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Via email: ic.spectrumoperations-operationsduspectre.ic@canada.ca

Mr. Eric Parsons
Senior Director, Spectrum Management Operations Branch
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Ottawa, Ontario
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Re: Canada Gazette Notice No. DGSO-002-18 — Consultation on a New Set of Service Areas for Spectrum Licensing

Attached, please find Comments of Rogers Communications Canada Inc. (Rogers) in response to *Canada Gazette*, Part I, December 1, 2018, *Consultation on a New Set of Service Areas for Spectrum Licensing* (DGSO-002-18).

Rogers thanks the Department for the opportunity to provide input on this important issue.

Yours very truly,



Howard Slawner
Vice President – Regulatory Telecom
HS/pg

Attach.

Consultation on a New Set of
Service Areas for Spectrum Licensing
DGSO-002-18

Comments of
Rogers Communications Canada Inc.
February 19, 2019



Executive Summary

- E1. Spectrum is a critical input for satisfying the growth in demand for advanced connectivity services in Canada. As Canada's largest single operator network, Rogers knows that wireless providers require continued and growing access to geographically-contiguous, interference-free, exclusively-licensed spectrum to keep pace with Canadians' demand for data services where they live, work, and play. While we continue to invest heavily in advanced communication networks and infrastructure, we also require additional spectrum to fully enable the deployment of 5th generation wireless technology.
- E2. Rogers supports Innovation, Science and Economic Development Canada's consultation on a new set of smaller service areas for spectrum licensing (Tier 5). The optimal solution for the Department in creating Tier 5 service areas is to adopt an enhanced Option 2, modifying the proposal by: amalgamating population centres with a common border into a single service area; defining small population centres as 5,000 to 29,999; amalgamating "other" areas with adjacent population centres; and, adopting Rogers' proposed additional design principles. This will improve management complexity by creating a rational number of service areas, promote coverage into sparsely populated areas and reduce the risk of interference between service areas while still achieving all of the Department's policy objectives for smaller Tier 5 service areas.
- E3. Notwithstanding the Department's desires to not restrict Tier 5 to certain bands, Rogers believes that Tier 5 service areas are best suited to frequencies above at least 6 GHz at this time. Incompatibility issues currently exist within Tier 4 areas for 3500 MHz, and interference issues would grow substantially worse under a potential Tier 5 licensing. Better coordination tools and advancements in technology are required prior to utilizing Tier 5 for frequencies below 6 GHz. It is simply not technically or economically feasible to mitigate potential interference and implement Tier 5 service areas in low or mid-bands in the near term. In fact, Tier 5 service areas are probably best suited for millimetre wave bands at this time.
- E4. Licensing of smaller service areas may assist small, rural service providers to access additional spectrum. However, it is critical the Department also recognize the importance of geographic contiguity of spectrum for national facilities-based networks for current and advanced communication services like 5G, especially for national Internet of Things networks and along transportation corridors. Any future licensing of spectrum on a potential Tier 5 basis should not sacrifice Canadians' ability to connect to robust, nation-wide or other wide-area networks.

Introduction

1. Rogers Communications Canada Inc. (Rogers) is pleased to provide Innovation, Science and Economic Development Canada (ISED or the Department) with the following comments in response to *DGSO-002-18: Consultation on a New Set of Service Areas for Spectrum Licensing*¹ (the Consultation), published in the *Canada Gazette*, Part I, December 1, 2018.
2. The optimal solution for the Department in creating a new set of service areas for spectrum licensing is to adopt an enhanced Option 2, modifying the proposal by: amalgamating population centres with a common border into a single service area; defining small population centres as 5,000 to 29,999; amalgamating “other” areas with adjacent population centres; and, adopting Rogers’ proposed additional design principles. This will improve management complexity by creating a rational number of service areas, promote coverage into sparsely populated areas and reduce the risk of interference between service areas while still achieving all of the Department’s policy objectives for smaller Tier 5 service areas. In addition, Tier 5 service areas should absolutely be restricted to frequencies above 6 GHz, and likely millimetre wave (mmWave) bands and above, until better coordination tools and advancements in technology make interference mitigation technically and economically feasible in low and mid-band spectrum.
3. Effective spectrum policy frameworks will help Canadian network operators meet the increasing demand for data and innovative new services. Canada’s mobile data traffic grew 38% in 2017, and is expected to grow four-fold from 2017 to 2022, a compound annual growth rate of 34%. In fact, Cisco predicts that Canadian mobile data traffic by 2022 will be equivalent to two times the volume of the entire Canadian Internet in 2005.² Ensuring that spectrum is widely available and free of interference for facilities-based operators is critical to meeting the current and growing capacity demands of 4th generation (4G) Long Term Evolution (LTE) and 5th generation (5G) mobile networks.
4. Rogers and Canada’s other facilities-based mobile network operators provide Canadians with world-class communication services. According to the mobile industry measurement company Open Signal:

Canada has become quite the LTE powerhouse, especially in terms of speed. Some of the fastest speed measurements we’re seeing globally

¹ ISED, *DGSO-002-18: Consultation on a New Set of Service Areas for Spectrum Licensing* (Consultation); <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11446.html>.

² Cisco, *VNI Mobile Forecast Highlights, 2017-2022*; https://www.cisco.com/c/m/en_us/solutions/service-provider/vni-forecast-highlights.html#

are now coming out of the North American country. But raw speed isn't the only thing Canada can brag about. Access to LTE signals is excellent, and the country is laying a solid foundation for 5G.³

5. The introduction of 5G services will be about people and things that can be broadly split into three use-case categories: enhanced mobile broadband (eMBB); massive machine type communications (mMTC); and, ultra-reliable low latency communications (urLLC). The mMTC use-case will see 10-100 times more devices connected to the network, with some Internet of Things (IoT) devices having 10-year battery lives. IoT will empower a wide variety of industries to increase their productivity and develop new business models. In the healthcare sector, medical and e-health services will be enabled along with a diverse range of wearables. In the transportation sector, the emerging Vehicle-to-Everything (V2X) technologies hold tremendous potential to enhance the capacity and safety of Canada's roadways. V2X services will provide increased autonomy and self-driving capabilities as well as advanced logistics, robust mobility functions, and enhanced location services to manage traffic flow and enhance safety. For public services, sensor networks for Smart Cities and remote sensing will enhance the abilities of governments of all levels to deliver services to citizens. A truly forward-looking spectrum licensing regime will foster innovation, investment, and the evolution of wide-area, seamless 5G networks covering people and transportation corridors to benefit Canadian consumers and businesses.
6. In addition to being Canada's largest wireless provider for traditional consumer mobile users, Rogers is the leader in the Machine-to-Machine (M2M) market and we continue to invest heavily in advanced wireless networks in order to satisfy our customers' growing demand for mobile data services. As Canada's largest single operator network, Rogers knows that wireless providers require continued and growing access to geographically-contiguous, interference-free, exclusively-licensed spectrum to keep pace with Canadians' demand for data services where they live, work, and play. In order to address the dramatic growth in demand for mobile data services, Rogers has already made significant investments to deploy 4G LTE mobile broadband technology to approximately 96% of the Canadian population.⁴ We continue to deliver innovative broadband services to Canadians on our march to 5G. Rogers is currently working with our network infrastructure vendor, Ericsson, on 5G trials in Toronto and Ottawa, in addition to other select cities over the next year.⁵

³ Open Signal, *State of Mobile Networks: Canada (February 2018)*; available from: <https://opensignal.com/reports/2018/02/canada/state-of-the-mobile-network>.

⁴ Rogers, *Rogers Communications 2017 Annual Report*., April 2017.

⁵ Rogers, *Rogers and Ericsson partner to bring 5G to Canadians*, April 2018; available from: <https://about.rogers.com/2018/04/16/rogers-ericsson-partner-bring-5g-canadians/>.

7. Yet, for network operators to continue providing Canadians with the most advanced and innovative connectivity technology solutions, spectrum policy must keep pace. The Canadian Radio-television and Telecommunications Commission (CRTC) states that at the end of 2017 mobile networks covered approximately one quarter of Canada's geographic land mass and 99% of Canadians. Moreover, when combining the coverage of all facilities-based service providers, 4G LTE networks are also available to approximately 99% of Canadians and covered 86% of Canada's major roads and highways.⁶ While providing coverage and the latest advanced services to Canadians in some rural and remote parts of the country continues to provide technical and economical challenges, facilities-based network providers like Rogers continue to invest billions of dollars to provide connectivity to Canadians.
8. According to the CRTC, telecommunications investments made in both wireless and wireline networks was \$12.1 billion in 2017 for plant and equipment, a combined capital intensity of 24% due to the requirement to maintain and upgrade extensive network infrastructure.⁷ These numbers will only continue to grow as, according to a recent report by Accenture, the initial roll-out of 5G networks is estimated to require approximately \$26 billion in capital investment, virtually all of which will be made by Canada's facilities-based mobile wireless service providers.⁸ Rogers increased our 2018 wireless capital expenditures to continue delivering reliable performance for our customers by augmenting our existing LTE network with 4.5G technology that is also 5G-ready,⁹ including deploying an LTE Cat M1 network to bring massive IoT to life.¹⁰ However, in order to enhance consumer experiences and expand network coverage, Canadian spectrum policy, including service area licensing policy, must ensure that spectrum can be effectively deployed across national facilities-based networks.
9. In the context of this consultation, the Department must ensure additional access to spectrum within rural areas is balanced with the need for national facilities-based networks to have access to geographically contiguous spectrum, and the increased costs of coordination for all network operators. The possible creation of smaller service areas must be designed to mitigate potential interference risks, especially in low and mid-band spectrum, while supporting new technologies and emerging use

⁶ CRTC, *Communications Monitoring Report 2018 – Retail Mobile Sector*, pg 3-4; available from <https://crtc.gc.ca/eng/publications/reports/policymonitoring/2018/cmr2018-mobile.pdf>.

⁷ CRTC, *Communications Monitoring Report 2018*.

⁸ Accenture, *Fuel for Innovation: Canada's Path in the Race to 5G*, pg 16; available from: https://www.5gcc.ca/wp-content/uploads/2018/06/CWTA-Accenture-Whitepaper-5G-Economic-Impact_Updates_WEB_06-19-2018.pdf.

⁹ Rogers, *Rogers Communications Reports Third Quarter 2018 Results*, October 2018.

¹⁰ Rogers, *Rogers to launch national LTE-M network to power the next era of IoT in Canada*, October 2018; available from: <http://about.rogers.com/2018/10/18/rogers-launch-national-lte-m-network-power-next-era-iot-canada/>.

cases, especially in high band and mmWave spectrum bands. The decision to license a particular band using a specific service area size should remain subject to consultation with all stakeholders, who can provide input on the optimal tier level for an individual spectrum band. However, until advanced technology and interference mitigation/coordination tools are widely available, the use of Tier 5 service areas should only be used for frequency ranges 6 GHz and above. The propagation characteristics of these higher bands, which would inherently limit the distance their radio waves would travel, would more effectively prevent interference with adjacent service areas, maximizing use of spectrum to Canadians in all service areas.

10. In addition to the specific input the Department has requested on design considerations for creating a new set of service areas for spectrum licensing, ISED should consider all the various policy implications that smaller Tier 5 service areas could have on the communication services offered to Canadian consumers and businesses.

Geographic contiguity of spectrum

11. The Department states that licensing of smaller service areas may facilitate additional access to spectrum for rural service providers to support current and emerging use cases and the adoption of new and emerging technologies, such as 5G and IoT.¹¹ While such licensing may assist small, rural service providers to access additional spectrum, it is critical the Department also recognize the importance of geographic contiguity of spectrum for national facilities-based networks for current and advanced communication services. This is especially true for national IoT networks and along transportation corridors, including land and water, for autonomous vehicles in a 5G world and beyond.
12. For instance, the Department highlights that, “a resource extraction company working in a specific area could benefit from having access to spectrum on a smaller scale.”¹² However, even with a smaller Tier 5 service area, coverage that is intended to primarily cover a resource extraction site seems best suited to be provided by a commercial mobile provider using a 5G network slice to create a virtual private network where coverage already exists or can be easily extended. Alternatively, a commercially-negotiated subordinate licence covering the site (on a grid cell level) can be made available to a company where coverage does not exist or that intends to operate its own private network. To grant a licence to an entire Tier 5 area risks potential interference in adjacent service areas that could disrupt coverage along highways or major routes. In addition, the Department has made

¹¹ ISED, *Consultation*, para 12.

¹² ISED, *Consultation*, para 14.

large amounts of unlicensed spectrum available vis-à-vis the amount available for commercial mobile networks, which could be deployed in such scenarios.

13. Any future licensing of spectrum on a potential Tier 5 basis should not sacrifice Canadians' ability to connect to robust, nation-wide or other wide-area networks.

Interference coordination tools

14. Interference between incompatible technologies is one issue with which operators must contend, a challenge that will increase with the introduction of smaller service areas. This is especially true in low and mid-band spectrum, where radio waves can propagate over significant distances even without favourable conditions. Rogers has had first hand experience dealing with interference issues even within the current Tier 4 licensing of the 3500 MHz Fixed Wireless Access band, as shared in our comments for the 3500 MHz Consultation.¹³ Signals at 3500 MHz can propagate over long distances even without atmospheric issues and we have seen numerous cases of interference at distances over 40 km, some as much as 80 km. The vast majority of our interference experience has been base-station-to-base-station but we have also seen issues of interference into customer premises equipment (CPE).
15. Rogers agrees with the Department's view the design of the areas should not be limited to accommodating higher frequencies only even though interference and coordination issues may be more significant in low and mid-band frequencies.¹⁴ However, we also strongly support the Department taking a cautious approach to the belief that advancements in technology and network design such as Multiple Input, Multiple Output (MIMO) networks and Time Division Duplex (TDD) technology will further the ability of service providers to coordinate in smaller service areas.¹⁵
16. As an example, even though both TD-LTE and WiMax (in its various versions) are both TDD technologies and use orthogonal frequency-division multiple access (OFDMA) waveforms, they are not compatible due to different radio frequency (RF) channel bandwidths or frame structures. As such, they cannot be fully synchronized; although careful attention to sub-carriers and timing offsets can help. However, the Department's current Spectrum Management System (SMS) database does not currently allow operators to upload this data, so operators may not know in advance if they will run into issues when expanding their network coverage or deploying new technologies.

¹³ Rogers Comments, *Spectrum for 3500 MHz Consultation*, para 85.

¹⁴ ISED, *Consultation*, para 32.

¹⁵ ISED, *Consultation*, para 18.

17. In addition, the data that is supposed to be available in the SMS database is currently unreliable for coordination and interference management, with many operator uploads not working correctly. In our experience, many small-scale operators in licensed and lightly licensed bands and operating non-standard legacy equipment— which can increase the coordination challenges – are not uploading data at all, even though it is a condition of licence. Further, all these challenges are compounded by the current instability of the SMS platform, especially when making requests for or uploading larger amounts of data.
18. Going forward, these challenges with using the SMS database to coordinate between operators will only be increased through the exponential increase in potential licensees and spectrum licences through the creation of Tier 5 service areas, massively increasing the amount of data in the SMS database. While we are appreciative of the Department’s efforts to rectify these ongoing issues with the SMS database, we recommend the Department provide clear guidance on its strategy and timing to improve the system stability, enhance the information available, and ensure compliance with the requirement to upload technical data from all operators.
19. Further, while Rogers recommends limiting the use of Tier 5 service areas to bands above 6 GHz, at least, until coordination tools and technology makes interference management technically and economically feasible in low or mid-bands, the Department should consider establishing mechanisms to encourage constraining radiated energy within the specified small service area. These mechanisms, such as, but not limited to, antenna downtilt, would help minimize the potential for interference in adjacent service areas in any frequency band.

Conditions of Licence

20. Although it should go without saying, any operator issued an exclusive spectrum licence in a Tier 5 service area should be in full compliance with all the Conditions of Licence in the band. This should include all radio station installation requirements, technical considerations, and international and domestic coordination, lawful interception, deployment requirements, and mandatory antenna tower and site sharing. The potential for many new, small facilities-based carriers significantly increases the risk of potential interference to established networks and all operators – no matter how small – should be operating in full compliance with all technical standards and regulations.

Potential for Mobile Network Code exhaustion

21. The potential for the creation of Tier 5 service areas to enable a number of new facilities-based mobile providers raises the possibility of exhaust of Mobile Network

Codes (MNC). The demand on MNCs will depend on the final number of service areas and mobile providers. In any event, the Department should correspond with the CRTC Interconnection Steering Committee and Canadian Steering Committee on Numbering to assess and prepare for any demand surge on MNCs and other numbering resources.

No unauthorized resale or excessive roaming

22. The Department should also be aware that Tier 5 service areas would provide unscrupulous actors with a newfound opportunity to engage in unauthorized resale. A service provider could construct a minimal mobile wireless network in a remote part of the country using a very low cost Tier 5 licence. They could then rely on mandated domestic roaming to provide service to customers throughout the rest of Canada. The vast majority of the service provider's subscribers would live far outside of its small, Tier 5 service area. Because it would rely on low-cost mandated roaming to serve its customers, the service provider would be effectively reselling its roaming partners' networks. This would effectively create a backdoor, mandated Mobile Virtual Network Operator (MVNO) regime despite the fact that both the CRTC and ISED explicitly have decided not to mandate MVNOs in order to preserve innovation and encourage network investment and ISED's mandatory roaming policy expressly precludes the use of roaming for resale.

23. We note that the CRTC has put together a list of excessive roaming criteria:¹⁶

The Commission may use some or all of the following indicators to help it determine whether the wholesale roaming customer has misused or allowed its MVNO to misuse the service, depending on the particular facts of the case:

- it has deliberately issued phone numbers from exchanges outside its home network footprint to its end-users;
- it has sold or marketed its services outside its home network footprint;
- it has sold or marketed its services in a manner that would result in its end-users gaining permanent access to the incumbent's network;
- it has provided its end-users with a device that has for its sole or predominant purpose permitting them to gain permanent access to the incumbent's network; and
- it has otherwise failed to take commercially reasonable steps to limit roaming on the incumbent's network by its end-users to incidental levels that are within the scope of the service. In considering this factor, the Commission may take into account evidence of broad traffic patterns

¹⁶ CRTC, *Wholesale mobile wireless roaming service tariffs – Final terms and conditions*, para 78; available from: <https://crtc.gc.ca/eng/archive/2017/2017-56.htm>.

and network use trends concerning a significant proportion of wholesale roaming customer or MVNO end-users.

24. The Department should make it explicit in its policy for new service areas for spectrum licensing that any licensee, including Tier 5-only licensees, must abide by all applicable roaming regulations from ISED and the CRTC, including, but not limited to, restrictions against unauthorized resale and excessive roaming.

No mandatory subordination

25. The Department should reject any proposals to force subordination agreements on exclusive spectrum licence holders. Licensees have acquired exclusive usage spectrum licences at significant and ongoing costs, having spent more than \$16.5B on spectrum at auction and in annual fees since 2001 alone.¹⁷ In addition to these high absolute costs, a recent report identified Canada as having the highest spectrum spend per person in the world over the last decade.¹⁸ Canadian facilities-based operators continue to expend considerable resources in network planning and deployments wherever it is economically feasible and market-demand exists. Further, any mandatory process could result in challenges to the Department's current policy of setting deployment targets for spectrum licences. If a spectrum licence was involuntarily sub-divided, it could result in interference and serve as an impediment to the future deployment plans of the primary licence holder, including other spectrum sharing arrangements. This would still be the case even if the requested Tier 5 sub-division were non-contiguous with other areas already being served by the primary licensee.
26. There is also no evidence for the need for mandatory subordination. As the Department is well aware, Rogers has received many requests over the years and has agreed to provide spectrum in almost every case. Rogers has entered voluntarily into multiple agreements subordinating spectrum to small regional and community-based carriers serving rural and remote areas, including community-based carriers serving remote Indigenous communities. These agreements have resulted in the provision of wireless services using Rogers' licensed spectrum in communities that could not otherwise have been economically served. In addition, Rogers has commercially negotiated subordinate licences for resource extraction sites. As long as Rogers is not using, or plans to use the spectrum, we make it available. This has helped foster network deployment in rural and remote parts of the country.

¹⁷ ISED, *Spectrum Auctions*; http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/h_sf01714.html. Note: \$16B is nominal and does not account for inflation. Spectrum fees calculated based on industry holdings.

¹⁸ GSMA, *Effective Spectrum Pricing: Supporting better quality and more affordable mobile services*; <https://www.gsma.com/spectrum/effective-spectrum-pricing/>.

27. Rogers remains open to entering into similar arrangements with our spectrum licences to extend coverage further. However, subordination and other spectrum sharing agreements should continue to be negotiated on a voluntary basis to ensure that the primary licensees' deployed wireless networks and future deployment plans are not negatively impacted to the detriment of current and future wireless subscribers. The Department appears to share this view, as stated in the recent AWS-1 licence renewal consultation that "commercial arrangements with third parties for the use of the spectrum can be an effective way for licensees to increase deployment in their licence area."¹⁹
28. In summary, the Department must ensure that the spectrum and licensing policies it adopts will provide fair and reasonable access to operators of all sizes and that efforts to potentially increase access to spectrum for small, rural and remote operators does not unduly burden national and large regional networks that already provide coverage to 99% of Canadians. The Department should adopt a modified Option 2 approach, as proposed by Rogers. This will improve management complexity by creating a rational number of service areas, promote coverage into sparsely populated areas and reduce the risk of interference between service areas while still achieving all of the Department's policy objectives for smaller Tier 5 service areas. The Department should continue to consult on the appropriate service area for particular licences but should not use Tier 5 service areas for frequencies below 6 GHz until coordination tools and technology are technically and economically capable of managing potential interference.
29. The remainder of Rogers' comments will respond to the specific issues raised in the Consultation.

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

30. Rogers is generally supportive of the Department's proposed design principles; however, additional design principles are required to ensure that the creation of Tier 5 service areas properly addresses technical considerations and reflects good spectrum management.²⁰ We propose several design principles below in response to Q1B that will enhance the Department's efforts to create smaller service areas

¹⁹ ISED, *Spectrum Licence Renewal Process for Advanced Wireless Services (AWS-1) and Other Spectrum in the 2 GHz Range*, para 29.

²⁰ ISED, *Consultation*, para 27.

while reducing the interference risks that are inherent in increasing the number of service area boundaries and potential number of network operators.

Recognize geographic differences: consider the unique characteristics of urban and rural areas in Canada.

31. Rogers recognizes the unique geographic differences between areas across Canada and agrees that consideration be given to these differences. As we discuss further below, this consideration for differences should include physical and human geography in both urban and rural areas.
32. However, the Department should also recognize the importance of exclusive licensing for access to interference-free spectrum and the use of auctions where the demand for spectrum is expected to exceed the available supply when considering potential alternative licensing approaches for different areas.²¹ In addition, geographic contiguity for national networks will be critical to support emerging services such as next generation IoT networks and coverage along transportation corridors, services that will be increasingly important in a 5G world and beyond. The use of Tier 5 for spectrum allocations may make it difficult to introduce 5G corridors along highways or major routes.

Foster demand: areas should have either a population base or some economic value to support commercial viability.

33. Rogers agrees that service areas should have a minimum population base to support a viable business case. Without some economic value to support commercial viability, any new, limited network deployments will be unsustainable. This would increase the risk of all the negative impacts of smaller service areas to larger regional and national networks with none of the potential benefits.
34. For clarity, service areas should consist of population centres and all adjacent sparsely populated expanses, which will promote the extension of coverage into sparsely populated areas. An individual service area should never consist solely of sparsely populated areas.

Maintain technological and competitive neutrality: Not favouring or discriminating against one technology or group of stakeholders over another.

35. Rogers supports a technology neutral approach based on sound scientific and economic principles.

²¹ ISED, *Consultation*, para 29.

36. While the Consultation notes, “the design of the areas should not be limited to accommodating higher frequencies only” and “that technological advancements may help with coordination in low/mid-bands in the future”,²² it should be highlighted that such coordination advancements are not a given. In addition, legacy equipment operating in neighbouring service areas and close proximity may increase coordination challenges.
37. Recognizing and supporting the Department’s commitment to technology neutrality, in the case of Tier 5 service areas, the Department should consider encouraging a common duplexing scheme (Time Division Duplexing or Frequency Division Duplexing) to mitigate potential interference. In the case of Time Division Duplexing, the use of time synchronization should be encouraged.

Ensure boundaries are in low population areas to minimize potential interference issues.

38. Rogers agrees with the Department that that service area boundaries should be located in low population areas, which will help to mitigate cross-boundary interference issues. However, to the maximum extent possible, the Department should consider the impact of future population growth, especially where adjacent service areas may have suburban areas growing towards each other (i.e., sprawl). We expand on this further, below.

Ensure areas nest within the existing Tier 4 service areas to maintain continuity with ISED's existing licensing structure.

39. Rogers supports the concept of tier nesting to maintain continuity with the existing tier structure. As the Department states, nesting within existing service areas will enable service providers to aggregate and manage various tier areas.²³ This will be essential for national and larger regional network operators to continue to provide wide area network coverage.

Use the ISED's existing grid cells as constituent building blocks.

40. ISED is proposing to use groupings of grid cell areas as the basis for creating spectrum service areas for electronic storage and mapping purposes.²⁴ While we are in general support of this proposed design principle, the Department’s existing grid cells may not be granular enough to support smaller tier areas. We recommend a review of the grid system before proceeding, including consideration of a more granular concept than grid cells that can adapt to and evolve with Canadian

²² ISED, *Consultation*, para 32.

²³ ISED, *Consultation*, para 34.

²⁴ ISED, *Consultation*, para 35.

population distribution. Clearly defined boundaries, based on geographic markers rather than a large hexagonal grid, will simplify cross-boundary coordination between operators.

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

41. As stated above, Rogers is generally supportive of the design principles the Department has proposed. We also propose several additional design principles that should be incorporated into the Department's efforts to create a new set of service areas to help ensure co-existence between operators without harmful interference. These principles include:

- geographic separation between population centres;
- population centres that share a border;
- population expansion (i.e., sprawl) and contraction;
- considerations for bodies of water (coastal and inland); and,
- considerations for terrain.

42. We expand on these principles below, providing illustrative examples of the concepts. The Department should note that these examples are not necessarily specific recommendations for potential service area tier boundaries.

Geographic separation between population centres

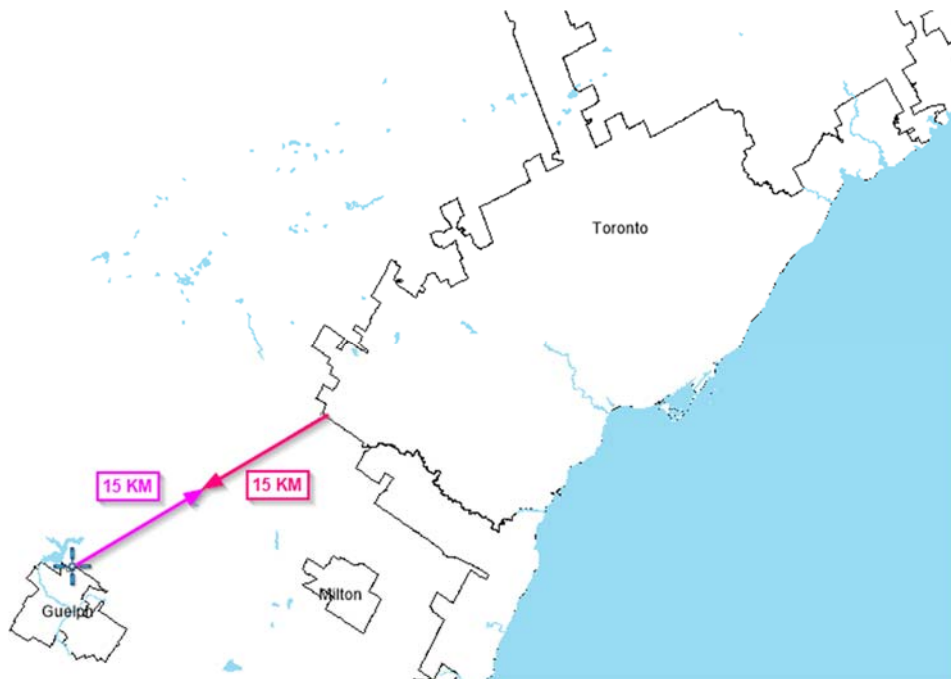
43. The Department should ensure that there is a minimum distance between population centres. Multiple population centres separated by short distances should be combined into common areas. This will mitigate potential interference over short distances. Rogers proposes that a minimum geographic separation between population centres should use a minimum of 30 km. While we continue to support a technologically neutral approach, based on current coordination and interference management techniques, we would also suggest that a minimum distance would only be feasible for frequencies greater than 6 GHz. Propagation characteristics of lower spectrum frequencies would result in such high levels of interference as to make coordination and coexistence unfeasible – both technically and economically.

44. Setting a minimum geographic separation between population centres of 30 km may reduce the possibility of interference between two emitters facing each other with a threshold of 15 km each. As noted above, Rogers has had first hand experience dealing with interference issues in the current Tier 4 3500 MHz band and has seen numerous cases of interference at distances over 40 km, some as much as 80 km.

The use of Tier 5 service areas for frequencies below 6 GHz spectrum, and potentially higher, would overwhelm any coordination efforts using tools that exist today or significantly impair and limit normal operation of existing networks.

45. Figure 1 below shows an example of the minimum separation principle between the cities of Toronto and Guelph in Ontario. Applying this design principle, Milton should be grouped with Toronto because the distance between the two population centres is too short.

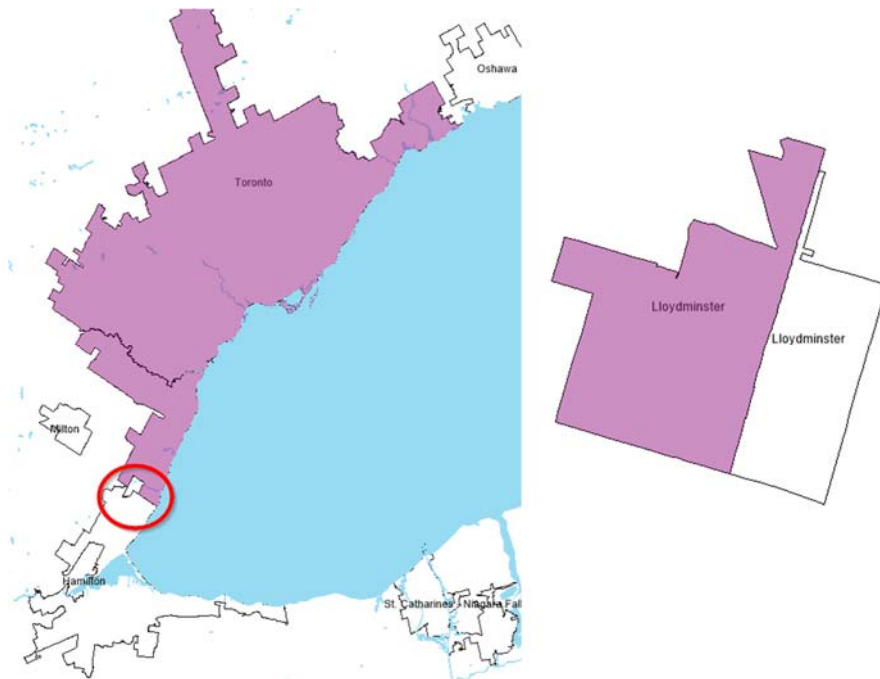
Figure 1: Geographic separation between population centres



Population centres that share a border

46. Wherever possible, adjacent population centres that share a geographic border should be amalgamated. This design principle will be most applicable in areas with major urban developments that have significant suburban growth, including different municipalities, between them. One such example, illustrated in Figure 2, are the adjacent population centres of Toronto and Hamilton in Ontario. Additionally, a single population centre that shares an existing border should be amalgamated. Lloydminster, Alberta and Lloydminster, Saskatchewan, also shown in Figure 2, is an example of this design case.

Figure 2: Population centres that share a border



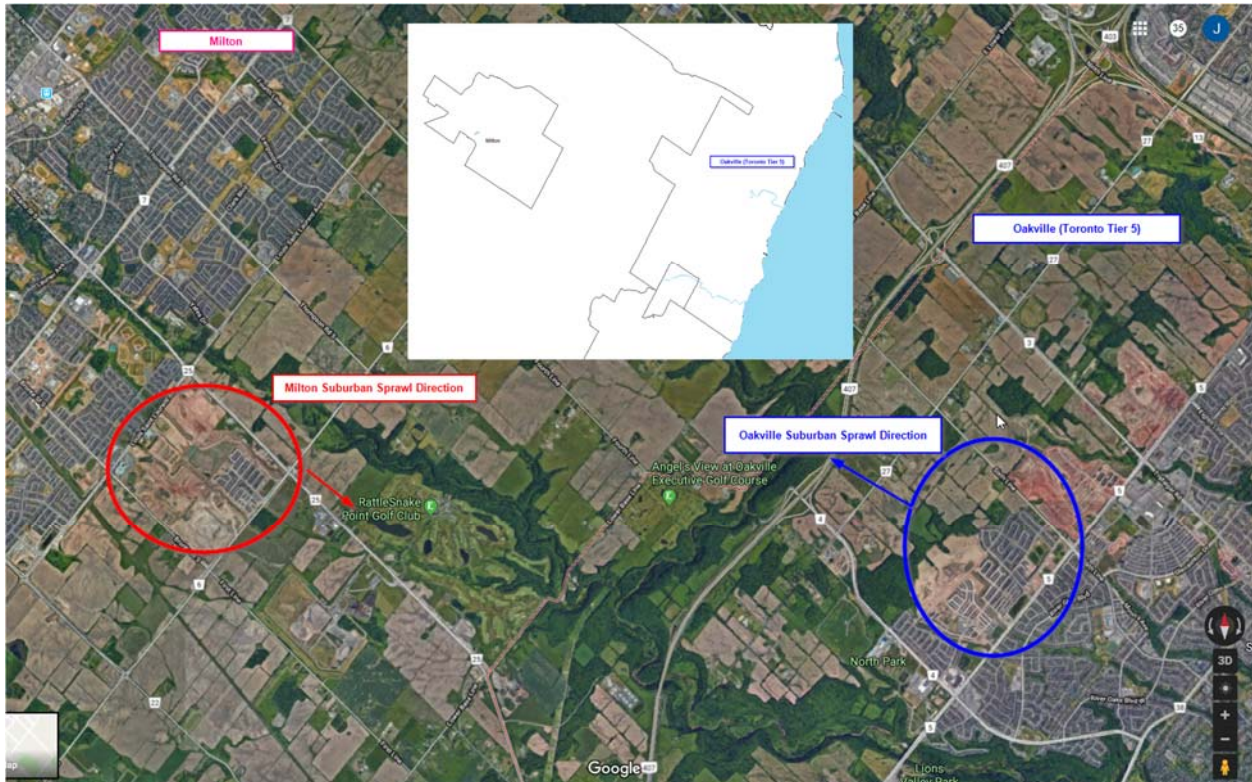
Population expansion (i.e., sprawl) and contraction

47. The Department's proposed design principles already include ensuring boundaries are in low population areas to minimize potential interference issues.²⁵ However, we recommend that the Department also consider, to the maximum extent possible, future development and population expansion (i.e., sprawl) when defining populated areas. Such considerations for the placement of service area boundaries will be especially important where neighbouring population centres' suburban areas may be growing towards each other. This will mitigate future interference issues.

48. An example of suburban sprawl is Milton (ISED Proposed Toronto Tier 5 Area) growing in a southeast direction towards Toronto, and Toronto growing in a northwest direction towards Milton.

²⁵ ISED, *Consultation*, para 36.

Figure 3: Population centres that share a border



49. The Department should also consider potential impacts to proposed service areas whose population base is limited to only small population centres that are contracting. Rural contraction may result in a Tier 5 service area that may no longer possess a population base that is of significant size to support a sustainable business case.

Considerations for bodies of water

50. Spectrum propagation characteristics can be impacted and magnified due to natural geography, which should be taken into account when placing tier boundaries. For instance, bodies of water are quite favourable to radio propagation, which can increase interference issues for service areas across the water. Areas that share a water border, including inland bodies of water and coastal areas, should be aggregated together into a single Tier 5, within reason.

51. As an example, as shown in Figure 4, Wasaga Beach and Collingwood are located on the same shore of Georgian Bay, Ontario, and should be placed in the same service area.

Figure 4: Considerations for bodies of water (inland)



52. Such a principle should also be applied in coast areas that share a water border, where potentially impacted population centres should be aggregated into a single Tier 5 service area, within reason. Figure 5 shows an example exploring the coast of British Columbia and the towns of Sechelt, and Gibsons.

Figure 5: Considerations for bodies of water (coastal areas)

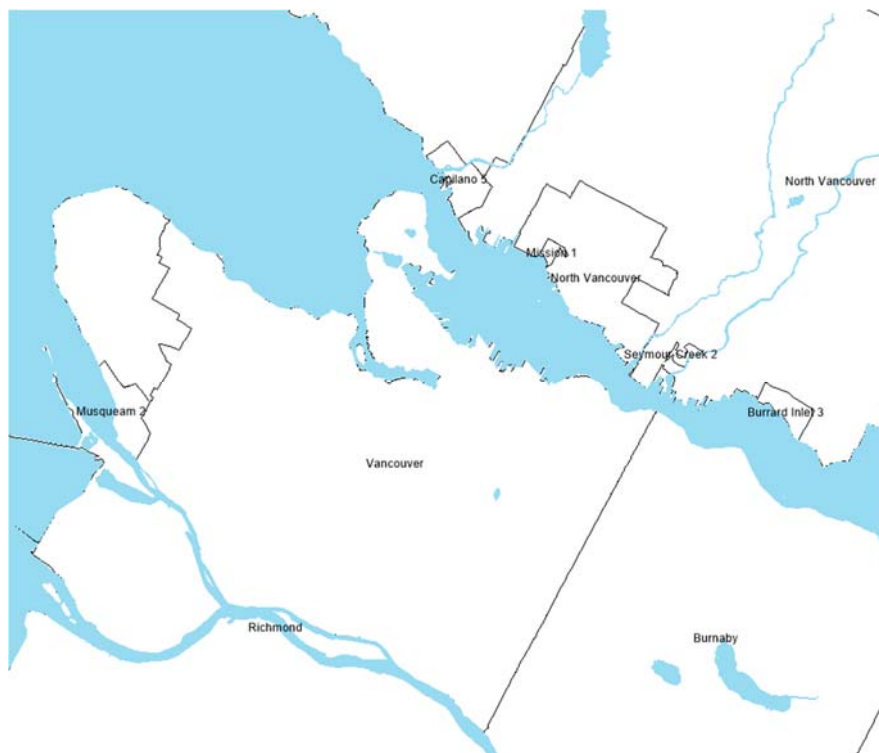


Considerations for terrain

53. In addition to bodies of water creating favourable radio propagation, spectrum propagation characteristics can be impacted and magnified due to elevation differences. Population centres with high or mountainous terrain should be taken into account when placing tier boundaries. Combining them into a common Tier 5 service area, within reason, will help mitigate the risk of interference under favourable propagation conditions.

54. As an example, as seen in Figure 6, the British Columbia municipalities of North Vancouver, West Vancouver, and Vancouver should all be grouped into a single Tier 5 service area.

Figure 6: Considerations for terrain



55. Another example of consideration for population centres with visibility to high terrain, as seen in Figure 7, would be the British Columbia municipalities of Kelowna, Peachland, and Summerland, which should be amalgamated into a single service area.

Figure 7: Considerations for terrain



56. In conjunction with the Department's proposed design principles, these additional design principles should reduce the risk of potential interference due physical geography or changes in population centres.

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

57. The Department should not select Option 1 as the basis for determining Tier 5 service areas. While the Department is proposing some potential adjustments and amalgamations, defining each of Statistics Canada's census subdivisions (CSD) as a unique service area could potentially create up to 5,162 Tier 5 service areas,²⁶ compared to 172 Tier 4 service areas – an increase of 2901%. Moving from 59 Tier 3 service areas to 172 Tier 4 service areas is an increase of 192%.

58. Such a high number of service areas would require a substantial amount of resources for both the Department and network operators – especially national and large regional operators – to administer and manage interference risks. As an example, if the Department's proposed 3500 MHz band (200 MHz in 10 MHz blocks)

²⁶ ISED, *Consultation*, para 39.

was licensed at the proposed Option 1 Tier 5, their could be potentially 103,240 licences for the 3500 MHz band alone.²⁷

59. Notwithstanding the design principles proposed by the Department, we note there are examples of potential service area boundaries running through population centres, which is a concern for interference mitigation. In addition, we note that the Department's existing grid system may not possess sufficiently granularity to accurately reflect the CSD boundaries.
60. Should the Department ultimately adopt Option 1 as the basis for determining Tier 5 service areas, the Rogers proposed principles should be incorporated to improve the design of Tier 5 service areas and reduce potential interference risks.

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

61. Should the Department elect to use CSDs as the starting point for creating Tier 5 service areas, we strongly recommend that adjacent urban CSDs be amalgamated. As the Consultation states, major urban centres may consist of multiple CSDs (e.g. Toronto).²⁸ The creation of a service area that contained only most or part of an urban centre would create the potential for substantial interference issues between these neighbouring service areas with no apparent benefit.
62. Amalgamating adjacent urban CSDs would respect the Department's guiding principle of placing service area boundaries in low population areas. Combining adjacent urban CSDs into a single service area also aligns with our proposed additional design principles.

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.

63. Rogers supports a minimum size for smaller service areas. As the Department states, "CSDs can be very small, with some being less than one square kilometre."²⁹

²⁷ For clarity, the Department should auction the 3500 MHz as Tier 4 at minimum, Tier 3 where possible, and increase the amount of spectrum available to a minimum of 300 MHz.

²⁸ ISED, *Consultation*, para 44.

²⁹ ISED, *Consultation*, para 45.

Within reason, very small CSDs should generally be amalgamated into the larger surrounding or adjacent CSDs. Specifically, densely populated CSDs should be amalgamated with all adjacent very small, lower populated CSDs. This will help mitigate the risk of interference between service areas.

64. Preventing very small CSDs from being their own service area would also lower the total number of Tier 5 service areas to administer for the Department and coordinate for network operators.

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

65. The use of CSDs as the basis of creating Tier 5 service areas increases the risk of creating small service areas in rural and northern communities, which may not be effective in achieving the Department's policy objectives. Rogers supports maximizing coverage in rural and northern areas, which may be constricted by small service areas.

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

66. As proposed, Option 2 will not suitably address all the potential interference risks meant to be mitigated by the Department's proposed design principles. We note that while Option 2 was developed to provide a clear delineation between highly populated urban areas and very rural areas, there are examples of area boundaries running through population centres. In addition, ISED's existing grid system may not be sufficiently granular to accurately reflect all population centres boundaries.
67. However, selecting Option 2 with Rogers' proposed additional design principles will improve the design and creation of Tier 5 service areas through reducing the interference risk that such small service areas can generate.

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.

68. Rogers supports the Department's proposed approach of removing the smallest population centres to reduce the overall number of service areas and to simplify management. However, the Department's proposal to increase the lower bound of the small population centres from 1,000 to 2,000 would still result in 563 small population centres, and a total of 651 Tier 5 service areas overall. Such a large number of relatively small service areas would create significant complexity for network operators to manage potential interference from adjacent systems. In addition, it would create significant administrative and regulatory burdens for the Department and national and large regional network operators to manage. We recommend the Department increase the lower bound of small population centres to 5,000.
69. Defining small population centres as those between 5,000 and 29,999 would reduce the number of small population centres to approximately 272. This would make the total number of Tier 5 services areas approximately 360 (30 large, 58 medium, and 272 small), which is more than double the current number of Tier 4 service areas. Such a number would meet the Department's policy objectives for smaller service areas while significantly reducing the interference and administration management complexity.
70. Rogers' proposal to create approximately 360 Tier 5 service areas would also be approximately 10 percent of the number of county-level licences in the U.S.,³⁰ which is in line with the total Canadian population being approximately 10% of the U.S. Due to similarities in markets, regulatory environments, and geography, the U.S. is the most relevant international comparison for Canada. Further, the FCC has selected the use of smaller service areas for the U.S. Citizen Broadband Radio Service band due to unique technical challenges of incumbent military and government users. These challenges do not exist in the equivalent Canadian 3.5GHz band, so adopting an unmodified U.S. solution to a non-existent Canadian issue would be a poor spectrum governance policy choice.
71. The other countries (United Kingdom, France, Sweden) referenced by the Department in Section 3.4 of the Consultation have much more densely populated counties as compared to rural Canada. All three combined have approximately 12% of the total area of Canada or, stated in another way, 143M people in an area slightly bigger than the province of Ontario (population 13.4M).³¹ It should also be noted that the United Kingdom and Sweden are currently consulting on use of smaller licensed areas mainly targeted to contained areas (such as buildings or stadiums) or specific frequency ranges dedicated to small area applications (such as industry

³⁰ ISED, *Consultation*, para 16.

³¹ Data from Statistics Canada and CIA World Factbook.

automation). The Department should be cautious in adopting policy choices which may make sense in relatively small, densely populated European countries but may not be relevant in the Canadian context.

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).

72. Generally speaking, Rogers supports the use of auctions to license mobile spectrum. As the Department indicates in the *Framework for Spectrum Auctions in Canada*, auction processes can be used as the spectrum assignment mechanism where the demand for spectrum is expected to exceed the available supply.³² Open auctions will ensure those companies that value the spectrum the most will be able to acquire it and put the spectrum to its highest use. It also makes certain that network operators pay the true market value of this scarce and valuable resource to the benefit of Canadian taxpayers. If spectrum remains unawarded through an open auction process, then alternative licensing could be explored.
73. The Department should take a very cautious approach when exploring any shared or opportunistic access. Opportunistic sharing technology is still years away from commercial deployment and has substantial technical, regulatory, and business challenges to overcome before it can become a reality. The Department should also recognize the large amount of spectrum already available for unlicensed use vis-à-vis the much smaller amount of licensed cellular mobile radio spectrum.
74. Further, the Department should amalgamate the “other” service areas with adjacent population centres, in whole or by dividing boundaries within the “other” area. This would create substantial benefits in the simplification of management by reducing the overall number of service areas, along with the reduction of potential interference and the maximizing coverage from population centres into adjacent sparsely populated areas.

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

75. Similar to our concerns above in the use of Option 1, the Department’s proposals for Option 2 risks creating small service areas in rural and northern communities, which

³² ISED, *Framework for Spectrum Auctions in Canada*, pg 1.

may not be effective in achieving the Department's policy objectives. Rogers supports maximizing coverage in northern or rural areas, which may be constricted by small service areas.

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

76. Rogers recommends that population centres with adjacent boundaries should be amalgamated to form a single service area. This would respect the Department's guiding principles of defining area boundaries in low population areas. It also aligns with our proposed design principles of a minimum geographic separation between population centres and considering, to the maximum extent possible, future development and population expansion (i.e., sprawl) when defining populated areas.

77. The creation of multiple service areas for population centres with adjacent boundaries, especially where their suburban areas are growing toward each other, risks creating the similar negative outcome as in Option 1. Effectively, it creates a service area that contains only part of a population centre, thus creating substantial interference issues within the population centre for no benefit.

Q4: 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.

78. Rogers generally supports Option 2 but recommends the Department adopt the following adjustments.

- i. Population centres with a common border should be amalgamated into one single service area. This will mitigate potential interference between population centres.
- ii. The definition of a small population centre will be 5,000 to 29,999. This will improve management complexity by creating a rational number of service areas while still achieving the Department's policy objectives for Tier 5 service areas.
- iii. "Other" areas should be amalgamated with adjacent population centres, in whole or by creating borders within the "other" area. This will promote coverage into sparsely populate areas and reduce the risk of interference.

- iv. Rogers proposed additional design principles should be adopted to help mitigate potential interference between service areas.

79. Rogers thanks the Department for the opportunity to share its views and participate in this consultation process.