a spectrum assignment mechanism in any situation:

- where the demand for spectrum exceeds the available supply;⁴

¹ Industry Canada, (February 1996), *Review of the Comparative Selection and Radio Licensing Process: Findings*.

² As per the government's *Cost-Recovery and Charging Policy*, Treasury Board of Canada Secretariat, April 8, 1997.

³ Referred to hereafter as "the consultation paper."

⁴ It is often difficult to estimate whether the demand for particular spectrum authorizations will indeed exceed the available supply. Thus the broader process described in Section 4 of this document moves seamlessly to an auction where demand exceeds supply and acts effectively as a first-come first-served process should supply exceed demand.

- where the government's policy objectives can be fully met through the various means available;⁵ and
- where the Minister of Industry is confident that reliance on the marketplace to select licensees is in the public interest.

In the recently completed consultation process on auction implementation issues, a number of respondents presented arguments as to why some specific types of licences should not be assigned via an auction. The department has incorporated these comments in determining the instances in which auctions will not be used as an assignment mechanism. These exceptions are outlined below.

2.1 Broadcast spectrum and related applications

Industry Canada will not auction spectrum allocated to broadcasting services. The issuance of broadcasting licences continues to be the responsibility of the Canadian Radio-television and Telecommunications Commission (CRTC) under the *Broadcasting Act*. The Minister of Industry's role in broadcasting extends to spectrum management and the technical aspects of broadcasting,⁶ including determining frequency allotments and issuing technical certificates to broadcasting licensees selected by the CRTC.

As for spectrum which may be used for, among other things, auxiliary broadcasting purposes such as Studio Transmitter Links (STL) or Electronic News Gathering (ENG), the department is of the view that an auction could be used if the three conditions stated above are met.

2.2 Priority users

Priority users will not have to participate in an auction to acquire the frequencies, in bands designated for priority services, that they require for carrying out their operations. These users include those whose radiocommunications systems are vital to national sovereignty and defence, public security and safety, emergency services and essential government operations. They will continue to receive priority access to spectrum.

2.3 Satellite services

Given the current international regulatory regime, auctions are not an appropriate spectrum assignment methodology for satellite systems where such systems are global in nature or where a significant level of international coordination is required. However, if the Minister determined it to be appropriate, it would be quite feasible to use auctions to assign spectrum in certain types of "planned" satellite bands such as Direct Broadcast Services

⁵ These include such measures as regulations, conditions of licence, utilization policies, standards, and auction rules.

⁶ *Department of Industry Act*, section 4(1)(k)(ii).

(DBS) bands,⁷ where countries have predefined spectrum and orbital slots with recognized rights internationally.

3. Spectrum Release Plan

An auction will be most successful when all pertinent information regarding the licences being auctioned is readily available at the beginning of the process. As several respondents in the recent consultation process pointed out, this should include information on spectrum the department plans to release in the future, the timing of its release, and the assignment mechanism.

This information will enable participants to more accurately assess the current and future marketplace when developing their business plans, and help them prepare a reasonable valuation for the spectrum in question. By reducing uncertainty, this information will give bidders greater confidence in determining an appropriate strategy.

Therefore, the department intends to commence the practice of issuing an annual plan that provides as much detail as possible on new frequency bands that may be opened for licensing. Furthermore, the department will identify the cases in which it expects first-come first-served licensing to be used and the cases in which a competitive licensing process, either an auction or a comparative review, will likely be used.

4. The Auction Process

In the consultation paper, the department proposed that any auction would be preceded by a full public consultation. The Minister's policy decisions would then be clearly articulated so that potential bidders have the fullest possible knowledge prior to the auction. Bidders would then be qualified to participate in the auction based on their compliance with clear and objective criteria. Finally, a remote-access simultaneous multiple round auction would commence.

Respondents were generally supportive of these proposals, but noted that some issues would be common to all future auctions. In order to expedite future auction processes, it was suggested that some issues (licence tenure or transferability, for example) be dealt with in terms of a "common framework" that would apply to all auctions. The department agrees with this suggestion and therefore approaches to these common issues are laid out in the remainder of this document. The department's proposal to allow for "comments on comments" as part of the consultation that would precede each specific auction was also generally supported.

⁷ It is important to note that this refers to the licensing of an entity that would seek to carry broadcast signals over satellite infrastructure. The licensing of the entity or entities that would actually provide broadcast services to consumers remains the responsibility of the CRTC.

After considering the input received, the department foresees future spectrum auctions taking place according to the steps outlined below.⁸

- (1) A Notice will be published in the *Canada Gazette* announcing the availability of a consultation paper addressing issues related to the spectrum auction in question. The deadline for receipt of comments and the electronic and/or physical address to which comments should be sent will also be specified in the *Gazette* Notice. For the “common framework” issues referred to above, comments will be sought as to whether there is any reason to deviate from the approaches laid out in the remainder of this framework document. For other issues that will require a different approach from auction to auction (the geographic and bandwidth definition of licences, for example), specific proposals or options will be put forward for comment.
- (2) After the closing date for receipt of comments, copies of all the comments received will be made available to the public through Industry Canada’s Web site, Industry Canada libraries and/or a commercial printing and copying service. Respondents will be encouraged to provide their comments in electronic format to facilitate posting on the department’s Web site.
- (3) A second — shorter — comment period will then be opened during which respondents may comment on the initial comments of others. Again, the submission of comments in electronic format will be strongly encouraged. After the closing date of this second period (which will also have been specified in the original *Gazette* Notice), these “comments on comments” will also be made available to the public.
- (4) After having reviewed all the input received, the Minister of Industry will make the final policy decisions. A second Notice will be published in the *Canada Gazette* announcing the availability of a paper that describes the licences to be auctioned, the terms and conditions that will be attached to the licences, the reserve price for each licence, the rules of the auction, and the eligibility criteria and application procedures to participate in the auction.⁹ Prospective bidders will also be invited to submit “Notifications of Interest,”¹⁰ if they so choose. As well, written questions asking for clarification of rules or policies will be accepted. It should be noted that no “confidential” questions will be accepted and that the department’s answers to all questions will be made public. The deadlines for receipt of the “Notifications of Interest,” written questions, and the auction application materials

⁸ A more detailed document describing the specific procedures that the department will follow when conducting a spectrum auction will be available in the near future. Interested parties may wish to check the *Strategis* Web site (<http://strategis.ic.gc.ca/spectrum>) for updates.

⁹ It should be noted that prospective bidders may be required to make full disclosure of any communications, agreements, arrangements or affiliations that they have entered into with any other potential bidder regarding the auction in question.

¹⁰ The department has found in the past that the publication of a simple list of interested parties early in the licensing process has been helpful to some smaller players who may wish to investigate the formation of a lawful strategic alliance with others. A “Notification of Interest” would consist of nothing more than basic identifiers such as the name, address and phone number of the interested party.

- (including a financial deposit) and the address to which they should be sent will be specified in the second *Gazette* Notice.
- (5) After the deadline for receipt of “Notifications of Interest” and written questions, the “Notifications of Interest” and the department’s answers to the questions received will be made public.
 - (6) Once the deadline for receipt of applications to participate in the auction has passed, all applications received will be reviewed to assess whether or not all eligibility criteria have been satisfied. Those who have submitted acceptable applications will then receive bidder packages (which will include items such as the instructions required to use the department’s automated bidding system and the initial bidding schedule), and a listing of which applicants have and have not been qualified as bidders will be made public. Should there be any licences for which only one qualified bidder has applied, that bidder will be immediately offered the licence at the specified reserve price.
 - (7) Seminars and/or mock auctions may then be held to allow bidders to better familiarize themselves with the bidding system and software.
 - (8) The auction will then commence and proceed until it ends according to the specified stopping rule. High bidders at the auction’s close will be issued their licences provided that their bid amounts are paid in full by the deadline specified in the auction rules. Should any licences remain unassigned after the auction, the department’s preferred approach will be to offer them in a subsequent re-auction within a reasonable period of time.

The time required to complete an auction process from the release of the original consultation paper to the assignment of licences will vary somewhat. It will depend on such factors as the complexity of the issues related to any specific auction, the volume of consultation comments received, the number of licences being offered, the number of parties applying to participate in the auction, the number of qualified bidders, and the time required by bidders to prepare their bidding strategies and financing. The department estimates that the elapsed time between the release of the initial consultation paper and the opening of the actual bidding would be roughly six to nine months and that the auction itself would then take anywhere from several days to several weeks to complete with licences finally being issued, at most, two months after bidding has closed.

5. Definition of Licences

The department's suggestion that the appropriate authorization instrument in an auction context would be the spectrum licence¹¹ was supported in the consultation comments received. The bandwidth and geographic dimensions of licences will be addressed in the consultation process that will precede each individual auction that may be held.

The department's proposal to establish sets of service areas based on Statistics Canada's Census Divisions and Subdivisions was also generally endorsed by respondents. The definition of the service areas within these tiers and accompanying maps and data tables are available on the department's *Strategis* Web site.¹² Summary tables are located in the Appendix to this document. In the consultation preceding each auction, the department will ask which tier or what mix of tiers¹³ should be used for that particular auction.

To facilitate the electronic storage and representation of these service areas, including the material on the department's publicly accessible Web site, they will be "translated" into areas based on Spectrum Grid cells.¹⁴ Given that an individual grid cell is only 25 km² in area, they offer sufficient granularity such that the variations between the borders of the grid-cell defined areas and the underlying Census Divisions and Subdivisions will be minute. In the event that any interference issues must be resolved between two licensees, the boundary as defined by the Spectrum Grid cells will be the one used.

5.1 Boundary conditions

Boundary conditions are intended to divide the spectrum resource into separate spectrum spaces in order to minimize the potential of radio interference between neighbouring licensees. To the potential licensee, they provide indications on the level of radio interference that may be expected *from* a neighbour as well as on the level of radio interference that may be transmitted *to* a neighbour. Since the boundary conditions cannot be based on the technical and operational characteristics of all potential systems in a specific frequency band, the department strongly encourages licensees in the same or adjacent geographic areas or frequency blocks to enter into mutually beneficial arrangements that would augment the boundary conditions, allowing both licensees to provide service to the edge of their service areas or to fully use the frequencies at their

¹¹ A spectrum licence is defined in subparagraph 5(1)(a)(i.1) of the *Radiocommunication Act* as an authorization "in respect of the utilization of specified radio frequencies within a defined geographic area."

¹² See *Service Areas for Competitive Licensing*, available at <http://strategis.ic.gc.ca/spectrum>.

¹³ For example, it may be advantageous to assign spectrum block X over Tier 1 service areas and spectrum block Y over Tier 2 service areas.

¹⁴ Spectrum Grid cells are defined in the Industry Canada (Spectrum Management) Client Procedures Circular 2-1-16 (CPC-2-1-16), *Licensing Procedure for Local Multipoint Communications Systems (LMCS)*, February 1, 1997 (available on the *Strategis* Web site at <http://strategis.ic.gc.ca/spectrum>). Spectrum Grid cells are six-sided figures with an area of 25 km² that fit together in an interlocking pattern over the geography of Canada.

band edge. The department will, however, consider the boundary conditions as guidelines if called upon to arbitrate in cases of conflict between licensees.

The department recognizes that there is no single set of boundary conditions that can be applied to all frequencies and services. A set of boundary conditions for a particular service could include: a power flux density limit at the boundary, antenna height and transmit power limits near the boundary, or out-of-band emission limits. Following the suggestion made by respondents to the consultation paper, the department foresees boundary conditions and radio interference management rules being developed by industry participants — perhaps under the auspices of the Radio Advisory Board of Canada (RABC) — on a case-by-case basis in response to a pre-auction consultation.

In the geographic domain, the boundary conditions should, in general, require that the *outbound* signal¹⁵ from a licence area at the boundary fall below a prescribed maximum signal level. There are many aspects to consider in prescribing the maximum signal level at licence area boundaries for each frequency band or service. Selection of this outbound signal boundary condition must take into account the impact on the various technical and operational characteristics of systems that can be implemented in the frequency band.

Setting the outbound signal boundary conditions at the maximum permitted radio interference level into the most interference susceptible type of system or equipment that may be implemented in the band allows for exclusive and unencumbered operation within a portion of the licence area. However, it also implies a large buffer zone¹⁶ straddling the boundary where co-frequency service can only be offered subject to coordination with neighbouring licensees thus detracting from the exclusive access.

On the other hand, setting the outbound signal boundary conditions at the minimum required nominal (i.e. unfaded) signal level¹⁷ requires that licensees either reach some form of cooperative sharing arrangement or coordinate their service near their shared boundary. This approach further reduces some of the exclusivity privileges, and increases the possibility of having one licensee lock out its neighbour by using all the available frequencies near the boundary, unless the licensees are required to communicate prior to implementation to ensure equal burden sharing.

Optimally, the outbound signal boundary condition should be set at an intermediate value between the maximum permitted radio interference level and the minimum required nominal signal level. This compromise would preserve most of the exclusivity privileges while reducing the buffer zone. Exclusive and unencumbered operation would be possible

¹⁵ The outbound signal corresponds to a transmit station facing towards the boundary.

¹⁶ Noting that the size of the buffer zone is dependent on service and terrain characteristics, transmit antenna height, transmit power and receiver characteristics.

¹⁷ The minimum required nominal signal level should not be biased towards specific technologies.

outside the buffer zone but a high level of cooperation or coordination would be required within the buffer zone.

Boundary conditions on the *inbound* signal¹⁸ could include antenna height, antenna characteristics and transmit power constraints close to the boundary in order to limit the potential radio interference into neighbouring spectrum spaces.

In the frequency domain, boundary conditions will include such measures as out-of-band emission limits and frequency stability requirements in order that adjacent frequency block operation would not be jeopardized. For general application, it is proposed that such out-of-band emission limits be expressed as absolute rather than relative levels. Here again, these boundary conditions will be developed by industry participants before each auction.

6. Licence Attributes

As the department suggested in the consultation paper and as respondents largely agreed in their comments, the use of a market-oriented mechanism like an auction should be accompanied by certain changes in the nature of licences as compared to the current practice of administrative assignment. Understanding exactly what is being auctioned will be very important for bidders to secure adequate financing and to develop a bidding strategy. While upholding the status of radio spectrum as a public natural resource, it is important to provide bidders, and subsequently licensees, with an attractive package of licence attributes so as to enhance their abilities to secure financing, to invest in their networks, and to provide the best possible services to Canadian consumers.

6.1 Ministerial authority

Some respondents expressed concern that the enhancement of licences would jeopardize the future ability of the government to reallocate spectrum to new uses related to meeting obligations under an international agreement or to national security concerns. The government will continue to possess all sovereign rights necessary to implement the required reallocation at any time. This is reflected in section 40 of the *Radiocommunication Regulations* which reads as follows:

40. The assignment of a frequency or frequencies to a holder of a radio authorization does not confer a monopoly on the use of the frequency or frequencies, nor shall a radio authorization be construed as conferring any right of continuing tenure in respect of frequency or frequencies.

Whether spectrum is assigned by an auction or by any other mechanism, section 40 will continue to apply. It is important to note that the department would reallocate spectrum assigned through auction only under extraordinary circumstances — taking into

¹⁸ The inbound signal corresponds to a transmit station near the boundary facing into the licence area.

consideration that the licensee complied with the conditions of licence, has made large investments in infrastructure, and is serving an established client base. If there were a reallocation, it would take place only after full consultation.

6.2 Flexible spectrum use

A key benefit to using auctions is that they allow market forces to determine who will gain access to spectrum as well as the uses to which spectrum will be put. To ensure that licensees can continue to quickly and efficiently adapt their service offerings to changing consumer demands, the department will provide licensees with the maximum possible flexibility in determining the services they will offer and the technologies they will employ. Beyond the need to conform to the applicable Canadian spectrum allocation, only those limitations required for interference management purposes will generally be imposed.

6.3 Transferability of licences

In order to facilitate the adaptation of spectrum use to changing marketplace conditions, the department proposed in the consultation paper to make licences transferable with a minimum of regulatory oversight and administrative work. Even if an auction works perfectly in generating an efficient initial assignment of licences, circumstances can change over time so that firms and consumers would benefit from provisions that allow licences to migrate to other users with new and more innovative service offerings or more efficient technologies. By allowing licences to be bought and sold after an auction, a firm with a more valuable new use of the spectrum can negotiate a transfer with the incumbent licensee that is beneficial not only to both parties, but also to consumers.

Overall, the response to this proposal was quite positive. Some also argued that transferability rights should be enhanced for all licences, including those that are assigned administratively. The department agrees that there is potential for an improvement in the efficiency of spectrum use if all spectrum users face a similar set of market-oriented rules regarding licence transfers, and will investigate further the possible enhancement of rights for licensees who acquired spectrum through administrative means.

Auctioned licences will be transferable subject to the following conditions and guidelines.¹⁹

- All eligibility criteria and licence conditions that apply to a licence, including those related to interference management, will continue to apply should the licence be transferred.
- Should an auction winner transfer its licence to another party, for example, four years into a 10-year licence term, the second party will only receive a licence term equal to

¹⁹ More detailed information on these new procedures for transferring licences will be available in a Client Procedures Circular (CPC) to be published in the near future. Interested parties may wish to check the Spectrum Management and Telecommunications page on the *Strategis* Web site (<http://strategis.ic.gc.ca/spectrum>) for updates.

the remaining six years, but will be eligible for the same licence renewal provisions as the original licensee.

- All proposed licence transfers must comply with any spectrum aggregation limit or other measures intended to preclude anti-competitive behaviour that may be in place.²⁰
- Written notification will be required of all proposed licence transfers. The department will also request attestations or other documentation to ensure that the points above (e.g. compliance with the eligibility criteria) have been satisfactorily addressed. Once a licence transfer has been registered, the department will revoke the original licence and issue a new licence in its place.
- The department will maintain a publicly accessible data base listing all auctioned licences and the respective licensee. The data base will be updated upon a licence transfer.

6.4 Divisibility

The department also proposed that licensees be permitted to transfer their licences not only in whole, but also in part; that is to say, licences should be divisible in both the bandwidth and geographic dimensions. This policy will serve many functions. First, it will encourage competition by removing potential entry barriers to certain competitors such as small businesses that may not have been successful in a past auction. Second, it will encourage more efficient spectrum use by permitting the deployment of a broader mix of service offerings. Third, it will speed service to unserved or underserved areas.

All respondents who provided an opinion on this issue agreed with the department's proposal to allow the divisibility of licences. Some respondents saw no reason to impose any limits on such divisibility. Others argued that there must be some restrictions in order to prevent interference problems and to ensure that licensees can operate efficiently. Such limits could be defined as a percentage of the bandwidth to be auctioned in the bandwidth dimension. In the geographic dimension, it was suggested that divisibility could perhaps be limited by Census Divisions or Subdivisions.

Given the greater reliance on market forces inherent in the use of auctions, the department is not convinced of the need to impose significant limitations on licence divisibility. There is no reason to assume that the parties involved in the division of a licence would not both be interested in minimizing interference and maximizing the reliability of the services they will provide. In order to maintain compatibility with the department's data base, licences will be divisible in the geographic dimension only in terms of Spectrum Grid cells. Thus when an auctioned licence is divided, the minimum geographic size that any one of the new divisions may take is one Spectrum Grid cell. As discussed in Section 5 of this document, the individual Spectrum Grid cells are sufficiently small that even with this restriction, an

²⁰ It should be noted that any licence transfer would also be subject to the provisions of the *Competition Act*.

extremely high degree of flexibility will be available to the parties involved in determining the size and shape of subdivided portions of a licence.

As for the bandwidth dimension, the department will not generally restrict the amount of spectrum that can be disaggregated. However, the department will require compliance with emission limitations in the frequency bands immediately outside and adjacent to each of the resulting frequency blocks, and with the spectrum assignment plan as defined in the applicable Standard Radio System Plan (SRSP).

In any situation, where there is a request for the transfer of a portion of a licence, the original licensee will be required to return its licence to the department. Once the transfer has been registered, the department can amend the original licence and issue a new licence to the transferee.

6.5 Length of licence term and renewal mechanism

In exchange for the market-based payments that auctions will generate, licensees will expect that their licence terms be sufficiently long to ensure that they can obtain adequate returns on their investments. This message was clearly articulated in the responses to the consultation paper. In that document, the department proposed a length of term in the range of 10 to 20 years, which is a significant increase in comparison with the current practice. On the question of renewal, the department asked for comments concerning whether licensees should have an expectation of renewal or whether the spectrum should be re-auctioned at the end of the term.

Most respondents favoured a long licence term of 15 to 20 years (two respondents proposed a 99-year licence term) with a high expectation of renewal, while adamantly rejecting the idea of re-auctioning. Respondents argued against the re-auctioning of licences on the basis that, once constructed, a radio-system is practically inseparable from the spectrum it uses. Therefore, re-auctioning can potentially disrupt the service and strand the investments of both the company and the end users. This, in turn, would lead to uncertainty and underinvestment, especially towards the end of the term. Furthermore, they argued that any renewal fees for the previously auctioned licences should be limited to the administrative costs of spectrum management.

Having reviewed the input received, the department intends to auction licences with a 10-year term and a high expectation of renewal at the end of the term. That is to say, the department will generally renew auctioned licences for subsequent 10-year terms unless a breach of licence condition occurs, a fundamental reallocation of spectrum to a new service is required (e.g. a reallocation by the International Telecommunication Union), or an overriding policy need arises (e.g. a spectrum reallocation to address a national security issue). To provide a more stable investment climate for licensees, a consultation process would commence no later than two years prior to the end of the licence term (i.e. after year eight) if the department foresaw the possibility that a licence would not be renewed. The imposition of any renewal fees and/or amendments to licence conditions for the initial

licensees in the subsequent term would also be addressed in a consultation process that would commence no later than two years prior to the end of the licence term.

In the event of bankruptcy or insolvency of a licence holder, the status and treatment of the licence will be subject to the general laws of bankruptcy and insolvency.

6.6 Service roll-out requirements

Service roll-out requirements generally stipulate that a licensee provide service to a certain percentage of the population in its licence area within a specified time frame. Under the comparative evaluation process, licence winners are often held accountable by condition of licence to a specified timetable for service delivery. In an auction scenario, roll-out requirements could be imposed in order to prevent a licensee from warehousing spectrum for the purpose of preventing the entry of other service providers.

Some respondents to the consultation paper argued that there was a need for roll-out requirements based on a concern that bigger, better established participants might use an auction to prevent competition by acquiring and warehousing spectrum. Others, however, noted that as a condition of licence it can be very difficult to enforce as licensees may often have very legitimate reasons (such as changes in the marketplace, equipment availability) for not being able to comply with the original timetable.

The department has come to the conclusion that in an auction framework, with a well-functioning secondary market, roll-out conditions will likely not be required to address competition issues. Concerns regarding anti-competitive spectrum warehousing can be addressed through other means such as setting appropriate market sizes and employing spectrum aggregation limit and/or bidder eligibility restrictions where required. Moreover, investors would be very reluctant to finance a winning bid where there would not be any return on investment.

Should there appear to be a need to impose roll-out conditions to advance other policy objectives, proposals will be made in the pre-auction consultation paper and the final policy decision will be clearly stipulated prior to the auction's commencement.

7. Financial Aspects of Auctions

7.1 Pre-auction deposits

The department sought comment in the consultation paper on whether prospective bidders should submit a pre-auction deposit. It was proposed that the deposit for each bidder should be generally related to the size of the population located within the geographic areas of the licences that bidder is interested in winning.

Respondents generally agreed on the need for a pre-auction deposit to ensure the financial viability and sincerity of the participants. They also agreed that the deposit should be based on a measure reflecting the potential market size of the licence.

The department will require that a pre-auction deposit, likely in the form of an irrevocable letter of credit, be submitted in order to participate in the auction. The required deposit for each bidder will be linked to the population and bandwidth associated with the licence or licences on which that bidder wishes to bid.²¹

For licence winners, the deposit will be credited toward payment of their winning bids. For unsuccessful participants, the deposit will be refunded less any penalties²² they have incurred. If the penalties exceed the deposit, any outstanding amount will be owed to the Crown.

The pre-auction deposit will be returned to any applicant that is found not to be a qualified bidder, to any applicant that provides written notification to the department of its withdrawal from the process prior to the auction's commencement, and to any bidder whose bidder eligibility points are reduced to zero during the auction and who is not potentially liable for any withdrawal penalties.

7.2 Reserve prices

Industry Canada has always operated on the principle that all spectrum users should contribute to covering the cost of spectrum management in Canada. This can be accomplished within the auction process by establishing reserve prices at a level that takes into account the cost of managing the spectrum in question for the whole term of the licence. In practice, it is admittedly difficult to come up with a precise long-run estimation of the cost of spectrum management attributable to any given spectrum band. Nonetheless, this will be the conceptual model that the department will follow in establishing what it expects will be quite modest reserve prices. The department sees no benefit in establishing high reserve prices that might dissuade legitimate service providers from establishing systems and serving consumers. Furthermore, where the value of a licence is high, the

²¹ This is explained in greater detail under the discussion of bidder eligibility points in Section 8.1 of this document.

²² See the discussion of withdrawal and forfeiture penalties in Sections 8.3 and 8.7 of this document.

department is confident that the bidding activity will result in an appropriate and fair return being generated for Canadian taxpayers.

Once an estimated long-run spectrum management cost figure has been determined for a band that is to be auctioned, that amount will be distributed over the individual licences to be auctioned in proportion to the “points”²³ associated with each licence to determine its reserve price. Similarly, the dollar per point figure that can be derived by dividing the total estimated long-run spectrum management cost figure by the total of the points associated with all licences up for auction will be used to determine the value of the pre-auction deposits referred to above.

7.3 Bid payment

In the consultation paper, the department proposed that winning bidders would pay 25 percent of the amount of their bids at the auction’s close with the remaining 75 percent to be paid in annual instalments over the term of the licence. It was felt that such an instalment payment scheme might aid smaller players who could have greater difficulty raising capital.

The majority of those who addressed this issue, in the response to the consultation paper, strongly rejected the use of instalment payments. Respondents remarked that the role of lender should be left with the financial markets and not with the government. As well, they pointed to the problems that have ensued from the PCS C-block auction in the United States where the Federal Communications Commission (FCC) used an instalment payment scheme. In particular, they noted that the instalment payment scheme resulted in speculative bidding, inefficient assignment of licences, artificially inflated bid prices, bid payment defaults, and delayed roll-out of services to consumers.

The evidence and arguments presented by respondents show that instalment payment plans are largely detrimental to the auction process and do not serve to aid smaller players — indeed the artificial inflation of bid prices harms the legitimate small players that one might hope to aid through the use of instalment payments. As such, the department will not allow the payment of bids in annual instalments but rather will require that winning bids be paid in full shortly after the close of an auction.

²³ See discussion of bidder eligibility points in Section 8.1 of this document.

More precisely, winning bidders will be required to submit 20 percent of their high bids within 10 business days of the auction's close. This payment will be non-refundable. If the winning bidder fails to make this initial payment in a timely manner then the licence will not be issued and the bidder will be subject to the applicable forfeiture penalty.²⁴ The remaining 80 percent will be due within 45 business days of the auction's close. Failure by the winning bidder to make this final payment in a timely fashion will also result in the licence not being issued and again the bidder will be subject to the applicable forfeiture penalty.

It is also important to note that beyond the payment of the winning bid, no other licence fees or payments will be required for the duration of the licence term.²⁵

8. Auction Design

In the consultation paper, the department proposed the use of simultaneous multiple round auctions. The rules for the simultaneous multiple round auction call for a related set of licences to be offered for sale at the same time. Bidding is organized into a series of rounds. At the beginning of each round, bidders are provided with information that includes the standing high bids on each licence and information about the bidder's own eligibility for bidding. New bids for a licence are required to exceed the standing high bid by at least some pre-established increment. In each round bidders are offered an opportunity to withdraw bids submitted in previous rounds, subject to a penalty. A minimum pace of bidding in the auction is established by the "activity rule," which penalizes bidders who are inactive by reducing their "bidder eligibility points." The rounds continue until there are no new bids on any licence. Details of the auction format are discussed below.

Auctions would be run electronically and bidders would be able to participate remotely from their offices. The simultaneous multiple round auction remains at the forefront of applied auction theory and has been used successfully by a number of diverse administrations around the world. Respondents to the consultation paper were generally supportive of the use of this auction design.

The department therefore expects to use the simultaneous multiple round format for future spectrum auctions. As discussed further below, both the theoretical and practical aspects of auction design continue to advance rapidly. The department will continue to examine new auction design developments and adopt them as appropriate. It is also important to remember that the design of any specific auction will be subject to public consultation prior to its actual commencement. Thus potential bidders will have an opportunity to comment on any design changes that the department may propose.

²⁴ See the discussion of forfeiture penalties in Section 8.7 of this document.

²⁵ As per subsection 5(1)(1.3) of the *Radiocommunication Act*.

Given the complexity of the simultaneous multiple round auction format, the department may hold information seminars and/or mock auctions prior to any real auction to allow bidders to better familiarize themselves with the bidding system and software.

The detailed elements that have now become largely standard in simultaneous multiple round auctions conducted around the world were discussed in the consultation paper. As proposed at that time, the department expects that future simultaneous multiple round auctions will feature the attributes discussed below.

8.1 Bidder eligibility points

Each licence available in an auction will be assigned a number of points approximately proportionate to the bandwidth and population covered by that licence. As part of the application package to participate in the auction, each prospective bidder will be asked to indicate which licences it may want to bid on during the course of the auction and to indicate the total number of “points-worth” of licences that it may wish to bid on in any round.²⁶ This number, which will also determine the pre-auction deposit required from the bidder (i.e. the required deposit will be calculated on a dollar-per-point basis), will define that bidder’s initial level of “bidder eligibility points.” The purpose of this information is to assist in the development of activity rules (discussed in more detail below) that are used to hasten the speed of the auction.

8.2 Activity rule

Before the auction, each bidder must specify which licences it wishes to bid on (as per the discussion on bidder eligibility points above). A bidder is defined to be active on a particular licence in a given round if either it has the standing high bid from the previous round or if it submits an acceptable bid in that current round. There are multiple stages — often three — each containing an unspecified number of bidding rounds. In the first stage bidders must be active on licences whose corresponding points add up to a certain percentage of the bidder’s eligibility point level (for example, one-half); in the second stage the percentage is increased (perhaps to three-quarters); and in the final stage bidders must be active on 100 percent of their bidder eligibility point levels. If a bidder falls short of the required activity level, the bidder’s eligibility point level shrinks proportionately. An auction begins and continues in stage one until bidding activity declines to an unacceptable level (say, three consecutive rounds in which new bids are placed on 10 percent or less of the licences available). At this point, the auction can move to stage two — and similarly to stage three later in the auction.

8.3 Bid withdrawals and related penalties

²⁶ For example, suppose that a bidder wished to be able to bid on licence X (two points), licence Y (three points), and licence Z (five points). This bidder could ask to have up to 10 points-worth of initial eligibility. If the bidder knew that it would not wish to be actively bidding on all three licences at the same time, it might choose to have a lower level of initial eligibility, say eight points, and thus be required to submit a smaller pre-auction financial deposit.

In the event that a bidder makes a bid that it later wants to change, that bidder will be given the opportunity to withdraw it. To encourage meaningful bids, however, a bid withdrawal penalty needs to be imposed. It is natural to have this penalty correspond to the potential loss in revenue caused by the withdrawn bid. If the licence for which the bid has been withdrawn ends up selling for more than the withdrawn bid, then no penalty will be charged to the bidder. If the licence ultimately sells for less than the withdrawn bid, then the penalty will be the difference between the withdrawn bid and the eventual final selling price. As a measure to reduce the overall time of the auction, while not compromising the auction's efficiency, the department will allow bidders to place new bids and/or withdraw previously submitted bids at the same time during a round, as opposed to having two distinct phases — one for bid submission and one for bid withdrawal — during each round.

8.4 Bid increments

Bid increments, like activity rules, are necessary to help hasten the auction's progress. For a bid to be acceptable it must be larger than the current standing high bid by the bid increment.²⁷ Increments will be set in percentage terms (x percent of the standing high bid) and/or in absolute dollar amounts. Bid increments will be changed during the course of the auction. For example, at the beginning of an auction when bidding activity is likely to be high, bid increments will be relatively large. As the pace of the bidding falls below a certain threshold, bid increments will be reduced. The rules for changing bid increments will be laid out with a fairly high degree of precision prior to the auction. However, to ensure the auction closes in a reasonable amount of time, there will be flexibility to "override" the rules regarding bid increments. All bidders will be given prior notice well in advance of any proposed changes to the size of the bid increments.

8.5 Waivers

Waivers are designed to prevent a bidder from losing bidder eligibility points when it does not satisfy the activity requirements in a given bidding stage. The purpose of waivers is to protect bidders against possible mistakes they might make during the course of an auction or to allow them to maintain bidder eligibility point levels in the case of technical or communication problems. Typically, each bidder will be given five waivers.

8.6 Stopping rule

An auction will close when a round goes by without any acceptable bids or waivers having been submitted on any licences. In *exceptional* circumstances, and after all participants have been notified in advance, any round can be declared as the final round. Similarly, exceptional circumstances, such as a natural disaster, may result in an auction being delayed, suspended or cancelled.

²⁷ With non-discretionary bidding (discussed in Section 8.8), bids will necessarily exceed the standing high bid by exactly the pre-established bid increment.

8.7 Bid forfeiture and related penalties

After the conclusion of the auction, any bidder who has submitted the high bid on a licence but fails to comply with the specified payment schedule will forfeit its right to have the licence issued to it. Furthermore, the bidder will be required to pay a penalty in the amount of the difference between the forfeited bid and the eventual selling price of the licence (in a subsequent re-auction), if the re-auction price is lower than the forfeited bid. In addition, an amount equal to 3 percent of the original forfeited bid will be charged to account for the administrative expenses incurred to reassign the licence.

8.8 Discretionary versus non-discretionary bidding

The consultation paper proposed the use of non-discretionary bidding. What this means is that rather than being offered the opportunity to enter any amount that exceeds the standing high bid by at least some minimum bid increment, bidders would instead have the choice of giving either a “Yes” or “No” response as to whether they wish to bid an exact amount equal to the standing high bid plus a predetermined bid increment. Non-discretionary bidding has a number of potential advantages, as outlined below.

- It drastically simplifies submission of bids, eliminating the errors that sometimes occur when a bidder must fill dozens (or even hundreds) of boxes with potentially quite large numbers.
- It allows rounds to be more brief and more frequent, both because the mechanics of entering and checking bids are simpler and because the prices, which never jump²⁸ in the revised design, are more predictable. This also reduces the need for frequent executive oversight during the bidding, saving costs for the bidders.
- It removes opportunities for bidders to send potentially collusive messages through the trailing digits of their bid amounts.

Relatively few comments were received on the issue of discretionary versus non-discretionary bidding and differing views were expressed by those who did specifically address this issue. Concerns about the use of non-discretionary bidding focused primarily on the proposed time-stamp tie-breaking rule.²⁹ Some respondents felt that a time-stamp

²⁸ Since bid levels would increase each round by only the established increment, bidders will be able to forecast exactly the maximum possible values that the price for any particular licence could reach by the end of the currently announced schedule. The bid schedule would be updated regularly so that bidders would always be able to make rolling forecasts, for one or two weeks in advance, for example.

²⁹ Under the non-discretionary bidding scenario, all bids on the same licence in a given round would, of course, be tie bids. It was proposed that the first bidder to place a bid on a licence (all bids would be electronically time-stamped as they were received) be given the status of standing high bidder on that licence for the next round. Other administrations have used the same tie-breaking rule with discretionary bidding, but the incidence of tie bids under that scenario has tended to be quite low.

tie-breaking rule might favour those bidders who, for example, had the fastest computers.³⁰ There is also the possibility that non-discretionary bidding with a time-stamp tie-breaking rule could be more susceptible to certain types of collusive behaviour.

Since the release of the consultation paper, new developments in auction theory and design have occurred and the United States Federal Communications Commission has completed both an auction featuring non-discretionary bidding³¹ and an auction featuring “multiple increment bidding.”³² The multiple increment bidding format is a variation on the non-discretionary bidding format, which allows bidders to increase high bids by up to, in the case of the LMDS auction, nine increments.

The multiple increment bidding format would appear to preserve the previously mentioned benefits of non-discretionary bidding while at the same time reducing the incidence of tie bids and any possible related problems. Multiple increment bidding should also lead to the faster conclusion of an auction than would single-increment non-discretionary bidding. The department is investigating the use of multiple increment bidding and will propose its use should it appear to be the optimal design option. Again, it is important to remember that the design of any particular auction will be the subject of public consultation before that auction’s commencement.

8.9 Bidder identities

Several respondents offered comments on the advisability of concealing bidder identities during an auction. While there could be some benefit to concealing bidder identities in order to deter bid collusion, the department is of the opinion that only under rare circumstances would these benefits outweigh the benefits of full information disclosure to bidders. Therefore, the department expects that for most auctions the identities of all bidders, the licences on which they are qualified to bid, and their initial eligibility point levels will be made public prior to the commencement of bidding. As well, full information on the bids placed by all bidders will be made available after each round.

9. Treatment of Incumbent Licensees

The consultation paper asked whether the results of future spectrum auctions should be used to adjust the licence fees of incumbent licensees with similar spectrum.

³⁰ It is worth noting, however, that unless the difference between two bidders’ valuations for a licence is so small as to fall within the margin of a single bid increment, the relative speed of bidders’ computers or telecommunications links will be a non-factor. As bid levels rise, the bidder with the lower valuation will drop out, allowing the bidder with the higher valuation to win at a price just above the lower bidder’s drop-out point.

³¹ The 800 MHz Specialized Mobile Radio Service (SMR) Phase 1 (Upper 10 MHz Block) auction, which closed on December 8, 1997, featured non-discretionary bidding (also referred to as “click-box” bidding).

³² This was the Local Multipoint Distribution Service (LMDS) auction, which closed on March 25, 1998.

A significant majority of respondents advised that in no circumstances should the department adjust existing licence fees based on auction results. There were several reasons cited. First of all, those bidding for licences will already have taken into account the existing fees of incumbents with whom they may compete when they are determining their valuations. If these fees themselves are uncertain, this creates unnecessary complications for the proper valuation of auctioned licences. Second, recalibration implies the retroactive application of today's valuations to licences awarded in the past. This is regarded as unwarranted and unfair because the current fee structure is based on legitimate good faith arrangements made with the government at the time of initial licensing. Third, one should take into account risks incurred and investments made by incumbents. Uncertainty created by recalibration damages established businesses because they made plans and secured financing under the rules of the day. Finally, readjusting fees based on future auction prices will create large uncertainties in the wireless sector. These uncertainties would have a major impact on the availability of financing, investment in new technologies, and the provision of new services.

Some respondents suggested that the department "grandfather" existing spectrum users and grant them the same rights that would be awarded to those who receive their licences via an auction process. One of the immediate concerns associated with such adjustment is the potential for an unjustified windfall gain. This might be particularly evident in the case where incumbents have been granted access to spectrum but have not used it and not paid fees for it, or where a nominal fee has been paid, but the spectrum is still not in use.

The department finds the arguments presented against fee recalibration compelling and agrees that incumbents' licence fees should not be tied to auction results for all the reasons cited. However, the department still feels there is a need to discuss how incumbent operators will be dealt with in an auction scenario. Progression towards the establishment of a homogeneous regime with respect to licensee rights will be required for the creation of a fully functioning secondary market for spectrum. The department intends to discuss possible adjustments to licence definitions, terms, conditions and fees for incumbent licensees in another consultation process. In particular, these issues will be addressed in the framework of transition of existing users from apparatus-based to spectrum-based licences.

10. Conclusions

- Any auction will be preceded by a full public consultation. Subsequent policy decisions will then be clearly articulated so that potential bidders will have the fullest possible knowledge prior to the auction. Bidders will be qualified to participate in the auction based on their compliance with clear and objective criteria, and a remote-access simultaneous multiple round auction will then commence.
- Consultations on the bandwidth and geographic dimensions of licences will be undertaken prior to any auction. Varying sized tiers of subnational licence areas will be based on groupings of Statistics Canada Census Divisions and Subdivisions. In the specific consultation process held before any particular auction, comments will be sought as to which tier or tiers (national, regional, local) should be used.

- Licensees will be given the maximum possible flexibility in their choice of service offerings and technologies. Limits will generally only be imposed for interference management purposes.
- Licensees will be allowed, by condition of licence, to transfer and subdivide their licences (along with all attendant conditions and obligations) to third parties who meet the applicable eligibility criteria.
- Licences will be assigned for an initial 10-year term. Licensees can generally expect to have their licences renewed for subsequent 10-year terms unless a breach of licence condition occurs, a fundamental reallocation of spectrum to a new service is required (e.g. an International Telecommunication Union reallocation), or an overriding policy need arises (e.g. a spectrum reallocation to address a national security issue). To provide a more stable investment climate for licensees, a consultation process would commence no later than two years prior to the end of the licence term (i.e. after year eight). This would address any possibilities that a licence would not be renewed, as well as the imposition of any renewal fees and/or amendments to licence conditions for the initial licensees in the subsequent term.
- The government will continue to possess all sovereign rights necessary to implement the required reallocation at any time, as per section 40 of the *Radiocommunication Regulations*, in case an overriding necessity to reallocate spectrum arises within the term of a licence. It is important to note that the department would reallocate spectrum assigned through auction only under extraordinary circumstances — taking into consideration that the licensee complied with the conditions of licence, has made large investments in infrastructure, and is serving an established client base. If there were a reallocation, it would take place only after full consultation.
- Payment of winning bids will be required in a lump sum amount at the auction's close. Modest reserve prices will be related to long-run spectrum management costs. Pre-auction deposits will be required to ensure the integrity of bidders.
- Auction results will not be used to recalibrate (up or down) the fees of incumbent licensees with similar spectrum.

Appendix

Service Areas/Zones de service

Tier 1³³/Niveau 1³³

#	Service Area Name/Nom de la zone de service	Population
1-01	Canada	28,846,761

Tier 2/Niveau 2

#	Service Area Name/Nom de la zone de service	Population
2-01	Newfoundland & Labrador/Terre-Neuve & Labrador	551,792
2-02	Nova Scotia & Prince Edward Island/Nouvelle-Écosse & Île-du-Prince-Édouard	1,043,839
2-03	New Brunswick/Nouveau-Brunswick	738,133
2-04	Eastern Quebec/Québec-Est	1,609,690
2-05	Southern Quebec/Québec-Sud	5,035,827
2-06	Eastern Ontario & Outaouais/Ontario-Est & Outaouais	2,047,352
2-07	Northern Quebec/Québec-Nord	194,810
2-08	Southern Ontario/Ontario-Sud	8,179,887
2-09	Northern Ontario/Ontario-Nord	824,802
2-10	Manitoba	1,115,900
2-11	Saskatchewan	980,770
2-12	Alberta	2,704,291
2-13	British Columbia/Colombie-Britannique	3,724,500
2-14	Yukon, Northwest Territories & Nunavut/Yukon, Territoires du Nord-Ouest & Nunavut	95,168

³³ For this table and all subsequent tables 'Population' refers to the population of the service area based on the 1996 Census.

³³ Pour ce tableau et tous les suivants 'Population' désigne la population de la zone de service d'après le recensement de 1996.

Tier 3/Niveau 3

#	Service Area Name/Nom de la zone de service	Population
3-01	Newfoundland & Labrador/Terre-Neuve & Labrador	551,792
3-02	Prince Edward Island/Île-du-Prince-Édouard	134,557
3-03	Mainland Nova Scotia/Nouvelle-Écosse continentale	751,011
3-04	Cape Breton/Cap Breton	158,271
3-05	Southern New Brunswick/Nouveau-Brunswick-Sud	171,361
3-06	Western New Brunswick/Nouveau-Brunswick-Ouest	209,200
3-07	Eastern New Brunswick/Nouveau-Brunswick-Est	357,572
3-08	Bas du fleuve/Gaspésie	311,501
3-09	Québec	909,256
3-10	Chicoutimi-Jonquière	388,933
3-11	Eastern Townships/Cantons de l'Est	503,748
3-12	Trois-Rivières	743,176
3-13	Montréal	3,682,384
3-14	Outaouais	106,519
3-15	Ottawa	1,193,489
3-16	Pembroke	112,948
3-17	Abitibi	194,810
3-18	Cornwall	66,849
3-19	Brockville	83,985
3-20	Kingston	160,574
3-21	Belleville	183,250
3-22	Cobourg	57,326
3-23	Peterborough	188,931
3-24	Huntsville	69,701
3-25	Toronto	5,146,581
3-26	Barrie	550,912
3-27	Guelph/Kitchener	560,682
3-28	Listowel/Goderich/Stratford	127,423
3-29	Niagara-St. Catharines	353,605
3-30	London/Woodstock/St. Thomas	742,833
3-31	Chatham	109,518
3-32	Windsor/Leamington	351,986
3-33	Strathroy	166,646
3-34	North Bay	124,950
3-35	Sault Ste. Marie	140,395

#	Service Area Name/Nom de la zone de service	Population
3-36	Sudbury	184,488
3-37	Kirkland Lake	130,650
3-38	Thunder Bay	244,319
3-39	Winnipeg	938,812
3-40	Brandon	177,088
3-41	Regina	359,584
3-42	Moose Jaw	109,722
3-43	Saskatoon	511,464
3-44	Edmonton	1,149,185
3-45	Medicine Hat/Brooks	134,724
3-46	Lethbridge	150,228
3-47	Calgary	944,382
3-48	Red Deer	176,376
3-49	Grande Prairie	149,396
3-50	Kootenays	134,973
3-51	Okanagan/Columbia	355,904
3-52	Vancouver	2,138,533
3-53	Victoria	382,745
3-54	Nanaimo	159,657
3-55	Courtenay	105,968
3-56	Thompson/Cariboo	173,967
3-57	Prince George	210,420
3-58	Dawson Creek	62,333
3-59	Yukon, Northwest Territories & Nunavut/Yukon, Territoires du Nord-Ouest & Nunavut	95,168

Tier 4/Niveau 4

#	Service Area Name/Nom de la zone de service	Population
4-001	St. John's	193,783
4-002	Carbonear	57,740
4-003	Gander/Grand Falls/Windsor	179,081
4-004	Corner Brook/Stephenville	91,998
4-005	Labrador	29,190
4-006	Charlottetown	85,846
4-007	Summerside	48,711
4-008	Yarmouth	64,812

#	Service Area Name/Nom de la zone de service	Population
4-009	Bridgewater/Kentville	141,495
4-010	Halifax	372,001
4-011	Truro	55,955
4-012	Amherst	37,559
4-013	Antigonish/New Glasgow	79,189
4-014	Sydney	158,271
4-015	Saint John	144,026
4-016	St. Stephen	27,335
4-017	Fredericton	150,457
4-018	Moncton	147,023
4-019	Miramichi/Bathurst	175,530
4-020	Grand Falls	29,665
4-021	Edmundston	29,078
4-022	Campbellton	35,019
4-023	Matane	126,219
4-024	Mont-Joli	43,984
4-025	Rimouski	52,677
4-026	Rivière-du-Loup	88,621
4-027	La Malbaie	29,918
4-028	Chicoutimi-Jonquière	223,248
4-029	Montmagny	60,714
4-030	Québec	770,868
4-031	Sainte-Marie	47,756
4-032	Saint-Georges	66,540
4-033	Lac Mégantic	23,614
4-034	Thetford Mines	45,272
4-035	Plessisville	21,317
4-036	La Tuque	16,517
4-037	Trois-Rivières	257,201
4-038	Louiseville	22,595
4-039	Asbestos	30,455
4-040	Victoriaville	49,830
4-041	Coaticook	13,085
4-042	Sherbrooke	208,974
4-043	Windsor	16,362
4-044	Drummondville	94,035
4-045	Cowansville	28,299

#	Service Area Name/Nom de la zone de service	Population
4-046	Farnham	29,567
4-047	Granby	84,058
4-048	St-Hyacinthe	79,713
4-049	Sorel	65,845
4-050	Joliette	123,212
4-051	Montréal	3,652,817
4-052	Sainte-Agathe-des-Monts	58,730
4-053	Hawkesbury	61,651
4-054	Mont-Laurier/Maniwaki	47,789
4-055	Ottawa	1,131,838
4-056	Pembroke	81,064
4-057	Arnprior/Renfrew	31,884
4-058	Rouyn-Noranda	61,650
4-059	La Sarre	22,586
4-060	Amos	25,565
4-061	Val D'Or	45,402
4-062	Roberval/Saint-Félicien	63,861
4-063	Baie-Comeau	52,298
4-064	Port-Cartier/Sept-Îles	49,526
4-065	Chibougamau	39,607
4-066	Cornwall	66,849
4-067	Brockville	70,974
4-068	Gananoque	13,011
4-069	Kingston	160,574
4-070	Napanee	39,829
4-071	Belleville	143,421
4-072	Cobourg	57,326
4-073	Peterborough	147,737
4-074	Lindsay	41,194
4-075	Minden	17,764
4-076	Toronto	5,146,581
4-077	Alliston	98,133
4-078	Guelph/Kitchener	535,736
4-079	Fergus	24,946
4-080	Kincardine	175,390
4-081	Listowel/Goderich	80,982
4-082	Fort Erie	27,183

#	Service Area Name/Nom de la zone de service	Population
4-083	Niagara-St. Catharines	326,422
4-084	Haldimand/Dunnville	34,599
4-085	London/Woodstock/St. Thomas	593,670
4-086	Brantford	114,564
4-087	Stratford	46,441
4-088	Chatham	78,128
4-089	Windsor/Leamington	351,986
4-090	Wallaceburg	31,390
4-091	Sarnia	126,423
4-092	Strathroy	40,223
4-093	Barrie	234,902
4-094	Midland	42,487
4-095	Gravenhurst/Bracebridge	51,937
4-096	North Bay	105,484
4-097	Parry Sound	19,466
4-098	Elliot Lake	30,205
4-099	Sudbury	184,488
4-100	Kirkland Lake	37,807
4-101	Timmins/Kapuskasing	92,843
4-102	Kenora/Sioux Lookout	63,732
4-103	Sault Ste. Marie	110,190
4-104	Thunder Bay	157,424
4-105	Fort Frances	23,163
4-106	Steinbach	44,334
4-107	Winnipeg	767,149
4-108	Morden/Winkler	36,530
4-109	Brandon	133,448
4-110	Portage la Prairie	20,385
4-111	Dauphin	43,640
4-112	Creighton/Flin Flon	25,152
4-113	Thompson	45,262
4-114	Estevan	47,616
4-115	Weyburn	23,121
4-116	Moose Jaw	60,784
4-117	Swift Current	48,938
4-118	Yorkton	71,002
4-119	Regina	217,845

#	Service Area Name/Nom de la zone de service	Population
4-120	Saskatoon	251,532
4-121	Battleford	89,351
4-122	Prince Albert	141,479
4-123	Lloydminster	31,668
4-124	Northern Saskatchewan/Saskatchewan-Nord	29,102
4-125	Medicine Hat/Brooks	81,509
4-126	Lethbridge	150,228
4-127	Stettler/Oyen/Wainwright	53,215
4-128	High River	44,070
4-129	Strathmore	34,451
4-130	Calgary	865,861
4-131	Red Deer	134,729
4-132	Wetaskiwin/Ponoka	41,647
4-133	Camrose	33,071
4-134	Vegreville	14,461
4-135	Edmonton	870,340
4-136	Edson/Hinton	44,083
4-137	Bonnyville	71,270
4-138	Whitecourt	25,493
4-139	Barrhead	22,305
4-140	Fort McMurray	36,494
4-141	Peace River	80,807
4-142	Grande Prairie	68,589
4-143	East Kootenay/Kootenay-Est	56,366
4-144	West Kootenay/Kootenay-Ouest	78,607
4-145	Penticton	88,331
4-146	Vancouver	2,054,062
4-147	Victoria	382,745
4-148	Nanaimo	159,657
4-149	Courtenay	105,968
4-150	Powell River	30,156
4-151	Squamish/Whistler	54,315
4-152	Kelowna	215,589
4-153	Kamloops	107,492
4-154	Salmon Arm	51,984
4-155	Williams Lake	41,196
4-156	Quesnel/Red Bluff	25,279

#	Service Area Name/Nom de la zone de service	Population
4-157	Skeena	69,804
4-158	Prince George	140,616
4-159	Dawson Creek	62,333
4-160	Yukon	30,766
4-161	Nunavut	25,153
4-162	Northwest Territories/Territoires du Nord-Ouest	39,249