



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

Submitted
February 19, 2019

Introduction

1. The Radio Advisory Board of Canada appreciates the opportunity to provide a response to this important consultation.

International Context

2. The Department noted that “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 GHz-3.6 GHz frequency band”.¹
3. The RABC adds that the US originally selected census tract size license areas for its Citizen Band Radio Service (CBRS) 3550-3700 MHz band in 2015. This led to over 200 experimental authorization grants (per FCC). Then, in October 2018, the US switched to county size license areas (3,141 counties total).
4. One of the considerations the FCC factored into their decision was military radar systems, especially in coastal areas with military ports and inland military test ranges. As such, the FCC split the CBRS band into a 3-tiered shared spectrum band:
 - Tier 1 – Military radar (ship-based and ground based):
 - 3550 – 3650 MHz
 - Tier 1 – Military radar (ground based):
 - 3650 – 3700 MHz
 - Tier 1 – Fixed Satellite Service – Receive Only:
 - 3600 – 3700 MHz
 - Tier 1 – Wireless ISP transitioning from incumbent to PAL/GAA after 5 years:
 - 3650 – 3700 MHz
 - Tier 2: Priority Access Licenses (PAL):
 - 3550 – 3650 MHz
 - Tier 3: General Authorized Access (GAA):
 - 3650 – 3700 MHz
5. It should be recognized that the Canadian spectrum environment in the 3.5 GHz band is different from that in the US.
6. The Department should take the Canadian spectrum environment into account when considering the implementation of small area licensing, such as the proposed Tier 5 service areas, for any low band, mid band, or millimetre wave spectrum. The Department must, in

¹ DGSO-002-18, paragraph 16

its consideration of Tier 5 service areas in any band, balance the increased cost of coordination against the potential for service level improvements.

7. The Department noted that “Furthermore, the United Kingdom and Sweden are both considering licensing spectrum on an even more localized basis, such as railway stations and soccer stadiums”.²
8. The RABC adds that in the UK, Ofcom has proposed to enable shared access in the 3.8 GHz – 4.2 GHz band, so that that this band could be used for private networks that automate processes in a range of industries and more broadly support IoT. Ofcom has also proposed to enable shared access in the 1800 MHz and 2300 MHz bands, so that these bands could be used by third parties seeking to extend mobile coverage in rural areas and in buildings, or for local private mobile networks. Ofcom maintains national licence sizes for 3.4 GHz – 3.8 GHz bands.
9. In Sweden, the PTS has proposed the use of specific licence areas in the 3.7 GHz – 3.8 GHz band, while reserving the 3.4 GHz – 3.7 GHz band for national mobile operators.
10. In the cases of Ofcom and of the PTS in Sweden, although they are consulting at this time on smaller service areas in frequency bands below 6 GHz, it should be noted it appears they are mainly targeting contained areas (such as within buildings and specific locations) or specific frequency ranges dedicated to small-area applications. The RABC encourages the Department to monitor these international proceedings to gather insights from such consultations to see how they may be applicable to the Canadian context.

Q1A Response

11. The RABC is in broad agreement with the design principles put forward by the Department in this consultation (paragraphs 22-27). We also recognize that geography is an important determining factor in the deployment of wireless services (paragraphs 28-29). The RABC agrees with the Department’s assessment that the creation of Tier 5 service areas may, via improved access to spectrum, support an improvement in service levels and coverage in rural and remote areas of Canada.
12. The RABC believes that Tier 5 service areas are technically feasible if they are appropriately implemented and managed. In our response to Question 1B below, we provide some further considerations that would contribute to the effective creation of Tier 5 service areas.

² *ibid*

13. The RABC also highlights that the Department, when developing a policy on a set of smaller service areas, must also take into account the importance of geographic contiguity of spectrum for emerging services. This will be especially true for examples like national Internet of Things coverage, for example and along transportation corridors for advanced vehicle autonomy and safety features.
14. The RABC is committed to providing technical guidance to assist the Department in maximizing the economic and social benefits of spectrum to Canadians whether urban, rural or remote.

Q 1B Responses

Q1B.1 Databases & Interference

15. The introduction of Tier 5 service areas will increase the potential for interference between different radio systems using different protocols. In mid-band spectrum, propagation distances extend to 40 km or more. The coexistence of multiple protocols such as TDD-LTE, WiMax, and other standards, will increase the likelihood of interference.
16. In order to take advantage of the technological benefits of the 5G standard, operators will use features, such as dynamic frame allocations, which further increase the complexity of frequency co-ordination. The LTE ecosystem enables the mitigation of interference through a number of mechanisms, including synchronization and MIMO. Currently, the most effective mechanism to reduce inter-system interference is synchronization.
17. While recognizing the Department's commitment to technology neutrality, in the case of Tier 5 service areas, the Department should encourage a common duplexing scheme (TDD or FDD) to mitigate potential interference. In the case of time division duplexing, the use of time synchronization should be encouraged.
18. The RABC requests that ISED ensure that a properly functioning database be in place to improve frequency co-ordination. The database should include fields such as TDD uplink/downlink ratio, and timing offset. ISED must have a mechanism to ensure that operators maintain up-to-date records in the database.
19. The RABC requests that ISED encourage the use of standards that permit synchronisation between different licensees' legacy systems and new systems.

Q1B.2 Boundary Definition

20. The RABC recommends that the Department consider additional design principles when developing a new set of smaller service areas. Spectrum propagation characteristics can be impacted and magnified due to natural geography, which should be considered when placing tier boundaries. For instance, areas that share a water border, including inland bodies of water and coastal areas, or areas with visibility to mountainous or high terrain should be aggregated together into a single Tier 5, within reason.
21. The Department's proposed design principles already include ensuring boundaries are in low population areas to minimize potential interference issues.³ However, the RABC recommends that the Department also consider, to the maximum extent possible, population expansion (i.e., sprawl). 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. The Department should also consider potential impacts to proposed service areas whose population base is limited to only small population centres that are contracting.
22. RABC understands that the Department is proposing to use the existing grid cell reference as the building block for implementing Tier 5 service areas, which would be nested within Tier 4 service areas. In the RABC's view, it may be worth considering borders that are not constrained to grid cell boundaries, in order to adapt to and evolve with Canadian population distribution.

Q1B.3 Allocation of Spectrum Using Tier 5 areas

23. In the allocation of spectrum using Tier 5 service areas, the RABC recommends that the Department consider the following points.
24. Since Tier 5 service areas would be small, frequency co-ordination will be simpler in higher frequency bands (such as in millimeter waves). In these bands, the coverage of stations would be inherently limited, and so would reduce interference with adjacent service areas. Although the RABC does not suggest limiting Tier 5 areas to millimeter wave bands only, it is important to highlight the challenge of using smaller service areas in lower frequency bands while maximizing spectrum use. Nonetheless, the RABC agrees that future technological advancements may support more efficient use of potential Tier 5 service areas in lower frequency ranges by mitigating potential interference.
25. If the Department is envisioning the use of Tier 5 service areas in frequency bands below 6 GHz, the Department should, at the very least, consider establishing mechanisms to

³ DGSO-002-18, paragraph 36

encourage constraining radiated energy to within the desired coverage area (such as, but not limited to, antenna downtilt) thereby minimizing the potential for interference.

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