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Spectrum Management and Telecommunications

Consultation on a New Set of Service Areas for Spectrum Licensing

Aussi disponible en français

Canada 

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1. Intent

1. Through the release of this document, Innovation, Science and Economic Development Canada (ISED), on behalf of the Minister, is initiating a consultation on a new set of smaller service areas for spectrum licensing (Tier 5) to complement ISED's existing suite of spectrum licensing mechanisms. These new service areas will help ensure that Canada is well prepared to meet current and future wireless needs, encourage additional access to spectrum within rural areas, and support new technologies and emerging use cases.
2. Comments are sought on the design principles, as well as service area proposals. In addition to providing comments, respondents are invited to submit alternative proposals for smaller service areas, along with supporting rationale. These proposals will form part of the consultation and be made public for comment.

2. Legislative mandate

3. The Minister of Innovation, Science and Economic Development, through the [Department of Industry Act](#), the [Radiocommunication Act](#) and the [Radiocommunication Regulations](#), with due regard to the objectives of the [Telecommunications Act](#), is responsible for spectrum management in Canada. As such, the Minister is responsible for developing goals and national policies for spectrum resources use and for ensuring effective management of the radio frequency spectrum resource.

3. Background and context

4. The radio frequency spectrum is a finite resource that is integral to Canada's telecommunications infrastructure. It provides access to a broad range of private, commercial, consumer, national security, scientific and public safety applications and services that benefit all Canadians.

3.1. Current tier structures

5. Service areas for competitive licensing of spectrum were first created in 1998 to facilitate the release of radio authorizations for spectrum use where the expected demand for spectrum exceeded the available supply. These service areas were used as part of spectrum auctions to allocate the finite amount of radio frequencies that were available within a defined geographic area.
6. As different wireless services and applications are best suited to different sizes of services areas, ISED established four tiers of [service areas for competitive licensing](#).
 - **Tier 1:** a single national service area covering the entire territory of Canada
 - **Tier 2:** consists of 14 provincial and large regional service areas covering the entire territory of Canada
 - **Tier 3:** consists of 59 smaller regional service areas covering the entire territory of Canada
 - **Tier 4:** comprises 172 localized service areas covering the entire territory of Canada,

based on contiguous groupings of Statistics Canada's 1996 census subdivisions (CSD)

7. Prior to licensing spectrum, ISED typically consults on technical and policy aspects of the band, including the appropriate tier size for licensing. Having a Tier 5 service area will provide an additional option that will support next generational technologies and services.

3.2. Rural context

8. In June 2018, ISED published SLPB-003-18, [*Spectrum Outlook 2018 to 2022*](#) (the Spectrum Outlook), outlining its overall approach and planning activities related to the release of spectrum for commercial mobile services, licence-exempt applications, satellite services and wireless backhaul services over the years 2018 to 2022. The Spectrum Outlook resulted from the consultation process SLPB-006-17, [*Consultation on the Spectrum Outlook 2018 to 2022*](#) (the Outlook Consultation).
9. With the increased demand for spectrum for a variety of uses and the growing importance of wireless services, ISED is committed to developing licensing policies that consider ongoing service provision in rural areas ensuring that Canadians in all areas of the country have access to the latest technologies, including 5G.
10. In recent consultations, ([*Consultation on a Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band*](#), [*Consultation on Revisions to the 3500 MHz Band to Accommodate Flexible Use and Preliminary Consultation on Changes to the 3800 MHz Band*](#) and [*Spectrum Outlook 2018 to 2022*](#)) some small and regional service providers expressed challenges in acquiring spectrum, generally for areas which are outside of the major population centres.
11. ISED acknowledges the feedback from stakeholders and reiterates its long-term commitment to encourage affordable telecom services to help bridge the digital divide, foster inclusivity, and support an innovative economy. ISED will continue to develop policies that encourage service to rural areas to ensure that all Canadians benefit from high-quality services, ubiquitous coverage, and affordable prices. These policies will continue to be developed in a transparent manner through the consultation process.
12. The licensing of smaller service areas may further facilitate access to spectrum for all service providers, particularly in rural areas, to support current and emerging use cases, the adoption of new and emerging technologies, such as 5G and Internet of things (IoT), and further the use of existing underused spectrum frequency bands.

3.3. 5G context

13. 5G represents the next major advancement in mobile technologies, enabling much higher data rates, massive machine-to-machine communication, and ultra-reliable low latency communications such as those used for emerging IoT applications. It is expected that 5G will require a combination of licensed and licence-exempt spectrum to support both commercial mobile and IoT usage. In addition, ISED recognizes that more flexible use licensing authorizations will allow for a combination of fixed wireless services, mobile services, and backhaul to be deployed as part of 5G networks.

14. ISED acknowledges the need to support innovative 5G services and the development of IoT applications in a way that encourages investment, is minimally restrictive, and facilitates provision of these services. With emerging 5G technologies developing, we expect to see new wireless use cases that may be targeted to specific areas. For example, a service provider targeting a small town or a resource extraction company working in a specific area could benefit from having access to spectrum on a smaller scale.

3.4. International context

15. Globally, countries including the United States, France, the United Kingdom, and Sweden are starting to use smaller service areas in certain bands as a licensing tool to actively support the development and adoption of 5G technologies and associated spectrum bands that harness the localized nature of millimetre wavelengths. As a natural extension, smaller service areas will result in the availability of more licences, particularly in rural areas.
16. The United States has proposed using county-level licence areas (3,141 counties), for its Citizen Band Radio Service (CBRS) 3550-3700 MHz band, whereas Sweden currently issues licences at the county level for the 3.4-3.6 GHz frequency band. France has also been using smaller areas for determining coverage obligations, which are roughly one order of magnitude smaller than Canada's Tier 4 service areas. Furthermore, the United Kingdom and Sweden are both considering licensing spectrum on an even more localized basis, such as railway stations and soccer stadiums.

3.5. Technical considerations

17. Comments received in the Outlook Consultation supported releasing low-, mid- and high-band spectrum to enable the development and adoption of 5G technologies. As spectrum bands rise in frequency, the attributes of the wavelengths, such as shorter propagation distances and attenuation properties, make them more suitable for coordination in smaller service areas.
18. Low-band spectrum (e.g. 600 MHz, 700 MHz, etc.) is ideal for covering large geographic areas and for in-building penetration, making it attractive for both urban and rural deployments. Traditionally, ISED has licensed this spectrum using larger tier sizes, but advancements in technology and network design may allow for future licensing based on smaller tier sizes.
19. Mid-band spectrum has been licensed using a variety of tier sizes, depending on the frequency characteristics and policy objectives of the particular band. The potential for interference between service providers will be mitigated as higher frequency mid-band spectrum becomes increasingly utilized, and ISED expects that a mix of different types of usage will emerge.
20. High-band spectrum in particular does not propagate well over large distances, and due to the lower potential for interference it is particularly well suited to smaller service areas. As new technologies allow for more use of higher frequency bands and their higher data carrying capacity, ISED anticipates seeing new business models and use cases emerge.

21. ISED recognizes that advancements in technology and network design will further the ability of service providers to coordinate in smaller service areas. For example, technologies such as Multiple Input, Multiple Output (MIMO) networks (with narrow, steerable beams) and Time Division Duplex (TDD) technology (with synchronization between systems) are expected to help minimize potential interference at service area boundaries.

4. Policy objectives

22. ISED's policy objective is to maximize the economic and social benefits that Canadians derive from the use of the radio frequency spectrum, including in rural and remote regions. In pursuing its policy objective, ISED is committed to ensuring that Canadian consumers, businesses and public institutions continue to benefit from access to high-quality wireless networks at competitive prices in urban as well as rural and remote communities. Wireless technology, whether through fixed or satellite broadband, is a key component for connectivity to rural homes and businesses, particularly in areas where wireline solutions are not feasible or cost prohibitive. ISED works to ensure that spectrum resources are available for the various services that provide broadband connectivity to rural Canadians.
23. As outlined in the 2017 [Innovation and Skills Plan](#), ISED recognizes the importance of innovation-led growth in all sectors of the economy including the digital economy. To remain at the forefront of wireless communications, Canada must develop policies that not only ensure access to spectrum in rural and urban areas, but also fosters the use of spectrum across the country so that all Canadians no matter where they live, work or play may make the best use of current and emerging technologies. The resulting dividends will not only be economic, but also increasingly social in nature, as the digital economy facilitates the sharing of ideas and information and the building of virtual networks and communities.
24. In developing this consultation, ISED has been guided by the policy objectives of the [Telecommunications Act](#), and the [Spectrum Policy Framework for Canada](#) (SPFC). These objectives include fostering innovation, investment, and the evolution of wireless networks to support sustained competition, so that consumers and businesses benefit from greater choice and timely availability of services across the country.
25. In pursuing its policy objectives, ISED is committed to ensuring that Canadian consumers, businesses and public institutions continue to benefit from access to high quality wireless networks at competitive prices across Canada. With the anticipated increase in spectrum demand as described in the Spectrum Outlook, ISED is developing spectrum management policies that reflect the current and expected future environments.
26. Consequently, ISED's policy objectives for a new set of service areas are to:
 - improve access to spectrum, furthering more efficient usage across Canada
 - address the unique geographical distribution of Canada's population, allowing for greater flexibility in the design of licensing frameworks
 - better address new and different services, technologies, applications and use cases

5. Design principles

27. ISED uses existing service areas for many purposes, such as spectrum licensing, setting deployment requirements, and the calculation of licence fees. Any approach to developing smaller tier sizes must further ISED's policy objectives, address technical considerations, and reflect good spectrum management.

5.1. Geographic differences

28. One of the objectives of smaller service areas is to better reflect both urban and rural service provider requirements. Smaller service areas can better address the population distribution characteristics within current Tier 4 areas and enables different business models and service offerings in different areas.
29. Creating Tier 5 would allow ISED to authorize alternative licensing approaches for different areas. Where fee calculation is based on population, a smaller area size will correspond to a lower population figure and thus lower fees for each licence. Similarly, deployment requirements could be tailored to smaller individual areas.

5.2. Foster demand

30. Each service area should include either a population base or some economic value that would foster demand for acquiring the spectrum licence.

5.3. Technological and competitive neutrality

31. ISED has an obligation to licence spectrum in a fair and transparent manner. Consequently, the design of new service areas should be technologically and competitively neutral. Therefore, when creating new service area boundaries, ISED does not take into account the interests of any specific service provider or technology.
32. New service areas should be as versatile as possible and support different frequencies. Tier 5 service areas are an additional tool which will add versatility to the existing tier system. Although interference and coordination issues may be more significant in low/mid-band frequencies, the design of the areas should not be limited to accommodating higher frequencies only. Note that technological advancements may help with coordination in low/mid-bands in the future.

5.4. Interference minimization

33. In addition to the technical considerations discussed in section 3.5 above, potential interference issues can be mitigated by ensuring that service area boundaries run through low population areas. In the development of the existing tier areas, boundaries were placed through lesser populated areas, wherever possible, in order to minimize potential interference problems.

5.5. Alignment with existing tiers

34. Under the current tier system, Tier 4 areas combine to create Tier 3 areas, which combine to create the Tier 2 areas. This is referred to as nesting and enables service providers to aggregate and manage various tier areas and levels and, additionally, is used to set deployment requirements. Therefore, Tier 5 areas should nest within the current Tier 4 areas.

5.6. Areas mapped according to ISED grid cells

35. For electronic storage and mapping purposes, ISED uses groupings of grid cell areas as the basis for creating spectrum service areas. This system will be maintained and any Tier 5 model must be converted into grid cell defined areas. There may be slight variations when the new Tier 5 service areas are converted into grid cell defined areas.

The minimum size of a grid cell is 1 minute latitude × 1 minute longitude.

5.7. Proposed design principles

36. In order to further facilitate access to spectrum for wireless providers so that they can provide next generation wireless services to all Canadians, including those in rural and remote areas, ISED is proposing the following design principles for the creation of a new set of service areas:
- Recognize geographic differences: consider the unique characteristics of urban and rural areas in Canada
 - Foster demand: areas should have either a population base or some economic value to support commercial viability
 - Maintain technological and competitive neutrality: not favouring or discriminating against one technology or group of stakeholders over another
 - Ensure boundaries are in low population areas to minimize potential interference issues.
 - Ensure areas nest within the existing Tier 4 service areas to maintain continuity with ISED's existing licensing structure.
 - Use the ISED's existing grid cells as constituent building blocks.

Question 1: Design principles

Q1A—ISED is seeking comments on the proposed design principles when providing responses, include supporting arguments for or against the proposed principles.

Q1B—ISED is seeking any suggestions on additional design principles that should be considered.

6. ISED proposals for a new set of smaller service areas (Tier 5)

37. Similar to current licensing procedures, the choice of service areas for a particular band or frequency range will continue to be consulted on prior to the release of new spectrum. When

proposing a licence area for a particular frequency band, ISED considers the policy objectives and characteristics for each particular frequency band as well as stakeholder feedback via a consultation process. Other factors that ISED may take into consideration include the type of service offering, frequencies involved, equipment ecosystem, interference potential, coordination requirements, technical limits or certification requirements, and international considerations.

38. Based on the design principles noted above, ISED is proposing two options for a new set of Tier 5 service areas:
- Boundaries based on Statistics Canada 2016 census subdivisions
 - Boundaries based on Statistics Canada 2016 census population centres

6.1. Option 1: Boundaries based on Statistics Canada 2016 census subdivisions

39. Tier 4 service areas were developed using contiguous groupings of Statistics Canada's 1996 [census subdivisions](#) (CSD), a term that refers to municipalities or areas typically treated as municipalities for statistical purposes. However, as municipalities do not cover the entire area of Canada, Statistics Canada divided the remaining areas into municipal equivalents for statistical purposes. As of the 2016 Census, there are 5,162 CSDs in Canada.
40. Option 1 proposes to define each CSD as a unique service area, which conforms to an individual municipality boundary as shown in figure 1 and figure 2 below. Note that service area boundaries will vary slightly from the map below once Statistics Canada defined areas are converted into ISED's spectrum grid cells.
41. As the census subdivision boundaries will be mapped onto ISED's spectrum grid cells to create the Tier 5 service areas, any grid cell where the centre of the grid cell is contained within the boundary will be allocated to that service area.

Figure 1: Option 1 based on 2016 census subdivisions – with Tier 4-077 (Toronto) Overlay

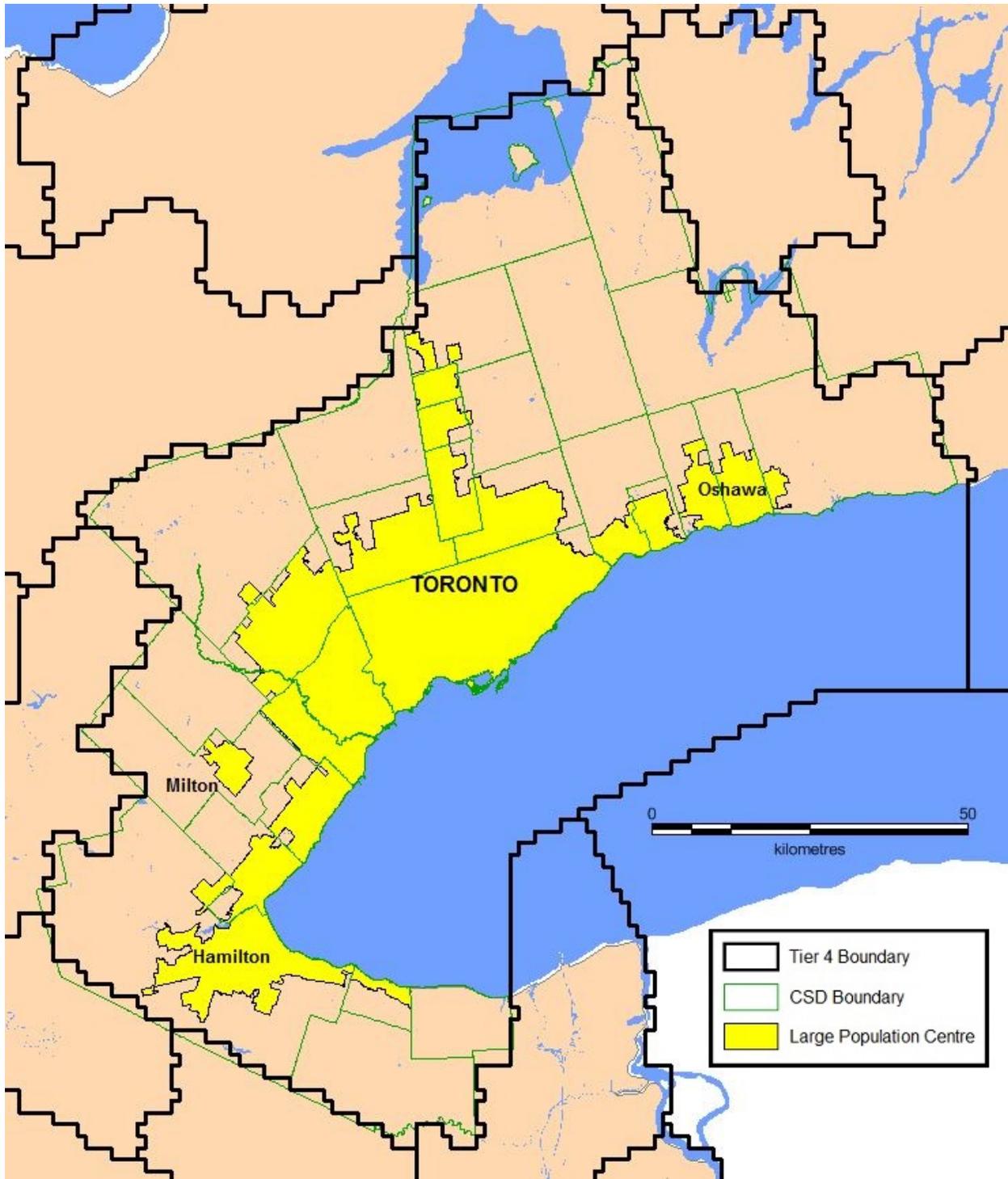
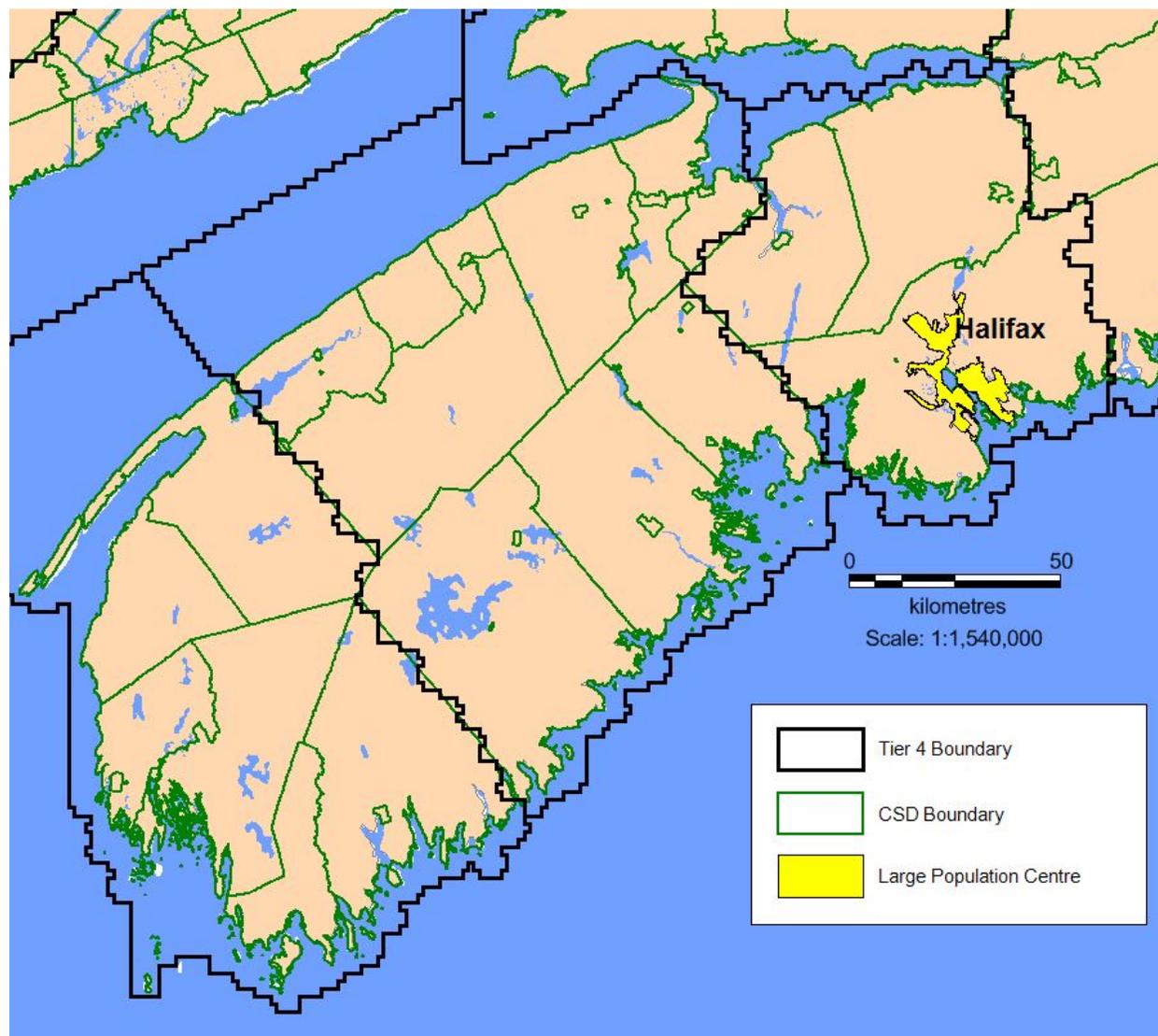


Figure 2: Option 1 based on 2016 census subdivisions – with Tier 4-008 (Yarmouth), 4-009 (Bridgewater/Kentville), and 4-010 (Halifax) Overlay



42. In past consultations, the amalgamation of urban and rural areas into a single service area has been raised as an issue hindering the delivery of services to more remote communities. Option 1 addresses these concerns by separating rural regions from major urban centres. As spectrum will be made available over a smaller area, it will provide more opportunities for targeted acquisitions and access to local service providers. A dense urban centre typically constitutes a municipality on its own, while a rural municipality may have residents spread out over a much larger geographical area.
43. Given the amount of data and information available for each census subdivision collected by the Government of Canada and other public/private entities, this option facilitates market analysis and business planning.

44. ISED recognizes that there may be interest in serving entire urban areas. Since major urban centres may consist of multiple CSDs (e.g. Toronto), a possible variation of the option would be to combine adjacent urban CSDs into a single service area.
45. CSDs can be very small, with some being less than one square kilometre. In the interest of reducing possible interference, ISED is considering setting a minimum size, where those CSDs that fall below this marker would be amalgamated into an adjacent CSD. This would also lower the number of service areas to administer.
46. Canada-wide map layer files for Option 1 are available ([ZIP version](#), 70 mb). Alternatively, the [census subdivision map layers](#) can be downloaded.

Question 2: Option 1 - Boundaries based on Statistics Canada 2016 census subdivisions

Q2A—ISED is seeking comments on the suitability of Option 1 in addressing the proposed design principles.

Q2B—ISED is seeking comments on whether adjacent urban CSDs should be combined into a single service area.

Q2C—ISED is seeking comments on whether there should be a minimum or maximum size for the service areas and if very small CSDs should be amalgamated into the larger surrounding or adjacent CSD.

Q2D—ISED is seeking comments to gauge if this option is suitable for northern and rural areas.

6.2. Option 2: Boundaries based on population centres

47. The second option was developed to provide a clear delineation between highly populated urban areas and very rural areas, and the urban-rural continuum that exists in between. It showcases the range of densely populated and sparsely populated areas, from remote areas with few residents to small urban centres to large metropolitan areas.
48. Option 2 would define each Tier 5 service area based on the associated boundaries of [population centres](#) defined by Statistics Canada. ISED proposes three categories of population centres based on the 2016 Census population data:
 - large (>100,000)
 - medium (30,000 to 99,999)
 - small (2,000 to 29,999)
49. The definitions of large and medium population centres are identical to those defined by Statistics Canada. However, ISED proposes a different population base for small centres

(2,000 to 29,999) compared to Statistics Canada's population base (1,000 to 29,999). This eliminates the smallest population centres (1,000 to 1,999) from becoming individual service areas, which lowers the overall number of service areas and simplifies management considerations.

50. There are 30 large population centres, 58 medium population centres, and 563 small population centres across Canada (based on Statistics Canada 2016 Census data).¹ The remaining contiguous areas, including all uninhabited areas and population centres with less than 2,000 people, within each Tier 4 area not covered by one of the three categories of population centres would become an individual Tier 5 service area ('other area') as well. This would ensure that all Tier 5 service areas nest within an existing Tier 4 area as shown in figure 3 and figure 4 below. Note that service area boundaries will vary slightly from the map above once Statistics Canada defined areas are converted into ISED's spectrum grid cells.
51. As the population centres will be mapped onto ISED's spectrum grid cells to create the Tier 5 service areas, any grid cell where the centre of the grid cell is contained within the boundary will be allocated to that service area.

¹ There are 355 population centres that have a population between 1,000 to 1,999.

Figure 3: Option 2 based on population centres – with Tier 4-077 (Toronto) Overlay

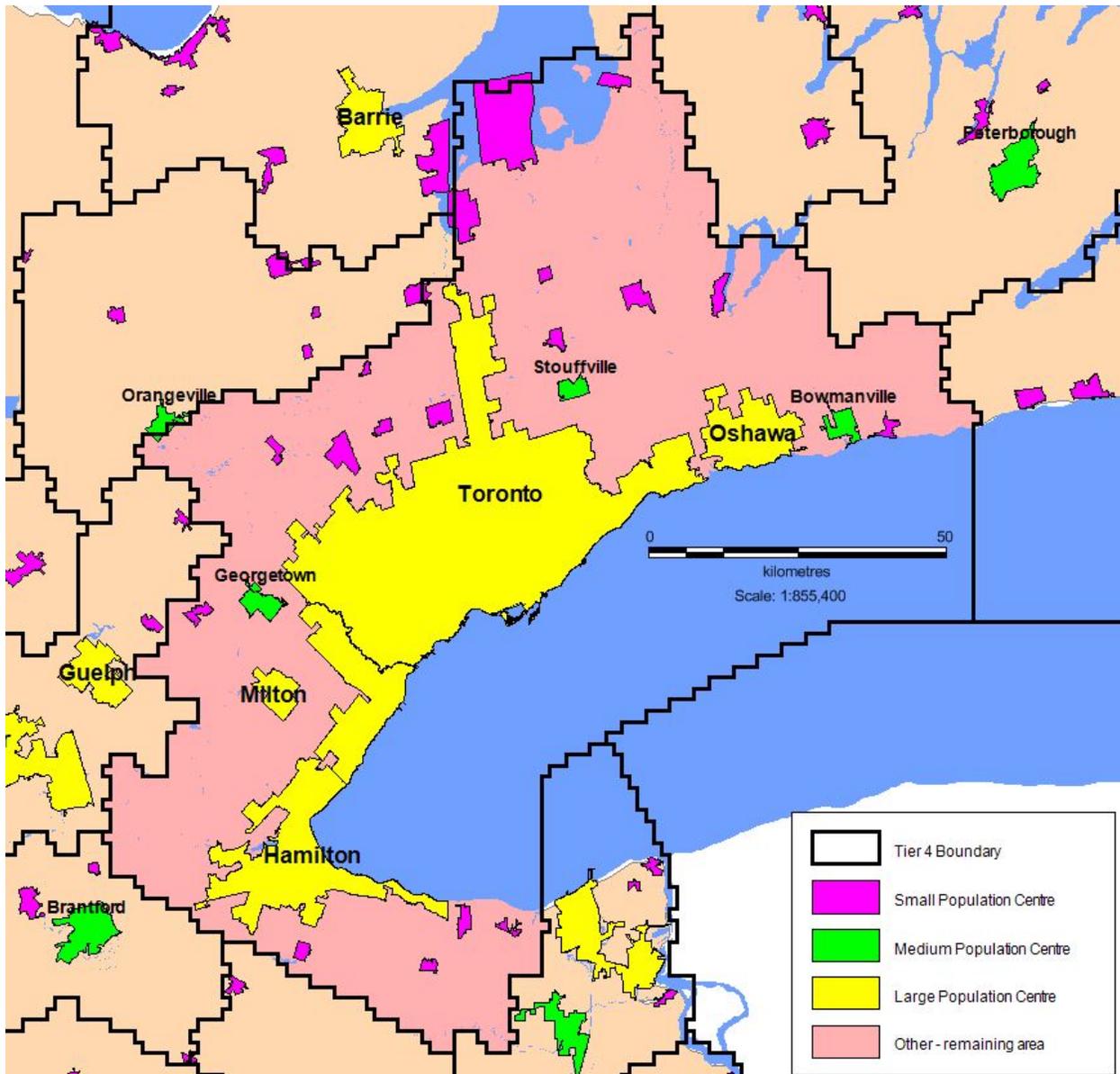
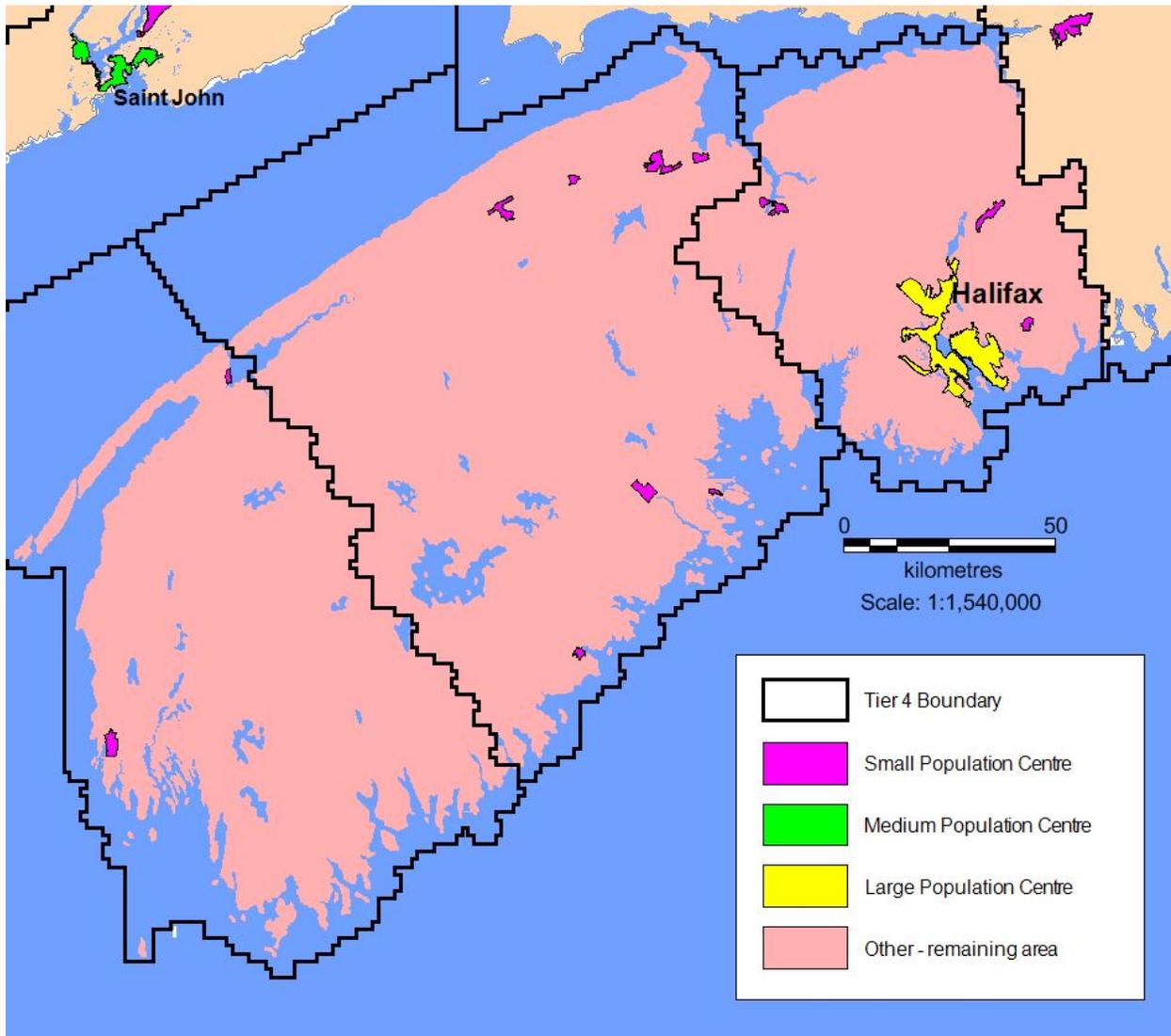


Figure 4: Option 2 based on population centres– with Tier 4-008 (Yarmouth), 4-009 (Bridgewater/Kentville), and 4-010 (Halifax) Overlay



52. ISED will also consider variations of Option 2 (e.g. adjusting the minimum population of the smallest population centres).
53. This approach better distinguishes the population characteristics of urban and rural areas. ISED recognizes that different business cases and service offerings may apply to different areas. More granularity allows for the consideration of demand across diverse areas, and the potential application of alternative licensing approaches.
54. Similarly, deployment requirements could be tailored to areas on a more granular basis. For example, the four types of service areas (large, medium, and small population centres, and remaining areas) could have different deployment requirements based on their population characteristics.

55. Canada-wide map layer files for Option 2 are available ([ZIP version](#), 6.4 mb). Alternatively, the [census population centre map layers](#) can be downloaded; however, please note that as stated in paragraph 49 ISED proposes a different population base for small centres (2,000 to 29,999).

Question 3: Option 2- Boundaries based on population centres

Q3A—ISED is seeking comments on the suitability of Option 2 in addressing the proposed design principles.

Q3B—ISED is seeking comments on the proposed minimum population for small population centre service areas. A rationale should be provided if a different population is proposed.

Q3C—ISED is seeking comments on whether the “other” service areas (remainder areas in each Tier 4) should be licensed differently (e.g. on a shared or first-come, first-served basis).

Q3D—ISED is seeking comments on whether this option is suitable for northern or rural areas.

Q3E—ISED is seeking comments on whether population centres, which have adjacent boundaries, should be amalgamated to form a single service area.

7. Alternative proposals

56. While ISED has drawn upon its spectrum management knowledge, experience, and interactions with stakeholders to develop these options, there may be other suitable options that merit consideration.

Question 4: Alternative proposals

ISED invites interested parties to submit alternative proposals for smaller service areas. All alternative service area proposals must be applicable to all of Canada and promote the federal government’s policy objectives.

Submissions should include a rationale for the proposal, an explanation of how it satisfies ISED’s policy objectives and how it meets each of the proposed design principles, and any other relevant information. One or more maps should also be included, preferably including one which covers all of Canada. Maps should be in a format that is readily accessible by ISED (e.g. in ArcGIS or MapInfo format, or publically available on the Internet with a link provided). Submissions should adhere to the requirements listed above in order to allow other stakeholders sufficient information to provide informed comments.

8. Next steps

57. ISED will review the comments received, gather further information if necessary, and publish any alternative proposals submitted for another round of comments by the public. ISED will publish a decision on a new set of smaller service areas after these steps are completed.

9. Submitting proposals and/or comments

57. Respondents are requested to provide their comments in electronic format (Microsoft Word or Adobe PDF), and their alternative proposals in electronic format by [email](#).
58. In addition, respondents are asked to specify question numbers for ease of reference and to provide supporting rationale for each response.
59. Written submissions should be addressed to the following address:
Innovation, Science and Economic Development Canada
c/o Senior Director, Spectrum Operations
235 Queen Street, 6th Floor
Ottawa, Ontario K1A 0H5
60. All submissions should cite the *Canada Gazette*, Part I, the publication date, the title and the notice reference number (DGSO- 002-18). Parties should submit their comments no later than January 31, 2019, to ensure consideration. Soon after the close of the comment period, all comments received and alternative service area proposals will be posted on ISED's [Spectrum Management and Telecommunications](#) website.
61. ISED will also provide interested parties with the opportunity to reply to proposals and comments from other parties. Reply comments will be accepted until March 7, 2019.
62. All proposals, comments and reply comments will be published, so those making submissions are asked not to provide confidential or private information in their submissions.
63. After the initial comment period, ISED may, at its discretion, request additional information if needed to clarify significant positions or new proposals. Should additional information be requested, the reply comment deadline may be extended.

10. Obtaining copies

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

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

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