

CANADA GAZETTE NOTICE NO. SLPB-002-20

**CONSULTATION ON THE TECHNICAL AND
POLICY FRAMEWORK FOR THE 3650-4200 MHZ BAND AND
CHANGES TO THE FREQUENCY ALLOCATION
OF THE 3500-3650 MHZ BAND**

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**REPLY COMMENTS
OF
BCE INC.**

30 NOVEMBER 2020

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1.0 **EXECUTIVE SUMMARY**

1. In accordance with the procedure set out by Innovation, Science and Economic Development Canada (the Department or ISED) in Notice No. SLPB-002-20, *Consultation on the Technical and Policy Framework for the 3650-4200 MHz Band and Changes to the Frequency Allocation of the 3500-3650 MHz Band* (the Consultation), issued in the *Canada Gazette*, Part 1 on 12 September 2020, we are providing BCE's Reply Comments.

5G equipment ecosystem and contiguous spectrum

2. The majority of commenters agreed that the equipment ecosystem under band class n78 (3300-3800 MHz) is currently at a more advanced stage of maturity than that of band class n77 (3300-4200 MHz), and that both band classes will be mature by the time 3800 MHz spectrum is available in Canada. Several noted that the recently launched Apple iPhone 12 and several other devices support band n77,¹ and Telus predicted that a robust radio and device ecosystem would develop within the next two years.² Operators similarly agreed that because n78 is a subset of the n77 band class, radios using spectrum below 3800 MHz will be capable of operating using spectrum from either band class.

3. 5G technology is designed to be optimized through the use of large contiguous blocks. While the most often cited benefits of larger channel sizes are greater peak speeds and spectral efficiency, the positive impact to latency and reliability is also significant. To support ultra-reliable transmissions, a large block of spectrum is required to account for the greater amounts of retransmission required to maintain the ultra-reliable quality of service. Facilities-based mobile carriers and equipment vendors acknowledged the utility of non-contiguous carrier aggregation, but stressed that it is not an adequate replacement for large blocks of contiguous spectrum, and that contiguity between the 3500 MHz spectrum band and 3800 MHz spectrum band is essential to allow the mobile industry to maximize the benefits of 5G technology.³ These benefits cannot be achieved to the same extent without access to contiguous spectrum.

¹ Ecotel Comments, paragraph 47; Iristel Comments, paragraph 10; Rogers Comments, paragraph 74; and Telus Comments, paragraph 22.

² Telus Comments, paragraph 22.

³ BCBA Comments, paragraph 20; Ericsson Comments, page 9; Huawei Comments, page 4; QMI Comments, paragraph 11; RABC Comments, paragraph 8; Rogers Comments, paragraphs 78 and 79; SaskTel Comments, paragraph 42; Shaw Comments, paragraph 81, and Xplornet Comments, paragraph 31.

Wireless Broadband Service and the 3650-3700 MHz spectrum band

4. The majority of commenters rejected the proposal to move Wireless Broadband Service (WBS) to 3900-3980 MHz (Option 2). Our recommendation that the Department move WBS to 3400-3450 MHz frequency range would best balance the need for large blocks of contiguous spectrum with the WBS users' concerns that band migration will impact their service continuity and financial viability.

5. In considering the proposed Option 2, the main concern raised by Wireless Internet Service Providers (WISPs) and other WBS users was the inability to support the 3900-3980 MHz frequency range using current equipment, and the lack of a developed equipment ecosystem. By contrast, most existing WBS equipment should be able to operate in the 3400-3450 MHz frequency range, thereby saving existing WBS operators the expense of replacing their entire network.

6. In addition, migration to the 3400-3450 MHz frequency range would resolve concerns from WBS users and potential flexible use operators alike about the length of the transition period. If the WBS band moves to 3400-3450 MHz, an accelerated transition would be possible for existing licensees, since many WBS users would only need to re-tune to a lower frequency after receiving their new assignment. Where equipment replacement is required, there is already a robust equipment ecosystem that operators could invest in immediately. In fact, WBS users CanWISP, BCBA and Telus all advocated for the interim or supplemental use of the 3400-3450 MHz frequencies for this reason.⁴ The BCBA commented, "WBS licensees can transition to the 3400-3450 MHz band within a reasonable timeframe, since most equipment available today is tuneable to this range."⁵

Satellite-dependent areas

7. We support maintaining the primary allocation of fixed satellite services (FSS) in the entire 3700-4200 MHz spectrum band in satellite-dependent areas. The C-band plays an important role in providing connectivity and critical services to the North and it is important to protect this C-band connectivity in the North until suitable alternatives are available.

⁴ BCBA Comments, paragraph 4; CanWISP Comments, page 17; and Telus Comments, paragraph 78.

⁵ BCBA Comments, paragraph 4.

8. There is no consensus on the definition of satellite-dependent areas. In defining satellite-dependent areas, the Department should consider the protection of satellite served communities from interference from flexible use, facilitating flexible use deployment in all population centres not dependent on satellite connectivity, reducing the number of border areas to minimize the need for interference mitigation and to reduce the administrative burden on licensees. Rogers' proposal for the definition of satellite-dependent areas is designed to refine the Department's proposal by removing areas covered by terrestrial mobile services or that have major population centres. Thus, Rogers' proposal correctly attempts to protect satellite served communities, facilitate flexible use deployment and reduce the number of border areas.

9. However, while we agree with Rogers that the Department should be able to make effective coverage area estimates based on the data for all terrestrial operators, we do not agree with using the SMS database for this purpose.⁶ While the SMS database could be the starting point of this analysis, the Department should engage all terrestrial operators to estimate the coverage area based on the three-year plans of terrestrial operators in addition to their existing coverage. Furthermore, the Department should review the coverage periodically, for example after five years, and re-estimate the geographic areas considering that terrestrial operators' coverage will expand with time. The periodic reviews could also be used to re-assess the overall need for satellite connectivity in satellite-dependent areas and the future treatment of 3700-4000 MHz spectrum in those areas.

Telesat proposal

10. Commenters such as CanWISP, Rogers and SaskTel recommend that the Department not adopt Telesat's proposal, as it is not in the best interests of Canadians.⁷ We disagree. The Telesat proposal provides more mid-band spectrum for 5G services than the Department's proposal and does so on an accelerated basis. This will result in the faster and more efficient deployment of 5G services, which in turn will benefit rural connectivity and competition in Canada's wireless market. Thus, Telesat's proposal would meet the Department's policy objectives and maximize benefits to Canadians.

11. Telus is also of the view that the Telsat proposal will make more mid-band spectrum available sooner.⁸ Telesat is proposing to make additional spectrum available for flexible use

⁶ Rogers Comments, paragraph 172.

⁷ CanWISP Comments, page 28; Rogers Comments, paragraph 272; and SaskTel Comments, paragraph 26.

⁸ Telus Comments, paragraph 212.

following the same timeline as 3500 MHz. As a result, in areas with large urban population centres, the spectrum will be available in the first part of 2022, and in areas where the largest population centre is greater than 30,000 people, spectrum will be available in the second part of 2023. This implies that for the vast majority of the Canadian population, operators will have access to 3800 MHz spectrum prior to the Department's proposed clearing date of 5 December 2023.

12. Telus also notes that the Telesat proposal clearly takes into consideration rural and remote connectivity as part of their proposed transition plan.⁹ Telesat's proposal would protect existing rural and remote connectivity through the deployment of Low Earth Orbit (LEO) satellites and the payment of costs related to the transition process. Deploying a substitute for C-band spectrum and covering transition costs will allow existing users to continue to invest and provide service in rural and remote areas rather than spend capital covering relocation costs. This is in contrast to the Department's proposal that makes no comment regarding the compensation of reasonable transition costs for existing satellite operators, FSS users, and WBS systems.

Conditions of licence

13. If the Department adopts the Telesat proposal, we would support the use of the 3500 MHz flexible use conditions of licence (CoLs) for the flexible use licences in the 3800 MHz spectrum band with the exception that the LTE deployment requirement in the 3500 MHz CoLs should be omitted. The use of the 3500 MHz flexible use CoLs for the flexible use licences in the 3800 MHz spectrum band was also supported by a number of commenters.¹⁰ General alignment between the two sets of conditions will reduce complexity and promote a stable, predictable regulatory regime.

Spectrum Set-asides and/or spectrum caps

14. While several commenters supported the implementation of spectrum set-asides and/or spectrum caps in the event that the Telesat proposal is adopted,¹¹ there is an abundance of

⁹ Telus Comments, paragraph 212.

¹⁰ BCBA Comments, paragraph 71; Cogeco Comments, paragraph 100; QMI Comments, paragraph 105; Rogers Comments, paragraph 294; SaskTel Comments, paragraph 164; and Telus Comments, paragraph 226.

¹¹ BCBA Comments, paragraph 74; CanWISP Comments, paragraph 26; CCSA Comments, paragraph 30; Cogeco Comments, paragraph 77; PIA Comments, paragraphs 170 to 176; QMI Comments, paragraph 98; SaskTel Comments, paragraphs 174 to 175; Shaw Comments, paragraph 42; TekSavvy Comments, page 28; and Telus Comments, paragraphs 203 to 205.

compelling evidence that these measures distort the allocation process, and are not necessary in today's highly competitive wireless market. Further, use of such measures could significantly obstruct or delay the achievement of the full benefits of 5G technologies.

15. Previous Canadian auctions employing set-asides have proven that they distort the allocation process to the significant benefit of the set-aside spectrum recipients and the detriment of Canadian taxpayers. Set-aside licences enable the favoured bidders to asymmetrically raise costs for set-aside-ineligible bidders at little risk to themselves. The Canadian auctions for AWS-1, 700 MHz, AWS-3 and 600 MHz spectrum – all of which had spectrum set-asides – resulted in some of the highest prices paid for spectrum in the world.

16. Spectrum set-asides and spectrum caps also restrict the amount of spectrum available to service providers to the detriment of Canadians across the country. Access to large blocks of contiguous spectrum is necessary for the full benefits of 5G technologies to be realized. As Rogers observed, a set-aside will only increase fragmentation risks across the band, which will further inflate costs to deploy and jeopardize the ability of operators to acquire sufficient amounts of contiguous spectrum.¹²

Rogers' asymmetric spectrum cap proposal

17. The proposal by Rogers to apply an asymmetric spectrum cap targeting Bell and Telus is a blatant attempt to convince the Department to impose an unprecedented new rule that would allow Rogers to secure more spectrum than either of its two largest competitors. Rogers' submission fails to articulate why regulatory intervention is necessary. Moreover, Rogers does not need any assistance from the Department to acquire spectrum and remain competitive with other network operators.

18. Rogers fails to make a clear case for the need for regulatory intervention. Rogers does not explain how the network sharing agreement between Bell and Telus negatively impacts competition or the Canadian public. Nor does Rogers dispute that Bell and Telus actively compete against each other in retail and wholesale markets. The primary complaint seems to be that it is dissatisfied with its own business model and previous auction results. Rogers is simply seeking to use the Department's auction rules to secure a new competitive advantage for itself. If adopted,

¹² Rogers Comments, paragraph 29.

such a spectrum cap would result in significant asymmetry in 5G spectrum holdings between the three national providers, and would give Rogers a major unwarranted advantage on a MHz per subscriber basis.

19. Rogers does not need new regulatory rules that would allow it to gain any advantage, and it does not need help acquiring sufficient spectrum to serve its subscribers and deploy 5G. Rogers' proposal to impose an asymmetric spectrum cap should be rejected.

Recovery of transition costs

20. Covering the transition costs of displaced spectrum users from auction proceeds, as set out in the Telesat proposal, will allow existing users to continue to invest and provide service rather than spend scarce capital on relocation costs. This is in contrast to the Department's proposal which makes no comment regarding the compensation of transition costs for existing satellite operators, FSS users, and WBS systems. We recommend that transition costs for existing satellite operators, FSS users, and WBS systems (either under the Department's proposal or under Telesat's proposal), be covered by the proceeds received from the allocation of the 3800 MHz spectrum band and the 3650-3700 MHz spectrum band. These transition costs are a direct result of the government's initiative to allocate more mid-band spectrum for flexible use and would not be otherwise incurred. We note that a number of commenters called for the Department to provide funds to cover the WBS transition.¹³

21. If the Department does not adopt Telesat's proposal, then we recommend that it receive a portion of the auction proceeds to: 1) expeditiously complete the 3800 MHz band transition process, which is a critical step in making spectrum available for mobile 5G services; and 2) enable the deployment of their LEO satellite constellation, which will address essential public policy priorities related to the long-term availability of broadband and telecommunications services in Canada's remote areas, including the far North.

Flexible use should extend to 4100 MHz

22. We recommend that the Department adopt a flexible use licensing model for fixed and mobile services that extends to 4100 MHz rather than 4000 MHz. Given that band class n77 goes up to 4200 MHz and we expect an ecosystem that incorporates this band class to develop in the

¹³ CanWISP Comments, page 18; CCSA Comments, paragraph 19; Rogers Comments, paragraph 143; and Xplornet Attachment, paragraph 34.

near future, 5G equipment should become available that supports flexible use in the 4000-4100 MHz frequency range. Allocating 100 MHz of additional spectrum will support higher peak rates, higher average data rates, and the efficient use of the 3800 MHz spectrum band.

23. The transport industry considers the extension of flexible use up to 4100 MHz as a high risk. However, in Japan, flexible use services already operate up to 4100 MHz and KDDI, a large Japanese telecommunications carrier, uses the entire 4000-4100 MHz band for 5G.¹⁴ Additionally low and mid powered applications operate up to 4200 MHz using Ofcom's shared access licences in the U.K.¹⁵ Thus, it appears that flexible use operations in the 4000-4200 MHz frequency range are successfully coexisting with radionavigation services in the 4200-4400 MHz frequency range in some countries.

24. We urge the Department to explore extending flexible use up to 4100 MHz by directing the RABC in conjunction with the aviation industry to carry out a study. The additional 100 MHz of spectrum offers significant economic and societal benefits to Canadians and therefore the Department should take all measures possible to release this spectrum while ensuring the safety of aviation operations.

2.0 DEVELOPMENT OF THE 5G EQUIPMENT ECOSYSTEM

25. The majority of comments agreed that the equipment ecosystem under band class n78 (3300-3800 MHz) is currently at a more advanced stage of maturity than that of band class n77 (3300-4200 MHz), and that both band classes will be mature by the time 3800 MHz spectrum is made available in Canada. Several noted that the recently launched Apple iPhone 12 and several other devices support band n77,¹⁶ and Telus predicted that a robust radio and device ecosystem would develop within the next two years.¹⁷ Operators similarly agreed that because n78 is a subset of the n77 band class, radios using spectrum below 3800 MHz will be capable of operating using spectrum in both band classes.

26. Regarding the ability of base station radios to handle multiple technologies and band classes, commenters agreed that some existing radios are able to support LTE and 5G at the

¹⁴ See https://www.soumu.go.jp/menu_new/s/s-new/s/01kiban14_02000378.html.

¹⁵ See <https://www.ofcom.org.uk/manage-your-licence/radiocommunication-licences/shared-access>.

¹⁶ Ecotel Comments, paragraph 47; Iristel Comments, paragraph 10; Rogers Comments, paragraph 74; and Telus Comments, paragraph 22.

¹⁷ Telus Comments, paragraph 22.

same time over separate channels (known as concurrent mode), but that the ability to operate both LTE and 5G using dynamic spectrum sharing is still in development.¹⁸

Access to contiguous spectrum continues to be necessary

27. Facilities-based mobile carriers and equipment vendors acknowledged the utility of non-contiguous carrier aggregation, but stressed that it is not an adequate replacement for large blocks of contiguous spectrum, and that contiguity between the 3500 MHz spectrum band and 3800 MHz spectrum band is necessary to allow the mobile industry to maximize the benefits of 5G technology.¹⁹ There are a number of technical and operational advantages to contiguous spectrum that cannot be replicated using carrier aggregation. As the RABC explained:

Contiguous blocks enable networks to realize the full potential of 5G, with wider contiguous channels providing lower latency and lower control signaling overhead compared to aggregating multiple carriers through carrier aggregation. Wider contiguous channels also enable maximum possible transmission bandwidth configuration, and thus provide better spectral utilization, with more physical resource blocks (PRB) and less guard band.²⁰

28. There are trade-offs and limitations to the use of carrier aggregation, including increased complexity, higher power consumption, and additional cost for end-user devices. Telus noted that in practice this limits the number of carriers that can be aggregated on a device, particularly for battery-powered consumer devices like smartphones.²¹ As Rogers observed, the increased cost and complexity required for terminal devices will ultimately result "in higher costs for Canadian consumers and businesses."²²

29. A few commenters, mainly WISPs, argued that moving the WBS band is of minimal importance because contiguity between the two bands would only benefit the single operator who acquires the upper end of the 3500 MHz band and the lower end of the 3800 MHz band.²³ However, this is not the case. Having separate 3500 MHz and 3800 MHz spectrum auctions will

¹⁸ CanWISP Comments, page 12; Huawei Comments, page 3; Iristel Comments, paragraph 11; QMI Comments, paragraph 10; Redline Comments, page 9; Rogers Comments, paragraph 76; SaskTel Comments, paragraph 40; Shaw Comments, paragraph 80; and TekSavvy Comments, page 6.

¹⁹ BCBA Comments, paragraph 20; Ericsson Comments, page 9; Huawei Comments, page 4; QMI Comments, paragraph 11; RABC Comments, paragraph 8; Rogers Comments, paragraphs 78 to 79; SaskTel Comments, paragraph 42; Shaw Comments, paragraph 81, and Xplornet Comments, paragraph 31.

²⁰ RABC Comments, paragraph 8.

²¹ Telus Comments, paragraph 27.

²² Rogers Comments, paragraph 78.

²³ Iristel Comments, paragraph 45; Cogeco Comments, paragraph 36; Shaw Comments, paragraph 81, and TekSavvy Comments, paragraph 18.

result in spectrum licensees having fragmented spectrum holdings and a 50 MHz (or more) gap will only make the problem worse. If a spectrum licensee has both 3500 MHz and 3800 MHz spectrum, then creating a single spectrum block without a 50 MHz (or more) gap would help ensure that the difference between their spectrum holdings will be small enough to be supported by the equipment ecosystem. The 3650-3700 MHz spectrum band must be cleared for flexible use in order to achieve contiguity between the 3500 MHz and 3800 MHz spectrum bands.

30. To mitigate spectrum fragmentation, Rogers' presented three assignment proposals regarding spectrum in the 3300-4200 MHz spectrum bands. The first is based on a temporary assignment of 3500 MHz spectrum, the second assigns frequencies based on a licensee's combined spectrum holdings and the third assigns 3800 MHz spectrum in the same order as the 3500 MHz assignment.²⁴ These assignment proposals are outside the scope of this consultation, but in general, we do not support any proposal that automatically assigns specific frequencies to spectrum licensees. Winning bidders need the opportunity to express their preference for particular frequencies. In addition, the development of an assignment mechanism must account for the final placement of WBS users, which will only occur after the Department releases its decision with respect to the Consultation.

31. In addition, as we and others observed in our comments, limitations to the instantaneous bandwidth (IBW) and operating bandwidth (OBW) will prevent the use of a single radio to cover the entire 3300-4200 MHz range.²⁵ Using multiple radios significantly increases costs and operational complexity for operators. As a result, we agree with Rogers that "even if completely contiguous bandwidths for flexible use licensees across the 3500 MHz and 3800 MHz bands are not ultimately achievable, having all 3300-4200 MHz holdings in two contiguous blocks close to each other will enable more efficient and cost-effective deployments."²⁶

32. Even if no coordination between auction assignment stages is undertaken, a contiguous band still provides the greatest opportunity for operators to acquire large contiguous blocks or blocks with a small frequency separation. In addition, as we discuss further in Section 5, moving the WBS band is necessary to reduce coordination issues between WBS users and flexible use operators.

²⁴ Rogers Comments, pages 15 and 16.

²⁵ See also QMI Comments, paragraphs 12 and 13; Rogers Comments, paragraph 81; Shaw Comments, paragraph 80; and Telus Comments, paragraph 28.

²⁶ Rogers Comments, paragraph 20.

Technical rules for the 3800 MHz band

33. We recommend that the Department align with the EU's technical rules on the lower portion of the band up to 3700 MHz and align with the U.S. ecosystem from 3700-4000 MHz (or 4100 MHz in the case of the Telesat proposal). This position was supported by a majority of the respondents including the RABC.²⁷ This would eliminate the need for the development of a Canadian specific ecosystem, and would leverage the available economies of scale to the maximum extent possible.

34. We are in agreement with the RABC, Telus, Ericsson, and Huawei²⁸ in calling for a single Radio Standards Specification (RSS) document for flexible use in the 3500 MHz and 3800 MHz spectrum bands that harmonizes the technical requirements between the n77 and n78 band classes. Given that the n77 band class covers the entire 3300-4200 MHz frequency range, we expect Canadian operators will migrate from the n78 ecosystem to the n77 ecosystem following the 3800 MHz spectrum auction. To ensure that this migration is successful, and to future-proof operators' investment in both the 3500 MHz and 3800 MHz spectrum bands, it is imperative that the Department ensures harmonization between the technical requirements of these two bands. Such harmonization must remove any future risk of backward compatibility and performance issues.

35. In addition, the Department's certification process must allow for future support of 3800 MHz in 5G devices (including user equipment and customer premise equipment) for network equipment to be made available prior to the 3800 MHz spectrum auction. This will allow for a more efficient deployment of equipment and ensure that base station devices do not need to be replaced to access 3800 MHz spectrum when it is deployed in the network or are delayed in being brought into service due to a slow certification process.

²⁷ Department of National Defence Comments, page 3; Ericsson Comments, page 10; Eutelsat Annex 1, page 1; Federated Wireless Comments, page 4; Huawei Comments, page 4; Mobilexchange Comments, page 11; PIA Comments, paragraph 18; Qualcomm Comments, page 1; RABC Comments, paragraph 11; Redline Comments, page 12; Rogers Comments, paragraph 87; SaskTel Comments, paragraph 45; Shaw Comments, paragraph 84; Telus Comments, paragraph 33; Toronto Police Service Comments, page 15; and Xplornet Comments Attachment, paragraph 4.

²⁸ Ericsson Comments, page 8; Huawei Comments, page 4; RABC Comments, paragraph 12; and Telus Comments, paragraph 34.

3500 MHz and 3800 MHz EIRP limit issue

36. We would like to raise a specific equipment certification issue that we have identified with the technical rules set out in RSS-192 for flexible use equipment in 3450-3650 MHz frequency range. The present device effective isotropic radiated power (EIRP) power limit (+23dBm/10 MHz) only allows the Department to certify Power Class 3 (PC3) devices in Canada, and would in essence prevent the certification of a higher power class, PC2 operating at a +26dBm limit. As explained below, this restriction would inappropriately prevent equipment vendors from obtaining Canadian certification for equipment that is already certified in the U.S.

37. This power limit is lower than the FCC limits for the 3.7 GHz band (3.7 to 3.98 GHz),²⁹ and from the newly proposed power limits for 3.45 to 3.55 GHz band.³⁰ By defining a 1 watt (+30 dBm) EIRP limit, the FCC is allowing user equipment (UE) up to PC1.5 (+29 dBm) to be certified in the 3.45-3.55 GHz and 3.7-3.98 GHz spectrum bands. Although PC1.5 is currently only identified for band class n41, by adopting a 1 watt EIRP as the maximum power limit, the FCC has future proofed its specifications against 3GPP higher power class (i.e., PC1.5) for bands n77 and n78.

38. In Europe, the Electronic Communications Committee (ECC) is presently developing a new standard that includes PC2 (+26 dBm) for band classes n77 and n78.³¹ Table 1 provides a summary of the power limit regulations between ISED, the FCC and the ECC.

²⁹ See <https://www.federalregister.gov/documents/2020/04/23/2020-05164/expanding-flexible-use-of-the-37-to-42-ghz-band#p-370>.

³⁰ See <https://www.federalregister.gov/documents/2020/10/21/2020-22529/facilitating-shared-use-in-the-3100-3550-mhz-band#p-54>.

³¹ See https://portal.etsi.org/w ebapp/WorkProgram/Report_WorkItem.asp?WKI_ID=54786.

Table 1: Power Limit Regulations

UE's TX power limit regulation						
Nation	Rule Part(s)	Frequency	UE's TX power limit	Expected UE power class	Expected UE 3GPP Operating band	LGE comment
US	FCC. Part27 Subpart O (Published)	3700MHz-3980MHz(Tx/Rx) *US Auction(Dec,2020)	+30dBm(1watt) EIRP	PC2 & PC3	5G NR n77	PC2 & PC3 support
	FCC. Part 27 (Proposed by FCC)	3450MHz-3550MHz(Tx/Rx) *US Auction(Dec,2021)	+30dBm(1watt) EIRP	PC2 & PC3	5G NR n77	PC2 & PC3 support
Canada	ISED. RSS-192 Issue 4 (Published)	3450MHz-3560MHz(Tx/Rx) *Canada Auction(Jun,2021)	+23dBm/10MHz	PC3	n78(or n77)	PC3 support (or/with Tx power back-off) PC2 not supported.
	TBD	3700MHz-3980MHz(Tx/Rx) *Canada Auction(2H2021(TBD))	TBD	TBD	n77	
	ECC Report 261 (July 2018)	3400MHz-3800MHz(Tx/Rx) *Analysis report only	(Page30) UE IN-BLOCK REQUIREMENT As for the technical conditions for user equipment (UEs), it is recommended that the in-block TRP for mobile UEs does not exceed 28 dBm. (Page40) User Equipment parameter: UE max Tx power +23dBm	PC3	n78	ECC report was analyzed based on PC3 UE.
Europe	ETSI. EN 301 908-25 (on-going) *Standard Not Ready For Download	Base on 3GPP spec. (TS38.521-1,-2,-3) 3GPP n78 freq : 3.3-3.8GHz 3GPP n77 freq : 3.3-4.2GHz	PC2 : Conducted power +26dBm(+3/-4dB)@ch BW *PC2 Max power upper limit +29dBm PC3 : Conducted power +23dBm(+3/-4dB)@ch BW *PC3 Max power upper limit +26dBm (If ETSI fully adopt the 3GPP specification) ※ ETSI has no EIRP regulations (LTE&NR) → ETSI power limit is based on UE Conducted Max Tx power(@chBW).	PC2, PC3 (If ETSI fully adopt the 3GPP specification)	n78,n77 (If ETSI fully adopt the 3GPP specification)	PC2 & PC3 support (If ETSI fully adopt the 3GPP specification)

※ Europe EN 301 908-25 (on-going) : *Standard Not Ready For Download, https://portal.etsi.org/webapp/WorkProgram/Report_Workitem.asp?WKI_ID=54786

39. In correspondence with the Department on this issue, concerns were raised regarding the ability to meet the specific absorption rate (SAR) limit. However, this does not appear to be an issue. The 3rd Generation Partnership Project (3GPP) Radio Access Network (RAN) WG4 has defined power class 2 UE for 5G New Radio (NR) bands n41, n77, n78 and n79. The power class 2 UE devices have a 3dB higher power capability compared to traditional power class 3 UE devices (i.e., conducted transmit power achieves +26dBm). As outlined in 3GPP's liaison statement (LS) R4-1808088 (LS dealing with power class 2 UE restrictions and SAR testing), the power class 2 capable UE is allowed to set its configured maximum output power with 26Bm under the condition that the scheduled uplink time in [x] ms is below the "maxUplinkDutyCycle" element. This element sets the maximum percentage of uplink time that can be scheduled during [x] ms for power class 2 UE, in order to ensure compliance with applicable electromagnetic energy absorption requirements. The default value of "maxUplinkDutyCycle" is 50%. In this LS, 3GPP RAN4 has informed the FCC about the uplink downlink configuration restrictions "maxUplinkDutyCycle" for power class 2 5G NR UE, and asked the FCC to take this restriction into consideration when conducting 5G NR PC2 testing.

40. In section 6.2.1 of the 3GPP 38.101-1,³² UE power classes are defined for each NR band. In the subsequent paragraphs after the table 6.2.1-1, we see:

³² See <https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3283>.

If a UE supports a different power class than the default UE power class for the band and the supported power class enables the higher maximum output power than that of the default power class:

- if the field of UE capability maxUplinkDutyCycle-PC2-FR1 is absent and the percentage of uplink symbols transmitted in a certain evaluation period is larger than 50% (The exact evaluation period is no less than one radio frame); or
- if the field of UE capability maxUplinkDutyCycle-PC2-FR1 is not absent and the percentage of uplink symbols transmitted in a certain evaluation period is larger than maxUplinkDutyCycle-PC2-FR1 as defined in TS 38.331, (The exact evaluation period is no less than one radio frame); or
- if the IE P-Max as defined in TS 38.331 [7] is provided and set to the maximum output power of the default power class or lower;

shall apply all requirements for the default power class to the supported power class (power class 3) and set the configured transmitted power as specified in clause 6.2.4

41. For Frequency Division Duplexing (FDD) bands, the assumption is that 100% duty cycle with 23 dBm meets SAR requirements. SAR is directly proportional to the duty cycle. For power class 2, the assumption is that the duty cycle will be 50% or less, which retains the average power to +23 dBm. Likewise, for power class 1.5 with a 25% duty cycle, the average power is still at +23 dBm. In R4-1909899, Sprint has shown that SAR is very close to linear considering power and duty cycle. In all cases, the difference was less than 10%. Therefore, there does not appear to be a problem with limiting +29 dBm HPUEs to a 25% duty cycle, in a similar way that NR PC2 operation has been limited to less than a 50% duty cycle.

42. In summary, in Time Division Duplexing (TDD) bands like n41, n77, and n78, if the uplink operation goes above the 50% duty cycle, the UE shall apply the requirements for the default power class (power class 3). In this case, there should be no issue for PC2 and PC1.5 UE to meet the SAR requirements.

43. In order to ensure that Canadian operators can leverage FCC certified devices operating in both bands n77 and n78, we urge the Department to align with the FCC +30 dBm EIRP limit for mobile devices in both the 3500 MHz and 3800 MHz spectrum bands. This would enable Canada to take advantage of the significant benefits (e.g., time to market, economies of scale, and UE costs) afforded by the use of existing FCC certified UE equipment meeting the +30dBm EIRP limit.

3.0 CHANGES TO THE SPECTRUM UTILIZATION FOR THE 3800 MHZ SPECTRUM BAND

3.1 Introduction of mobile service in the 3700-4000 MHz spectrum band

44. There was general support for the proposed changes to the Canadian Table of Frequency Allocation (CTFA), and for the proposal to develop a flexible use licensing model in the 3650-4000 MHz band. We continue to support both proposals. As SaskTel noted:

The introduction of mobile services in the 3700-4000 MHz is in alignment with other jurisdictions such as the United States, the European Union, Japan, and the United Kingdom. This will enable the deployment of 5G technologies that leverages a 3GPP standardized equipment and device ecosystem that is developing globally in the 3800 MHz band, and Canadians will benefit greatly from economies of scale arising from this global device ecosystem.³³

3.2 Changes to the FSS use in the 3700-4200 MHz spectrum band

45. A number of commenters supported the use of 3700-4000 MHz for flexible use.³⁴ However, Intelsat proposed that FSS earth stations continue to be authorized in the 3700-4000 MHz frequency range with the condition that they must coordinate or reach commercial agreement with flexible use operators. Intelsat acknowledges that co-existence of flexible use and FSS within the same frequency band will not be possible everywhere in such cases.³⁵ We do not support Intelsat's proposal as the 3700-4000 MHz frequency range is key for 5G deployment and the presence of earth stations and the required coordination will slow down and restrict the deployment of flexible use services. Flexible use services will be deployed extensively by all operators in this frequency range which will make coordination and agreements with multiple parties detrimental to flexible use deployment as well as FSS operations.

46. In addition, we do not support Xplornet's proposal to limit new FSS earth stations to only the satellites that currently serve Canada using the C-band.³⁶ We expect that as a result of the C-band migration in the U.S., a number of new satellites will become operational and are likely to play a role in FSS migration to the upper end of the band in Canada.

³³ SaskTel Comments, paragraph 4.

³⁴ CanWISP Comments, page 14; SSI Comments, page 32; Telus Comments, paragraph 42; Shaw Comments, paragraph 87; and QMI Comments, paragraph 22.

³⁵ Intelsat Comments, page 20.

³⁶ Xplornet Comments, paragraph 14.

Guard band between flexible use and FSS

47. There was general agreement with the use of a 20 MHz guard band to protect FSS operations in the 4000-4200 MHz frequency range.³⁷ However, Corus³⁸ recommended the use of a 50 MHz guard band and the North American Broadcasters Association³⁹ and CBC⁴⁰ also provided support for a guard band wider than 20 MHz. We recommend that the Department adopt the use of measures set by the FCC⁴¹ for protecting FSS earth stations in the contiguous U.S., which includes a 20 MHz guard band along with power flux density (PFD) limits and filters on FSS earth stations. These measures are applicable to the non-satellite dependent areas in Canada and no additional measures are necessary. A wider guard band will lead to inefficient use of spectrum and no evidence has been provided in support of a guard band wider than what was approved by the FCC. Additionally a wider guard band will create a Canada-specific band, which will restrict the ability to use the U.S. equipment ecosystem in Canada, without offering the benefit of additional spectrum as in the case of Telesat proposal.⁴²

48. Rogers proposed the option of eliminating the guard band in the case where the spectrum adjacent to 4000 MHz is being used for low powered WBS applications.⁴³ This is consistent with the current co-existence of WBS with FSS without the use of a guard band. We reiterate that WBS should be moved to 3400-3450 MHz. However, if the Department's proposed Option 2 is adopted we foresee shared flexible use with WBS in some form in the future and therefore recommend that the Department keep the FCC measures in place for protecting FSS services in the 4000-4200 MHz frequency range which includes a guard band of 20 MHz.

³⁷ CanWISP Comments, page 14; Eutelsat Comments Annex 1, page3; Intelsat Comments, page 20; QMI Comments, paragraph 25; RABC Comments, paragraph 18; SES Comments, page 10; Shaw Comments, paragraph 88; Telesat Comments paragraph 53; Telus Comments paragraph 45; and Xplornet Comments, paragraph 15.

³⁸ Corus Comments, page 4.

³⁹ North American Broadcasters Association Comments, page 4.

⁴⁰ CBC Comments, page 5.

⁴¹ FCC report and order, <https://www.fcc.gov/document/fcc-expands-flexible-use-c-band-5g-0>.

⁴² Telesat, "Fast tracking affordable, Canada-wide 5G and universal connectivity with 3800 MHz spectrum", 5 July 2020.

⁴³ Rogers Comments, paragraph 99.

Maintaining FSS services in satellite-dependent areas

49. There is general agreement on maintaining the FSS allocation in the entire 3700-4200 MHz spectrum band in satellite-dependent areas.⁴⁴ In addition, SES proposed that satellite-dependent areas have access to the entire 500 MHz in the 3700-4200 MHz spectrum band, and there should be no restrictions on future earth station deployments.⁴⁵ It is clear that C-band is important for maintaining connectivity in satellite-dependent areas and will continue to play a key role in providing critical services.⁴⁶ The satellite industry and users agree that connectivity options in higher frequencies such as Ku and Ka band continue to grow in satellite-dependent areas.⁴⁷ However, satellites that use the Ku and Ka bands do not provide the same coverage or reliability for telecommunication services in these areas as C-band. We propose that the right balance is achieved by not allowing any new earth stations in satellite-dependent areas in 3700-4000 MHz while allowing existing users to utilize the entire 500 MHz spectrum. This recognizes the investments already made by the FSS users in satellite-dependent areas and will provide them the necessary flexibility to continue to provide services in those areas using satellite connectivity.

50. We do not agree with Rogers' proposal to restrict existing FSS users in satellite-dependent areas to increase capacity after the deadline.⁴⁸ This would lead to a sub-optimal use of existing infrastructure deployed by existing FSS users in the satellite-dependent areas. However, we expect the 3700-4000 MHz frequency range to become available for flexible use in satellite-dependent areas in the future when appropriate alternatives to C-band based services become available. Therefore, we recommend that the Department restrict the deployment of new earth stations in the 3700-4000MHz frequency range to reduce the extent of stranded investment when flexible use services are introduced.

51. We do not agree with Rogers' proposal⁴⁹ to impose timelines such as five to 10 years for migration of FSS services to 4000-4200 MHz in satellite-dependent areas, nor do we agree with Xplornet's suggestion⁵⁰ that a primary allocation is not needed for FSS anywhere in the country.

⁴⁴ Eutelsat Comments Annex 1; page 3; Intelsat Comment, page 21; SES Comments, page 10; Telesat Comments, paragraph 54; Telus Comments, paragraph 47; and QMI Comments, paragraph 27.

⁴⁵ SES Comments; page 11.

⁴⁶ Intelsat Comments, page 22; SES Comments, page 11; Telesat Comments, paragraph 61; Xplornet Comments paragraph 17; SSI Comments, paragraph 33; and Eutelsat Comments, page 4 all identify the importance of C-Band.

⁴⁷ Intelsat Comments, page 22; SES Comments, page 12; Telesat Comments, paragraph 57; and SSI Comments, paragraph 34.

⁴⁸ Rogers Comments, paragraph 102.

⁴⁹ Rogers Comments, paragraph 112.

⁵⁰ Xplornet Comments, paragraph 18.

Satellite-dependent areas rely on C-band for critical services and reliable and comparable alternatives are currently not available. There are major developments ongoing with regards to connectivity in satellite-dependent areas such as Telesat's plan to build a LEO satellite constellation⁵¹. We recommend that the Department closely follow these developments and monitor the availability of C-band substitutes in satellite-dependent areas. The Department should then re-evaluate the use of flexible use service in satellite-dependent areas in a follow-up consultation as endorsed by the RABC.⁵²

3.3 Changes in status of FSS in the 3500-3700 MHz spectrum band

52. The majority of comments support the Department's proposal to remove the primary FSS allocation from the 3500-3700 MHz spectrum band.⁵³ Intelsat proposed⁵⁴ to allow FSS operations on a secondary basis and SES did not have a strong view regarding the removal of the primary allocation from the 3500-3650 MHz frequency range and allow new earth stations to collocate with legacy earth stations.⁵⁵

53. While we do not oppose the operation of FSS on a non-protected basis in this band, we do oppose the proposal to keep the primary allocation for FSS in the entire 3500-3700 MHz spectrum band and authorizing new FSS earth stations in this band at legacy locations. The legacy earth stations specified in SRSP 520 are a restriction to flexible use deployment, and we expect those to cease operations in the near future once the satellites they use reach their end-of-life. In addition, authorizing new earth stations in the 3500-3700 MHz spectrum band at the legacy sites will lead to continued restrictions on flexible use deployment in this band. The 3500-3700 MHz spectrum band has already been repurposed for flexible use by the Department and the Department has provided FSS operators sufficient time to plan their transition out of this band.⁵⁶ Therefore, we do not support SES' proposal but rather support the Department's proposal to remove the primary FSS allocation in the 3500-3700 MHz spectrum band.

⁵¹ See <http://www.globenewswire.com/new-s-release/2020/11/09/2123028/0/en/Telesat-and-the-Government-of-Canada-Finalize-600M-Agreement-to-Bridge-Canada-s-Digital-Divide-with-Telesat-s-Low-Earth-Orbit-Satellite-Constellation.html>.

⁵² RABC Comments, paragraph 23.

⁵³ SES Comments, pages 13 and 14; Telesat Comments, paragraph 79; Xplornet Comments, paragraph 27; Corus Comments, page 5; North American Broadcasters Association Comments, page 4; CanWISP Comments, page 15; Rogers Comments, paragraphs 114 and 116; Telus Comments, paragraphs 57 and 62; and QMI Comments, paragraphs 31 and 33.

⁵⁴ Intelsat Comments, page 25.

⁵⁵ SES Comments, pages 13 and 14.

⁵⁶ SLPB-001-19 *Decision on Revisions to the 3500 MHz Band to Accommodate Flexible Use and Preliminary Decisions on Changes to the 3800 MHz Band*, June 2019.

4.0 BLOCK SIZES IN THE 3650-4000 MHZ SPECTRUM BAND

54. There was general support for the Department's proposal to establish unpaired blocks of 10 MHz in the 3650-3980 MHz frequency range, though a few comments advocated for the use of 20 MHz blocks to align with the FCC's band plan.⁵⁷ Using 10 MHz blocks aligns with the 3500 MHz band plan and with the 3GPP channel spacing sizes for both LTE and 5G NR. As the Department acknowledges, the adoption of a 10 MHz block size does not prevent the Department from licensing blocks as aggregated packages of spectrum in multiples of 10 MHz blocks.⁵⁸ Therefore, we continue to agree with the spectrum block configuration proposed in the Consultation.

5.0 TREATMENT OF EXISTING USERS

5.1 Proposal for treatment of WBS incumbents

55. The majority of commenters rejected the proposal to move WBS to 3900-3980 MHz (Option 2). Our recommendation that the Department move WBS to 3400-3450 MHz frequency range would best balance the need for large blocks of contiguous spectrum with the WBS users' concerns that band migration will impact their service continuity and financial viability.

56. In considering the proposed Option 2, the main concern raised by WISPs and other WBS users was their inability to support the 3900-3980 MHz spectrum band using current equipment, and the lack of a developed equipment ecosystem in this spectrum band. Displacement to 3900-3980 MHz would require a total overhaul of existing WBS deployments, as CanWISP summarized:

The costs of displacement will be substantial for WISPs from [a] hardware (HW) and software (SW) perspective. WISPs would have to swap out their entire network and correspondingly assume the entire cost of new gear (core and radios) as well as customer premise equipment (CPEs). A portion of WISPs' towers would not be able to support simultaneously both old and new equipment.⁵⁹

57. In response to Question 15, some WBS users provided rough cost estimates to migrate⁶⁰ and CanWISP provided estimates from their members in confidence to the Department.

⁵⁷ PIA Comments, paragraph 43; and Rogers Comments, paragraph 117.

⁵⁸ Consultation, paragraph 80.

⁵⁹ CanWISP Comments, page 17.

⁶⁰ See Ecotel Comments, paragraph 38; Iristel Comments, paragraphs 53 to 62; and Xplornet Comments Attachment, paragraph 33.

TekSavvy described the cost of migration as "prohibitively expensive" for WISPs like themselves, stating that the replacement expense would "compromise the viability of TekSavvy's wireless operations and correspondingly and result in TekSavvy [*sic*] inability to provide innovative broadband services to its customers."⁶¹ Similarly, the CCSA commented that without funding support, these costs would "threaten [our members'] ability to continue effective service delivery through their fixed wireless networks."⁶² We note that a number of commenters, including ourselves, called for the Department to provide funds to cover the WBS transition.⁶³

58. In addition to the obstacle of cost, there is no existing LTE ecosystem above 3800 MHz, and the 5G ecosystem has not been developed. This means WBS users will need to wait before they can begin upgrading their network. As Iristel observed, this will have a negative impact on WBS network investment in the immediate future: "who wants to deploy a WBS radio only for a few years?"⁶⁴

59. By contrast, most existing WBS equipment should be able to operate in the 3400-3450 MHz spectrum band, thereby saving existing WBS operators the expense of replacing their entire network. Rogers agreed that this assignment is "the best policy outcome,"⁶⁵ while the RABC recognized the benefits this option would provide to WBS users:

Compared to the ISED proposed Option #2, this scenario enables a smoother migration of the WBS ecosystem, since some of the existing WBS equipment already has the ability to switch, via software, operating bands from 3650-3700 MHz to 3400-3450 MHz and WBS systems moving to 3400-3450 MHz would benefit from a mature LTE (E-UTRA) B42 or 5G n78 ecosystem.⁶⁶

60. In addition, migration to the 3400-3450 MHz would resolve concerns from WBS users and potential flexible use operators alike about the length of the transition period. If the WBS band moves to 3400-3450 MHz, an accelerated transition would be possible for existing licensees, since many WBS users would only need to re-tune to a lower frequency after receiving their new assignment. Where equipment replacement is required, there is already a robust equipment ecosystem that operators could invest in immediately. In fact, WBS users CanWISP, BCBA and Telus all advocated for the interim or supplemental use of the 3400-3450 MHz spectrum band for

⁶¹ TekSavvy Comments, paragraph 21.

⁶² CCSA Comments, paragraph 13.

⁶³ CanWISP Comments, page 18; CCSA Comments, paragraph 19; Rogers Comments, paragraph 143; and Xplornet Attachment, paragraph 34.

⁶⁴ Iristel Comments, paragraph 41.

⁶⁵ Rogers Comments, paragraph 124.

⁶⁶ RABC Comments, paragraph 48.

this reason.⁶⁷ The BCBA commented, "WBS licensees can transition to the 3400-3450 MHz band within a reasonable timeframe, since most equipment available today is tuneable to this range."⁶⁸

61. Most WBS users advocated for the WBS spectrum band to remain in its current frequency range (Option 1),⁶⁹ with the exception of BCBA, Xplornet, and Telus.⁷⁰ A few also argued for additional spectrum to be added to the current frequency range.⁷¹ We agree with the Department, however, that moving the WBS spectrum band is preferred because it "will allow for more efficient use of the spectrum for future 5G applications."⁷² As discussed in Section 2, contiguity between the 3500 MHz and 3800 MHz spectrum bands increases the chance that operators can acquire 100 MHz+ blocks of spectrum, which will enable the full benefits of 5G technology.

62. Some commenters argued that this contiguity would at most benefit one operator.⁷³ However, this is not the case. Having separate 3500 MHz and 3800 MHz spectrum auctions will result in spectrum licensees having fragmented spectrum holdings and a 50 MHz (or more) gap will only make the problem worse. If a spectrum licensee has both 3500 MHz and 3800 MHz spectrum, then creating a single spectrum block without a 50 MHz (or more) gap would help ensure that the difference between their spectrum holdings will be small enough to be supported by the equipment ecosystem. As Rogers stated, "[h]aving 50 MHz, plus any effective guard bands, separating the 3500 MHz and future 3800 MHz bands – potentially sterilizing up to 100 MHz of prime 5G spectrum until new technical rules are in effect – would be an extremely poor policy outcome for all Canadians."⁷⁴

63. Moving the WBS spectrum band would reduce the potential coordination challenges between WBS and flexible use operators. If the WBS spectrum band stays where it is today (3650-3700 MHz), both flexible use operators below 3650 MHz and those above 3700 MHz would need to ensure coordination with WBS operators to avoid interference between WBS and flexible use operations. However, if WBS moves to 3400-3450 MHz frequency range, WBS operators would only need to coordinate with flexible use operators on the upper portion of the frequency

⁶⁷ BCBA Comments, paragraph 4; CanWISP Comments, page 17; and Telus Comments, paragraph 78.

⁶⁸ BCBA Comments, paragraph 4.

⁶⁹ Ecotel Comments, paragraph 35; CanWISP Comments, paragraph 3; Cogeco Comments, paragraph 40; Eastlink Comments, paragraph 10; Iristel Comments, paragraph 6; and TekSavvy Comments, paragraph 23.

⁷⁰ BCBA Comments, paragraph 4; Telus Comments, paragraph 66; and Xplornet Comments, paragraph 27.

⁷¹ CanWISP Comments, page 17; Cogeco Comments, paragraph 37; Iristel Comments, paragraph 6; and TekSavvy Comments, paragraph 29.

⁷² Consultation, paragraph 90.

⁷³ Iristel Comments, paragraph 45; Cogeco Comments, paragraph 36; Shaw Comments, paragraph 81, and TekSavvy Comments, paragraph 18.

⁷⁴ Rogers Comments, paragraph 128.

(i.e., 3450 MHz). The RABC acknowledged this major benefit to relocating the band: "By removing the current 3650-3700 allocation to WBS, co-existence with new 3500 MHz and 3800 MHz flexible use systems would be dramatically simplified by removing legacy technologies from in between the two bands which may prove difficult to coordinate with."⁷⁵

64. Finally, we do not support the proposal to allocate more than 50 MHz to the WBS band. With access to 50 MHz of spectrum, WBS users already have a spectrum allocation that meets their needs. As Rogers demonstrated in their comments, a WISP can easily meet the CRTC's 50/10 Mbps universal speed target using 30 MHz of spectrum.⁷⁶ In addition, as Rogers argued, if there are more than two carriers in a particular area who each require 30 MHz of spectrum or more, this suggests a need for fully licensed spectrum.

65. In our comments, we observed that the Department has already made 50 MHz of 3500 MHz spectrum available in a set-aside that is open to WISPs, which WBS licensees could use to augment their existing licence holdings. Between a 50 MHz WBS band and the 3500 MHz set-aside, WISPs would have priority access to 100 MHz of spectrum in the 3500 MHz spectrum band. This is a more than sufficient allocation for lightly licensed fixed wireless spectrum in rural areas.

66. The Department's priority should be to allocate the maximum amount of spectrum to flexible use. As the RABC stated, "spectrum is a critical resource for wireless carriers, and additional spectrum in mid-range frequency bands, which provide both coverage and capacity, is required to meet ever-growing demand."⁷⁷ While we see moving the WBS band to 3400-3450 MHz as a well-balanced solution that meets the needs of all stakeholders, if this is not adopted we would strongly prefer WBS to remain at 3650-3700 MHz than for the Department to assign additional WBS spectrum in any part of the 3500 MHz band.

5.1.1 Proposed transition process for the displacement of WBS licensees

67. Some WBS users argued that the proposed December 2023 transition deadline for urban areas was too aggressive. CanWISP called the December 2023 deadline "not practical," and the CCSA, the Regional Municipality of Durham, TekSavvy, and Xplornet all stated that December

⁷⁵ RABC Comments, paragraph 43.

⁷⁶ Rogers Comments, paragraph 125.

⁷⁷ RABC Comments, paragraph 14.

2025 was the earliest possible transition deadline for all areas.⁷⁸ Potential flexible use operators, however, cannot afford to wait five years to get access to needed 5G spectrum in the country's most populated regions. We agree with Rogers' and Telus' comments that the Department should further accelerate displacement in urban markets,⁷⁹ and we continue to support moving up the displacement deadline for non-urban areas to December 2023, as did Telus.⁸⁰ Since the Department is proposing December 2023 as the Canadian FSS transition deadline, there is no reason to delay the displacement of WBS operations in rural areas for an additional two years. These changes are necessary to facilitate the timely introduction of 5G technologies for Canadians. As we observed above, if the WBS band is moved to 3400-3450 MHz, the transition for existing licensees could take place before December 2023.

68. Rogers and Telus both proposed expanding the list of urban areas that would be displaced first. Rogers proposed adding specific Tier 4 areas related to their deployment,⁸¹ while Telus proposed expanding to include both medium and large population centres on a Tier 5 basis.⁸² We agree with expanding the list to include further urban areas, but believe that any expansion should be generic rather than based on a particular operator's footprint. In addition, Tier 4 areas are a more appropriate choice than Tier 5. As a result, we suggest the Department expand the list of urban Tier 4 areas to include all large and medium population centres.

69. Although a number of commenters opposed the extension of the moratorium on new WBS deployments to all Tier 4 service areas,⁸³ we continue to support this proposal. As Telus stated, a moratorium is necessary to allow for transition plans in and out of the band to begin, and also to give prospective licensees bidding at auction certainty around potential encumbrances.⁸⁴ However, the moratorium should not interfere with normal business developments. Therefore, we recommend that the Department allow current WBS licences to be transferred, or be cancelled and reissued, as the case may be, in all Tier 4 service areas as long as such changes do not result in the deployment of incremental new stations. This would support the continued operation of existing services.

⁷⁸ CanWISP Comments, paragraph 19; CCSA Comments, paragraph 18; Durham Comments, page 2; TekSavvy Comments, page 12; and Xplornet Comments Attachment, paragraph 38.

⁷⁹ Rogers Comments, paragraph 149; and Telus Comments, paragraph 80.

⁸⁰ Telus Comments, paragraph 81.

⁸¹ Rogers Comments, paragraphs 153 to 157.

⁸² Telus Comments, paragraphs 88 to 90.

⁸³ BCBA Comments, paragraph 9; CanWISP Comments, paragraph 17; Ecotel Comments, paragraph 81; Iristel Comments, paragraph 72; Mobilexchange Comments, page 14; QMI Comments, paragraph 46; Rural Municipalities of Alberta Comments, paragraph 8; TekSavvy Comments, page 12; and Xplornet Comments Attachment, paragraph 40.

⁸⁴ Telus Comments, paragraphs 91 to 92.

5.1.2 Shared spectrum licensing process for the WBS spectrum band

70. Wherever it is ultimately placed, the WBS spectrum band should remain for fixed use only, and we do not support proposals to reallocate the spectrum band for flexible use. Operators who wish to provide mobile wireless services should do so through exclusive flexible use spectrum or through commercial arrangements with facilities-based mobile wireless operators. For example, as Rogers observed, WBS users who have an interest in creating private mobile networks "will be best, and most likely, served by 5G network slices using exclusively licensed spectrum."⁸⁵

71. To manage access to the band in high demand areas such as major metropolitan centres, Rogers and Telus proposed that WBS spectrum in urban areas should be exclusively licensed through a future licensing process.⁸⁶ We support this position as it would maximize the use of spectrum and provide additional capacity to flexible use systems in urban areas where it is most needed.

72. We continue to support the Department's proposal to apply technical restrictions to the WBS spectrum band to facilitate sharing within the band and co-existence with adjacent bands. Technical rules similar to those used in the adjacent 3500 MHz flexible use spectrum band would ensure flexible use licensees in the 3500 MHz spectrum band can get access to the existing ecosystems in the U.S. and Europe. In their comments, Rogers and Xplornet also advocated for TDD synchronisation to avoid the need for a guard band.⁸⁷ Both WBS and adjacent band flexible use operators must ensure they maintain TDD synchronisation between systems to address interference issues between systems.

73. The current Spectrum Management System (SMS) database approach has worked well to date in facilitating licensee-to-licsee coordination so long as licensees comply with the requirement to keep the database up-to-date. We, along with a number of other parties, expressed support for maintaining this system, so long as the Department adequately enforces its proper use.⁸⁸ There was virtually no industry support for the adoption of some kind of dynamic

⁸⁵ Rogers Comments, paragraph 163.

⁸⁶ Rogers Comments, paragraph 140 and Telus Comments, paragraph 70.

⁸⁷ Rogers Comments, paragraph 168 and Xplornet Comments Attachment, paragraph 46.

⁸⁸ BCBA Comments, paragraph 46; Iristel Comments, paragraph 104; Rogers Comments, paragraph 164; and Xplornet Comments Attachment, paragraphs 42 to 44.

spectrum sharing database, and many parties explicitly rejected this as an option.⁸⁹ For example, SaskTel noted:

[A]lthough a database-based sharing approach has been launched in the CBRS band in the much larger United States market, this was only done because it was necessary in the United States to protect high-priority incumbent transitory military users in the CBRS band. Such a situation does not exist in Canada, as coordination can be accomplished both with new users and with any incumbent FSS users that are still in operation.⁹⁰

74. Indeed, calls to adopt any new system that is not designed for the Canadian context will only add unnecessary expense and complexity to achieve the same outcome as the existing process. Thus, we recommend that the Department continue with the current licensing process for WBS spectrum.

5.2 Proposal for the treatment of FSS incumbents

5.2.1 Proposal for treatment of FSS incumbents in the 3650-3700 MHz spectrum band

75. The Department's proposal to remove the primary FSS allocation from 3650-3700 MHz received support from a number of commenters.⁹¹ However, Intelsat⁹² and SES⁹³ supported the ability to obtain new FSS earth stations in this band on a non-protected basis. We are not opposed to non-protected FSS use in the band but would caution that investment in new earth stations in this band could end up being stranded as flexible use deployment grows over time.

5.2.2 Definition of satellite-dependent areas

76. There was no consensus on the definition of satellite-dependent areas. Rogers⁹⁴ and Telus⁹⁵ rightly point out that flexible use services may not be deployed in major population centres based on the Tier 4 areas in the Department's proposal. Rogers provides an example of satellite-

⁸⁹ BCBA Comments, paragraph 48; Ecotel Comments, paragraph 85; QMI Comments, paragraphs 51 to 53; RABC Comments, paragraph 53; Rogers Comments, paragraph 165; SaskTel Comments, paragraph 78; and Telus Comments, paragraph 95.

⁹⁰ SaskTel Comments, paragraph 78.

⁹¹ SES Comments, page 14; Telesat Comments, paragraph 79; Xplornet Comments, paragraph 24; Corus Comments, page 5; CanWISP Comments, page 15; Rogers Comments, paragraph 116; and Telus Comments, paragraph 62.

⁹² Intelsat Comments, page 25.

⁹³ SES Comments, pages 15 and 16.

⁹⁴ Rogers Comments, paragraph 171.

⁹⁵ Telus Comments, paragraphs 105 and 109.

dependent areas based on its own coverage⁹⁶ and Telus proposed that satellite-dependent areas could be the complement of the mid-band mobile network footprint with a 50 km separation distance which implies that satellite-dependent areas should be defined as areas where mobile operators do not have mid band coverage.⁹⁷ Similarly, Shaw proposed to define satellite-dependent areas as those, which do not have terrestrial or wireless coverage.⁹⁸

77. In defining satellite-dependent areas, the Department should consider the protection of satellite served communities from interference from flexible use, facilitating flexible use deployment in all population centres not dependent on satellite connectivity, reducing the number of border areas to minimize interference mitigation and to reduce the administrative burden on licensees. Rogers' proposal for the definition of satellite-dependent areas is designed to refine the Department's proposal by removing areas covered by terrestrial mobile services or that have major population centres. Thus, Rogers' proposal correctly attempts to protect satellite served communities, facilitate flexible use deployment and reduce the number of border areas.

78. However, while we agree with Rogers that the Department should be able to make effective coverage area estimates based on the data for all terrestrial operators, we do not agree with using the SMS database for this purpose.⁹⁹ While the SMS database could be the starting point of this analysis, the Department should engage all terrestrial operators to estimate the coverage area based on the three-year plans of terrestrial operators in addition to their existing coverage. Furthermore, the Department should review the coverage periodically, for example after five years, and re-estimate the geographic areas considering that terrestrial operators' coverage will expand with time. The periodic reviews could also be used to re-assess the overall need for satellite connectivity in satellite-dependent areas and the future treatment of 3700-4000 MHz spectrum in those areas.

79. CanWISP proposed to define a "thin layer of remote communities" in some areas as satellite-dependant, which will enable WISPs to serve them using satellite backhaul.¹⁰⁰ CanWISP also supported the inclusion of remote industries such as mining operations and off-shore drilling

⁹⁶ Rogers Comments, paragraph 172.

⁹⁷ Telus Comments, paragraph 112.

⁹⁸ Shaw Comments, paragraph 101.

⁹⁹ Rogers Comments, paragraph 172.

¹⁰⁰ CanWISP Comments, page 20.

in satellite-dependant areas¹⁰¹ along with Intelsat¹⁰², Inmarsat, Telesat¹⁰³, SSi¹⁰⁴, TekSavvy¹⁰⁵, and Xplornet.¹⁰⁶ No evidence has been put forward to support using the entire 3700-4200 MHz spectrum band at such remote operations. The 4000-4200 MHz spectrum band will be sufficient for WISPs to provide service to such operations using satellite backhaul. Therefore, such remote operations should not be defined as satellite-dependant. The addition of such operations to satellite-dependant areas will only add unnecessary restrictions on flexible use deployments in population centres and will deprive a large number of Canadians from realizing the full benefits of 5G services.

5.3 FSS space station operations in the 3700-4200 MHz spectrum band

80. A number of commenters agreed with the modification of existing FSS satellite authorizations in non-satellite-dependant areas to operate on a no-interference basis in 3700-4000 MHz spectrum band after the transition deadline.¹⁰⁷ The commenters generally agreed with the Department's proposed timeline and emphasized the importance of aligning the timeline with the U.S. FSS clearing timeline.¹⁰⁸ Satellite operators raised concerns¹⁰⁹ about the deadline but are willing to align with the U.S. timelines if financial compensation is made part of the proposal.¹¹⁰

81. The Canadian process can capitalize on the progress made in the U.S. and align itself with the U.S. timelines as the U.S. clearing process is already impacting Canadian operations irrespective of the Department's decision. Any further delay in the timeline will lead to unused spectrum which is a wasteful outcome both socially and economically. It is clear that all four major satellite operators serving Canadian customers, namely Telesat¹¹¹, Intelsat¹¹², SES¹¹³, and Eutelsat¹¹⁴ are willing to meet the Department's deadline, and in the case of Telesat clear the band

¹⁰¹ CanWISP Comments, page 20.

¹⁰² Intelsat Comments, page 26.

¹⁰³ Telesat Comments, paragraph 83.

¹⁰⁴ SSi Comments, paragraph 54.

¹⁰⁵ TekSavvy Comments, page 14.

¹⁰⁶ Xplornet Comments, paragraph 51.

¹⁰⁷ Intelsat Comments, page 26; Telesat Comments, paragraph 84; CanWISP Comments, page 20; SSi Comments, paragraph 56; Rogers Comments, paragraph 179; Telus Comments, paragraph 118; and Shaw Comments, paragraph 102.

¹⁰⁸ SES Comments, page 18; CanWISP Comments, page 20; Rogers Comments, paragraph 181; Telus Comments, paragraph 122; and Shaw Comments, paragraph 103.

¹⁰⁹ Telesat Comments, paragraph 107.

¹¹⁰ SES Comments page 18; and Intelsat Comments, pages 26 and 27.

¹¹¹ Telesat, "Fast tracking affordable, Canada-wide 5G and universal connectivity with 3800 MHz spectrum", 5 July 2020.

¹¹² Intelsat Comments, pages 26 and 27.

¹¹³ SES Comments, page 18.

¹¹⁴ Eutelsat Comments Annex 1, pages 7 and 8.

earlier than the deadline, provided the right framework is in place and provides financial compensation. We recommend that the Department should seize this opportunity and create the right framework which leads to an early clearing of the 3700-4200 MHz spectrum band for flexible use which will deliver the maximum benefit to Canadian consumers.

5.4 Existing licensed FSS earth stations in the 3700-4200 MHz spectrum band

82. A number of commenters agreed with the Department's proposal for in-band protection for FSS service before and after the transition in the 3700-4200 MHz and 4000-4200 MHz spectrum bands respectively in non-satellite-dependant areas.¹¹⁵ In addition, satellite operators put forward proposals for adjacent band protection for FSS operating in the 3700-4200 MHz spectrum band in satellite-dependant areas. Intelsat recommended using notification and coordination with FSS earth stations within 25 km of flexible use stations.¹¹⁶ SES recommended using measures similar to those being proposed for protecting FSS from adjacent band in non-satellite-dependant areas after the transition.¹¹⁷ The measures proposed by SES include the use of a guard band of 20 MHz and PFD limits to protect 3700-4200 MHz FSS operations from adjacent band flexible use.

83. The CBC proposed that the Department create an automated system to notify incumbent FSS operators of the arrival of flexible use in their vicinity.¹¹⁸ Corus¹¹⁹ and the North American Broadband Association¹²⁰ also make a general statement about flexible use being separated 16-40 km from FSS. A contrary position is taken by Rogers and Xplornet. Rogers proposed to revise the out of band emissions value of -13 dbm/MHz in RSS 192 to a less restrictive value and suggests that it would not cause interference to FSS operating above 3800 MHz.¹²¹ Xplornet viewed the one year notification requirement in cases where flexible use is being deployed within 25 km of FSS earth stations as excessive.¹²²

84. We note that the measures adopted for adjacent band protection of FSS operators depend on the future use of the 3650-3700 MHz spectrum band in satellite-dependant areas. If the

¹¹⁵ Intelsat Comments, page 29; SES Comments, pages 20 and 21; Telesat Comments, paragraph 115; CanWIS P Comments, page 22; Rogers Comments, paragraph 192; and Telus Comments, paragraphs 134 and 137.

¹¹⁶ Intelsat Comments, page 29.

¹¹⁷ SES Comments, pages 20 and 21.

¹¹⁸ CBC Comments, page 11.

¹¹⁹ Corus Comments, page 8.

¹²⁰ North American Broadcasters Association Comments, page 6.

¹²¹ Rogers Comments, paragraph 193.

¹²² Xplornet Comments, paragraph 59.

3650-3700 MHz spectrum band continues to be allocated in satellite-dependant areas for WBS then the measures in SRSP 303.65 for coordination between WBS and FSS are sufficient. WBS is a low powered application and the coordination distance of 25 km is sufficient for adjacent band protection for FSS. FSS and WBS have co-existed with the current measures without any problems to date which is also highlighted by CanWISP.¹²³ Therefore, no additional measures are required.

85. However, if high-powered flexible use is allowed to operate in the 3650-3700 MHz spectrum band in the future in satellite-dependant areas, then extra measures will be required to protect FSS operations in the adjacent band. We recommend that adequate measures be put in place for the protection of FSS use in the 3700-4200 MHz spectrum band in satellite-dependant areas from the adjacent band. The appropriate forum to address such proposed measures is the RABC through the revision of SRSP 520 and RSS 192 to include flexible use up to 3700 MHz.

86. Additionally, we recommend that the Department reject the comments from Corus and the North American Broadband Association. These comments do not take into account the measures already established for in-band and adjacent band protection in non-satellite-dependant areas established by the FCC and proposed by the Department. The 20 MHz guard band, PFD limits and the use of filters on FSS earth stations will lead to a seamless process for co-existence of flexible use and FSS in non-satellite-dependant areas. In the case of satellite-dependant areas, the Department's proposals already offer in-band protection for FSS while the measures for adjacent band protection will need to be finalized as discussed above.

87. Finally, with respect to the CBC proposal, the Department's SMS is already designed to provide the necessary information to all spectrum users. We encourage the Department to ensure that the SMS is accurate and that timely updates to data occur, as it would facilitate efficient coordination among users.

The addition of new footnote CZZ

88. There is a general agreement with the proposed footnote. However, SES recommended that the footnote be modified to recognize that certain satellite gateways in non-satellite-dependent areas will also be afforded protected access to the 3700-4000 MHz spectrum band¹²⁴

¹²³ CanWISP Comments, page 16.

¹²⁴ SES Comments, page 21.

and Telesat proposed to include the word "gateway" in the footnote.¹²⁵ We understand the intent of this addition but see this as unnecessary. The protection of the designated gateways can be addressed through a new SRSP or the revision of an existing SRSP. The inclusion of additional wording in the CTFA is unnecessary.

Continued operation of gateways in satellite-dependent areas

89. The Department's proposal of consolidating the gateway sites received general support.¹²⁶ Corus, however, highlighted a number of logistical challenges related to building such gateways within three years as per the Department's proposed deadline.¹²⁷ In our view, these logistical challenges can be addressed through coordinated planning and management. For example, in the U.S., four consolidated gateways will be established in a similar timeframe through coordination and management led by satellite operators. For this reason, we support Telesat's proposal¹²⁸ to take responsibility to coordinate and manage the transition to consolidated gateways. If the Telesat proposal is not accepted by the Department, then we are confident that the Department can have a key role by using a centralized body such as the RABC to develop the necessary coordination for the consolidation of gateways.

90. SSi suggested that the gateway sites can be repacked to 4000-4200 MHz in non-satellite-dependant areas.¹²⁹ However, gateway sites that can be repacked into 4000-4200 MHz as a result of FSS migration do not need to be consolidated and will be subject to the standard Department proposed protection measures applied to earth stations operating in the 4000-4200 MHz spectrum band in non-satellite-dependant areas. These protection measures are a guard band of 20 MHz, PFD limits and the use of filters on earth station antennas. The gateways which are required to operate in the entire 3700-4200 MHz spectrum band will need to be consolidated to two sites in order to minimize barriers to flexible use deployment. Such gateways should be consolidated into two sites away from population centres as supported in most comments.

¹²⁵ Telesat Comments, paragraph 119.

¹²⁶ Intelsat Comments, page 30; SES Comments, page 22; Telesat Comments, paragraph 122; Rogers Comments, paragraph 200; and Telus Comments, paragraph 147.

¹²⁷ Corus Comments, page 9.

¹²⁸ Telesat, "Fast tracking affordable, Canada-wide 5G and universal connectivity with 3800 MHz spectrum", 5 July 2020.

¹²⁹ SSi Comments, paragraph 66.

91. The proposal from PSBN¹³⁰ to establish four gateway sites to increase resiliency is excessive. Appropriate resiliency measures can be achieved at two geographically separated gateway locations and therefore the Department should dismiss PSBN's proposal.

5.5 Existing licence-exempt FSS earth stations in the 3700-4200 MHz spectrum band

92. A number of commenters¹³¹ supported the proposal to issue interim authorizations as it would offer protection to licence-exempt earth stations, which play a key role in the day-to-day operations of enterprises, particularly in the broadcasting sector. However, Rogers opposed the issuance of such authorizations in non-satellite-dependant areas.¹³² We do not support Rogers' proposal as licence-exempt earth stations in non-satellite-dependant areas are performing key business functions for the broadcasting sector such as receiving and sending content viewed by Canadians. The interim authorizations will protect these earth stations prior to transition and ensure that Canadians are able to receive content uninterrupted throughout the transition. The Department's proposal for interim authorizations will also facilitate early flexible use deployment by identifying the earth stations and enabling deployment of flexible use through coordination in non-satellite-dependant areas prior to the transition deadline.

93. TekSavvy¹³³ and CanWISP¹³⁴ opposed the authorization process and CanWISP further clarified that it opposes the authorization process if the Department's proposed Option 2 for WBS use is selected. We are also concerned about WBS and FSS co-existence in satellite-dependant areas if Option 2 is selected. In fact, the concern is far greater for FSS users who receive weak satellite signals in this band as WBS operations in the vicinity of FSS earth stations would cause significant interference. The problem is not only limited to interim authorized earth stations but also to all licensed earth stations in this band. The co-existence issues that may arise due to the Department selecting 3900-3980 MHz for WBS should have no bearing on the interim authorization process. These are separate issues and the issue of co-existence of WBS and FSS in satellite-dependant areas should be dealt with separately either by not selecting Option 2 for WBS or through the development of a SRSP. The interim authorization process is generally supported and should be implemented by the Department to support a smooth transition process.

¹³⁰ PSBN Comments, paragraph 105.

¹³¹ Intelsat Comments, page 30; SES Comments, page 23; Telesat Comments, paragraph 123; Xplornet Comments, paragraph 60; Corus Comments, page 10; and North American Broadcasters Association Comments, page 7.

¹³² Rogers Comments, paragraph 202.

¹³³ TekSavvy Comments, page 17.

¹³⁴ CanWISP Comments, page 23.

90 days to submit applications for interim authorizations

94. A number of commenters supported the 90 day deadline.¹³⁵ However, SES indicated that it may take time for broadcast distribution undertakings and other enterprises operating licence-exempt earth stations to gather all of the location-specific information required to apply for an authorization as they have operated many such earth stations for a long period of time without any need to obtain or maintain such information.¹³⁶ We disagree with this comment based on the fact that SAB-001-19 has been in place for over a year and the deadline was extended to 30 November 2020. The affected enterprises have already been notified and have had sufficient time to gather the required information.

95. We do not agree with Telus' comment¹³⁷ to limit the acceptance of applications to sites that have responded to SAB-001-19 as this would be overly restrictive. Rather, we urge the Department to limit its acceptance of applications to 90 days after the publication of a decision. The list of earth stations should then become frozen after the 90 day deadline for planning and logistics purposes as Telesat highlighted in its comments.¹³⁸

Interim authorizations

96. CanWISP¹³⁹ and TekSavvy¹⁴⁰ are opposed to providing interim authorizations citing that this would cause interference to WBS operations if Option 2 for the relocation of WBS is selected by the Department. Similarly, SES highlighted the need for adjacent band protection for such authorized earth stations before and after the transition.¹⁴¹ SES proposed to use the same measures for protection of FSS using the 3700-4200 MHz spectrum band in satellite-dependant areas as those set by FCC and proposed by the Department for protection of FSS in the 4000-4200 MHz spectrum band in non-satellite-dependant areas. SES also proposed to remove the word "not" from the conditions associated with interim authorizations.¹⁴²

¹³⁵ Intelsat Comments, page 30; Xplornet Comments, paragraph 61; Corus Comments, page 10; North American Broadcasters Association Comments, page 7; CanWISP, Comments, page 23; and Rogers Comments, paragraph 203.

¹³⁶ SES Comments, page 23.

¹³⁷ Telus Comments, paragraph 149.

¹³⁸ Telesat Comments, paragraph 128.

¹³⁹ CanWISP Comments, page 24.

¹⁴⁰ TekSavvy Comments, pages 17 to 19.

¹⁴¹ SES Comments, pages 23 to 25.

¹⁴² SES Comments, page 26

97. In addition, the North American Broadcasting Association stressed that broadcasters must continue to have full band/full arc use of the 3700-4200 MHz spectrum band during the interim period and full band/full arc use of the 4000-4200 MHz spectrum band following the transition.¹⁴³ They also stressed that the proposed conditions must provide protection from in-band PFD emissions during the transition period and out-of-band-emission (OOBE) PFD emissions following the transition as both can cause harmful interference to earth stations.¹⁴⁴

98. The concerns raised by CanWISP and TekSavvy are not related to the interim authorization process but rather to the protection and coexistence of WBS and FSS users. As stated earlier, we recommend the Department consider coexistence issues between WBS and FSS users in making a decision about WBS relocation and address the adjacent band protection in satellite-dependant areas through the SRSP process.

99. The interim authorization process proposed by the Department provides adequate protection to FSS earth stations during the transition and will facilitate the efficient and early deployment of flexible use spectrum by enabling flexible use licensees to coordinate with such earth stations prior to the transition deadline. The proposals set forth by the Department offer in-band protection to such interim authorized stations in both satellite-dependant and non-satellite-dependant areas before and after the transition.

100. With respect to adjacent band operations, it must be noted that prior to the transition deadline the adjacent band in non-satellite-dependant areas will have WBS operations unless WBS transitions out of the band earlier than the FSS deadline. To date, WBS and FSS have successfully coexisted without any measures other than notification. The deployment of flexible use prior to the transition deadline can be managed through notification and coordination measures and therefore no additional adjacent band protection measures are necessary. After the transition deadline, such interim authorized earth stations will transition to 4000-4200 MHz in non-satellite-dependant areas and will be protected by a guard band of 20 MHz from the adjacent band flexible use operations. We support the Department's proposals with respect to non-satellite-dependant areas and see no justification to modify them.

¹⁴³ North American Broadcasters Association Comments, page 8.

¹⁴⁴ North American Broadcasters Association Comments, page 9.

Proposed eligibility of licence-exempt stations

101. There is general agreement¹⁴⁵ with the Department's proposed eligibility criteria except for CanWISP¹⁴⁶ and TekSavvy¹⁴⁷ who put forward three additional technical parameters. However, the concerns raised by CanWISP and TekSavvy are not related to the interim authorization process but rather to the protection and coexistence of WBS and FSS users. The Department should, therefore, adopt the proposed eligibility criteria for interim authorizations.

5.6 Fixed service in the 3700-4200 MHz spectrum band

102. We continue to support the Department's proposal to retain existing point-to-point operations in the 3700-4000 MHz band, as did other commenters.¹⁴⁸ Some raised objections to this proposal, stating that the 3700-4000 MHz spectrum band should be reserved to the greatest extent for flexible use systems.¹⁴⁹ While typically we agree with this principle, there appear to only be three fixed systems in operation, all of which are in remote locations, and they are therefore unlikely to pose a significant challenge to the deployment of flexible use systems.¹⁵⁰

6.0 TECHNICAL CONSIDERATIONS

6.1 Coexistence between flexible use systems

103. A number of commenters agreed with the Department not to mandate TDD synchronization for interference between TDD flexible use systems in the 3650-3980 MHz frequency range.¹⁵¹ Rogers proposed that the Department mandate all users across the 3300-4200 MHz spectrum band to support TDD time and frequency synchronization and develop a common framework through a purpose specific group such as the RABC.¹⁵² Xplornet proposed that the Department mandate TDD synchronization between systems and the use of GPS

¹⁴⁵ Intelsat Comments, page 32; SES Comments, page 26; Rogers Comments, paragraph 213; and Telus Comments, paragraph 164.

¹⁴⁶ CanWISP Comments, page 25.

¹⁴⁷ TekSavvy Comments, pages 19 and 20.

¹⁴⁸ CanWISP Comments, page 25; Department of National Defence Comments, page 5; Ericsson Comments, page 19; QMI Comments, paragraph 76; Rogers Comments, paragraph 218; and SaskTel Comments, paragraph 112.

¹⁴⁹ Intelsat Comments, page 32; Mobilexchange Comments, page 20; North American Broadcasters Association Comments, paragraph 9; Telus Comments, paragraph 167; TekSavvy Comments, page 20; and Toronto Police Services Comments, page 25.

¹⁵⁰ Department of National Defence Comments at page 5, states that the Department of National Defence operates one Point-to-Multipoint system in Suffield, Alberta.

¹⁵¹ CanWISP Comments, page 25; Telus Comments, paragraph 169; Shaw Comments, paragraph 110; Eastlink Comments, paragraph 13; QMI Comments, paragraph 77; and RABC Comments, paragraph 68.

¹⁵² Rogers Comments, paragraph 222.

synchronized radios,¹⁵³ and Redline proposed that a central entity should dynamically determine the required TDD synchronization in each region, based on the requested TDD split of each deployed radio and by selecting the most requested one.¹⁵⁴

104. We support the Department's proposal not to mandate TDD synchronization and support the use of interference mitigation measures laid out in SRSP 520 and RSS 192. The flexible use spectrum band of 3650-3980 MHz is envisioned to be similar to the 3450-3650 MHz spectrum band and we support the development of a common SRSP that simplifies and standardizes the development of equipment for Canada in the entire 3450-3980 MHz frequency range. While TDD synchronization offers benefits of added interference mitigation, it should not be mandated. It should be left up to flexible use licensees to adopt its use where and when necessary.

105. The Dynamic Spectrum Alliance proposed a dynamic spectrum access (DSA) database system to minimize interference.¹⁵⁵ PSBN also supported a spectrum access system approach,¹⁵⁶ and CanWISP recommended an approach similar to what Ofcom implemented for shared access license.¹⁵⁷ These systems are not appropriate for exclusively licensed operations planned for the 3650-3980 MHz spectrum band. There is generally very little support for such solutions in the Canadian industry even for shared licensing scenarios due to the higher equipment costs this may impose.¹⁵⁸ The Department should reject such proposals.

6.2 Coexistence between flexible use systems and WBS systems prior to displacement

106. Iristel recommended that flexible use licensees should not be allowed to turn on their systems in a given licence area until the spectrum clearing has been completed.¹⁵⁹ Xplornet shared the same view about restricting flexible use in the band until it is cleared.¹⁶⁰ Redline proposed to set transmit power in tiers with lower power limits closer to WBS receivers and in the 10 MHz adjacent to the 3650-3700 MHz spectrum band.¹⁶¹ They also proposed to combine these measures with PFD limits and stricter OOB limits in the 3700-3800 MHz spectrum band. Rogers recommended the use of a PFD limit of -114.5dbm/MHz/m2 at the WBS receive antenna provided

¹⁵³ Xplornet Comments, paragraph 67

¹⁵⁴ Redline Comments, page 17.

¹⁵⁵ Dynamic Spectrum Alliance Comments, page 8.

¹⁵⁶ PSBN Comments, paragraph 132.

¹⁵⁷ CanWISP Comments, page 25.

¹⁵⁸ Only Cogeco at paragraph 48 of its Comments and Redline at page 15 of its Comments support a dynamic spectrum access approach.

¹⁵⁹ Iristel Comments, paragraph 108.

¹⁶⁰ Xplornet Comments, paragraph 68.

¹⁶¹ Redline Comments, pages 18 and 19.

a common TDD framework is established.¹⁶² Otherwise, Rogers proposed a coordination distance of 70 km for unsynchronized co-channel systems.¹⁶³ Similarly, the BCBA finds 80 km as an appropriate coordination distance,¹⁶⁴ and the PSBN recommended the use of PFD triggers and coordination distance.¹⁶⁵ CanWISP¹⁶⁶ and TekSavvy¹⁶⁷ proposed the use of a shared access licensing process similar to the one being used by Ofcom, and the Dynamic Spectrum Alliance proposes the use of a DSA system to simplify and facilitate coordination.¹⁶⁸

107. We note that there is no opposition to the measures specified in SRSP 520 and RSS 192 for adjacent band co-existence of flexible use systems and WBS.¹⁶⁹ Question 45 of the Consultation specifically asks for comments on WBS coexistence prior to displacements, and while commenters agree on adjacent band measures which are specified in SRSP 520 and RSS 192, there are various proposals for co-channel co-existence as it does not exist currently. We recommend that the Department should adopt measures for co-channel coexistence, between flexible use and WBS, which are simple to implement and facilitate early flexible use deployment while protecting WBS systems prior to the transition deadline. The use of a DSA like system is simply not practical. The industry does not support such systems and even if it did, the process to agree upon the system and implement it would extend beyond the WBS transition deadline. The measures defined in SRSP 520 and RSS 192 are sufficient for adjacent channel co-existence and the specific coordination measures for co-channel co-existence should be agreed at the RABC.

6.3 Coexistence between flexible use systems and licensed or authorized FSS earth stations

Adjacent band

108. There is general support for the Department's proposal for coordination between FSS earth stations and flexible use licensees deploying within 25 km of those FSS earth stations.¹⁷⁰ However, Corus¹⁷¹ and the North American Broadcasters Association¹⁷² proposed a distance of

¹⁶² Rogers Comments, paragraph 227.

¹⁶³ Rogers Comments, paragraph 229.

¹⁶⁴ BCBA Comments, paragraph 56.

¹⁶⁵ PSBN Comments, paragraph 135.

¹⁶⁶ CanWISP Comments, page 26.

¹⁶⁷ TekSavvy Comments, page 22.

¹⁶⁸ Dynamic Spectrum Alliance Comments, page 9.

¹⁶⁹ CanWISP Comments, page 26; Telus Comments, paragraph 175; and Shaw Comments, paragraph 113.

¹⁷⁰ Intelsat Comments, page 32; Xplornet Comments, paragraph 70; CanWISP Comments, page 26; Rogers Comments, paragraph 232; and Telus Comments, paragraph 176.

¹⁷¹ Corus Comments, page 13

¹⁷² North American Broadcasters Association Comments, page 10.

40 km due to the lack of a guard band during the transition period. In addition, Telesat does not endorse the 25 km distance and proposed to study the distance as part of a SRSP.¹⁷³

109. The proposed 25 km is an appropriate distance for coordination in non-satellite-dependant areas during the transition and is also specified in SRSP 520 and SRSP 303.65 for coordination with FSS earth stations in the 3700-4200 MHz spectrum band. Both Corus and the North American Broadcasters Association acknowledge that 5G and LTE base stations can interfere with co-channel FSS operations within 16 km if the two antennas are not aligned, and up to 40 km if the 5G base station antenna is aligned in the same orientation as the FSS antenna as per the IEEE report. The report also notes that OOB interference clearly exists up to 16 km.¹⁷⁴ We note that the coordination distance of 25 km should be more than sufficient for mitigating adjacent channel interference based on the OOB interference distance provided in the report.

110. SES¹⁷⁵ proposed measures similar to those being used to protect FSS in the 4000-4200 MHz spectrum band in non-satellite-dependant areas for the protection of FSS in the 3700-4200 MHz spectrum band in satellite-dependant areas. Intelsat¹⁷⁶ and Telesat¹⁷⁷ also highlighted the need to protect FSS operations in the entire 3700-4200 MHz spectrum band at designated gateways with respect to the removal of FSS coexistence requirements from SRSP 520. In satellite-dependent areas, we propose that appropriate adjacent channel interference protection measures should be developed through a SRSP process and we also recommend to add the exceptions related to the designated gateway sites in the relevant SRSP.

Co-channel and earth station technical parameters

111. The commenters mostly agreed on adopting U.S. co-existence measures.¹⁷⁸ Intelsat, while supporting U.S. measures, recommended more stringent OOB limits for base stations and proposed to revise the OOB PFD threshold to a lower value where the earth station antenna elevation angle is lower than 19 degrees. Corus¹⁷⁹ and the North American Broadcasters Association¹⁸⁰ recommended mitigation measures which are significantly more stringent than

¹⁷³ Telesat Comments, paragraph 146.

¹⁷⁴ Corus Comments, page 4.

¹⁷⁵ SES Comments, pages 28 and 29.

¹⁷⁶ Intelsat Comments, page 33.

¹⁷⁷ Telesat Comments, paragraph 148.

¹⁷⁸ SES Comments, page 30; Telesat Comments, paragraph 149; Xplornet Comments, paragraph 72; CBC Comments page 17; CanWISP Comments, page 26; Rogers Comments, paragraph 238; Telus Comments, paragraph, 182; Shaw Comments, paragraph 117; and RABC Comments, paragraph 82.

¹⁷⁹ Corus Comments pages 14 to 17.

¹⁸⁰ North American Broadcasters Association Comments, pages 11 and 12.

those set by FCC, notably a 50 MHz guard band, -128 dbm/MHz/m² OOB PFD threshold and -81.6 dbm/MHz in the adjacent flexible use band and the use of a spectral mask on base stations. SES proposed a coordination distance of 70 km for gateway sites.¹⁸¹

112. Corus and the North American Broadband Association present no evidence to justify the significant deviations that they propose in the FCC mandated measures. They propose that the values be measured at the earth station antenna as a total limit from all emissions. The FCC in setting the -124 dbm/MHz/m² PFD limit for the OOB threshold already took into consideration the impact of aggregation from multiple sources.¹⁸² Similarly, Intelsat proposed that more stringent OOB limits be applied to flexible use base stations which can be designed to meet these limits without significant impact and with the added benefit of facilitating protection of FSS earth stations. However, they acknowledge that it may hinder the operation and deployment of 5G handsets.¹⁸³ The measures set by the FCC are designed to protect FSS earth stations and were accepted by the members of both the satellite and broadcasting industry. We see no evidence submitted to deviate from the measures set by the FCC.

113. In addition, a coordination distance with gateway sites and the exception highlighted by Intelsat¹⁸⁴ for earth stations with elevation angles less than 19 degrees should be discussed and agreed upon during the development of a new SRSP or through an update to an existing SRSP. There is not enough evidence to make a decision on these matters in this consultation.

114. There is general support for aligning with the U.S. ecosystem and adopting U.S. mitigation measures is a major part of that alignment. No commenter presented any evidence that suggests otherwise. There are significant benefits to be gained from alignment with the U.S. ecosystem and therefore we strongly recommend that the Department adopt the co-existence measures set by FCC. The adoption of measures that differ from those mandated by the FCC will lead to the development of a unique Canadian ecosystem which will lead to much higher equipment costs in Canada. This in turn will result in higher costs for wireless services, which is contradictory to the Department's mandate.

¹⁸¹ SES Comments, page 31.

¹⁸² FCC Report and Order, FCC 20-22, *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, paragraph 363, available at <https://www.fcc.gov/document/fcc-expands-flexible-use-c-band-5g-0>.

¹⁸³ Intelsat Comments, page 34.

¹⁸⁴ Intelsat Comments, page 34.

6.4 Coexistence between flexible use systems and aeronautical radionavigation systems

115. In their comments, Boeing and the Aviation Industry Associations referred to a report prepared by the Radio Technical Committee for Aeronautics (RTCA Report) and consider a proposed 220 MHz guard band (3980-4200 MHz) to be a necessary but insufficient measure to fully avoid harmful interference with radionavigation systems operating above 4200 MHz.¹⁸⁵ The RTCA Special Committee 239 (SC-239) formed a 5G Task Force in April 2020 to lead this study effort as a multi-stakeholder group after the FCC decision on expanding flexible use services in the C-band.¹⁸⁶ In addition, Transport Canada proposes a list of measures to protect radionavigation systems from interference from flexible use systems operating in the 3650-3980 MHz spectrum band and also regards Telesat's proposal to extend flexible use up to 4100 MHz as high risk.¹⁸⁷

116. We understand the significance of radio altimeters and their use in flight navigation and the risks identified by the aviation industry. However, we have concerns about the conclusions of the RTCA report in light of the analysis of that report submitted by the CTIA to the FCC¹⁸⁸. In its analysis, the CTIA concludes that the RTCA Report's conclusions are unfounded.¹⁸⁹ The CTIA indicates that under the RTCA's analysis, radio operations today in spectrum bands in the vicinity of 4200-4400 MHz would be producing harmful interference to altimeters.¹⁹⁰ There is no evidence that such interference is occurring today. In light of the responses submitted by the CTIA to the FCC, we recommend further study of this issue and that the Department should closely monitor the developments regarding the RTCA report. The measures proposed by Transport Canada are premature and should not be considered by the Department until the conclusion of the discussions on the RTCA report.

117. The transport industry considers the extension of flexible use up to 4100 MHz as a high risk. However, Japan already allows flexible use services up to 4100 MHz and KDDI, a large Japanese telecommunications carrier, uses the entire 4000-4100 MHz band for 5G.¹⁹¹

¹⁸⁵ Boeing and Aviation Industry Associations Comments page 1.

¹⁸⁶ FCC Report and Order, FCC 20-22, *Expanding Flexible Use of the 3.7 to 4.2 GHz Band*, paragraph 363, available at <https://www.fcc.gov/document/fcc-expands-flexible-use-c-band-5g-0>.

¹⁸⁷ Transport Canada Comments, page 3.

¹⁸⁸ CTIA *Ex Parte Presentation, Expanding Flexible Use of the 3.7-4.2 GHz Band*, GN Docket No. 18-122, available at <https://ecfsapi.fcc.gov/file/102753048597/201027%20CTIA%20Ex%20Parte.pdf>.

¹⁸⁹ CTIA *Ex Parte Presentation, Expanding Flexible Use of the 3.7-4.2 GHz Band*, GN Docket No. 18-122, page 18, available at <https://ecfsapi.fcc.gov/file/102753048597/201027%20CTIA%20Ex%20Parte.pdf>.

¹⁹⁰ CTIA *Ex Parte Presentation, Expanding Flexible Use of the 3.7-4.2 GHz Band*, GN Docket No. 18-122, page 16, available at <https://ecfsapi.fcc.gov/file/102753048597/201027%20CTIA%20Ex%20Parte.pdf>.

¹⁹¹ See https://www.soumu.go.jp/menu_new/s-s-new/s/01kiban14_02000378.html.

Additionally low and mid powered applications operate up to 4200 MHz using Ofcom's shared access licences in the U.K.¹⁹² Thus, it appears that flexible use operations in the 4000-4200 MHz frequency range are successfully coexisting with radionavigation services in the 4200-4400 MHz frequency range in some countries.

118. We urge the Department to explore extending flexible use up to 4100 MHz by directing the RABC in conjunction with the aviation industry to carry out a study. The additional 100 MHz of spectrum offers significant economic and societal benefits to Canadians and therefore the Department should take all measures possible to release this spectrum while ensuring the safety of aviation operations.

7.0 LICENSING PROCESS FOR THE NEW FLEXIBLE USE LICENCES

119. No commenters objected to the Department's proposal to use an auction as the licensing process for the flexible use spectrum in the 3800 MHz spectrum band. Auctions that do not implement spectrum set-asides and/or spectrum caps are an efficient, fair and transparent process to assign spectrum to those that value it the most. Thus, if the Department does not adopt the Telesat proposal, we would support the Department's use of an auction as the licensing process for the flexible use spectrum in the 3800 MHz spectrum band. Similarly, if the Department accepts Telesat's proposal, then we support their proposal to return 200 MHz in the 3900-4100 MHz spectrum band for reallocation through an auction process conducted by the Department.

120. Like Rogers and Telus, we recommend that the Department auction the 3800 MHz spectrum band at the same time as the 3500 MHz spectrum band.¹⁹³ As Telus argues, "by including this additional 250 MHz of spectrum in next year's auction, ISED would be able to conduct a single joint assignment stage that creates contiguous allocations across all of the spectrum allocated from 3450-3900 MHz."¹⁹⁴ However, we only recommend a single auction of the 3500 MHz and 3800 MHz spectrum bands if it does not result in a delay of the 3500 MHz auction of more than six months. In addition, if the auction is delayed (in no circumstances by more than six months), then the Department should shorten the transition period in non-urban areas by an equivalent period of time to ensure the timely deployment of this key mid-band spectrum.

¹⁹² See <https://www.ofcom.org.uk/manage-your-licence/radiocommunication-licences/shared-access>.

¹⁹³ Rogers Comments, paragraph E7 and Telus Comments, paragraph 192.

¹⁹⁴ Telus Comments, paragraph 192.

8.0 PROPOSED ACCELERATED SPECTRUM CLEARING APPROACH

Benefits to Canadians

121. Commenters such as CanWISP, Rogers and SaskTel recommended against adopting Telesat's proposal as they believe it is not in the best interests of Canadians.¹⁹⁵ We disagree. The Telesat proposal provides more mid-band spectrum for 5G services than the Department's proposal and does so on an accelerated basis. This will result in the faster and more efficient deployment of 5G services, which in turn will benefit rural connectivity and competition in Canada's wireless market. Thus, Telesat's proposal would meet the Department's policy objectives and maximize benefits to Canadians.

122. Telesat is proposing to make the additional spectrum available for flexible use following the same timeline as 3500 MHz. As a result, in areas with large urban population centres the spectrum will be available in the first part of 2022, and in areas where the largest population centre is greater than 30,000 people, spectrum will be available in the second part of 2023. This implies that for the vast majority of the Canadian population, operators will have access to 3800 MHz spectrum prior to the Department's proposed clearing date of 5 December 2023.

123. Telus noted that the Telesat proposal clearly takes into consideration rural and remote connectivity as part of their proposed transition plan.¹⁹⁶ Telesat's proposal would protect existing rural and remote connectivity through the deployment of LEO satellites and the payment of costs related to the transition process. Telesat has indicated that they will use the proceeds from the private sale to support the deployment of its LEO satellite constellation which will protect service continuity for eligible earth stations. Telesat will also "cover reasonable, direct, out-of-pocket expenses incurred by the Eligible Earth Station operators as a result of the transition, provided that they receive reasonable cooperation in the process, including access to technical information and facilities."¹⁹⁷ Deploying a substitute for C-band spectrum (i.e., Telesat's LEO project) and covering transition costs will allow existing users to continue to invest and provide service in rural and remote areas rather than spend capital covering relocation costs. This is in contrast to the Department's proposal that makes no comment regarding the compensation of reasonable transition costs for existing satellite operators, FSS users, and WBS systems.

¹⁹⁵ CanWISP Comments, page 28; Rogers Comments, paragraph 272; and SaskTel Comments, paragraph 26.

¹⁹⁶ Telus Comments, paragraph 212.

¹⁹⁷ Telesat, "Fast tracking affordable, Canada-wide 5G and universal connectivity with 3800 MHz spectrum", 5 July 2020, paragraph 48.

124. In addition, Telesat's proposal will preserve connectivity in satellite-dependent areas:

Telesat understands and agrees entirely with the basic imperative to preserve the vital services that satellite-dependent areas rely upon. Ensuring continuity of services is a basic premise of the Telesat Proposal. On that basis, Telesat would not oppose defining satellite-dependent areas or applying different protections within those areas.¹⁹⁸

125. We support the Department's proposal to allow existing licensed FSS earth stations to continue to operate in the entire 3700-4200 MHz spectrum band in satellite-dependent areas and be protected from interference from in-band flexible use operations. We recommend that this also be adopted if the Telesat proposal is accepted. As the above quote indicates, existing users of 3800 MHz spectrum in satellite-dependent areas can also be protected under Telesat's repurposing plan.

126. Unlike the Department's proposal, Telesat's has the additional benefit of ensuring wireless operators will know their 3500 MHz and 3800 MHz spectrum holdings prior to deploying 3500 MHz spectrum:

Specifically, ISED's Proposal would not enable an auction of 3800 MHz until well after the 3500 MHz auction and the spectrum would not be available for deployment until December 2023. This timeline would effectively require wireless carriers to acquire and deploy their 3500 MHz spectrum without knowing their 3800 MHz holdings. This would necessitate the carriers deploying equipment to launch on 3500 MHz spectrum (in 2021) and then be forced to duplicate that expensive process in order to launch on 3800 MHz spectrum (in 2024).¹⁹⁹ [footnotes omitted]

127. Thus, Telesat's proposal meets the Department's policy objectives and maximizes the benefits of the 3800 MHz spectrum band to Canadians.

Conditions of licence, service areas and licence term

128. If the Department adopts the Telesat proposal, we would support the use of the 3500 MHz flexible use CoLs for the flexible use licences in the 3800 MHz spectrum band with the exception that the LTE deployment requirement in the 3500 MHz CoLs should be omitted. The use of the 3500 MHz flexible use CoLs for the flexible use licences in the 3800 MHz spectrum band was

¹⁹⁸ Telesat Comments, paragraph 168.

¹⁹⁹ Telesat Comments, paragraphs 7 and 8.

also supported by a number of commenters.²⁰⁰ General alignment between the two sets of conditions will reduce complexity and promote a stable, predictable regulatory regime.²⁰¹

129. With respect to deployment, we recommend adopting the same general deployment requirement that will apply to flexible use licences in the 3500 MHz spectrum band. The Department should not, however, adopt the additional deployment requirements that will be applied to LTE operators of 3500 MHz spectrum. As described in our initial comments, these additional obligations are unduly punitive to Canada's LTE service providers, and are excessively proscriptive given the uncertainty about how 5G will be used.²⁰²

130. Given that 3500 MHz spectrum and 3800 MHz spectrum will likely be deployed at the same time, both sets of licences should have a 20 year licence term. Long-term, or indeed indefinite, licence terms are appropriate in consideration of the very significant investments required by carriers to deploy spectrum, the need to coordinate with international standards bodies and equipment manufacturers, and the technology lifecycles common in the wireless industry. Therefore, we recommend that the 3800 MHz licences have a term of 20 years from the date they become usable.

Nature and timing of the Minister's approval

131. As indicated in our initial comments, additional clarity from the Department is required regarding the extent to which the Minister and the Department may, as a condition of approval, require changes to any agreement between Telesat and a potential acquirer of spectrum. Telesat will need to clarify what will happen in their process if the Minister rejects the transfer application (e.g., will the potential acquirer have an opportunity to renegotiate the initial agreement). In order to avoid uncertainty regarding Ministerial approval and having to renegotiate the initial agreement, we recommend that the Department indicate that there will be a high expectation of approval if the proposed transfer satisfies all eligibility conditions required by the Department.

²⁰⁰ BCBA Comments, paragraph 71; Cogeco Comments, paragraph 100; QMI Comments, paragraph 105; Rogers Comments, paragraph 296; SaskTel Comments, paragraph 164; and Telus Comments, paragraph 226.

²⁰¹ As we have stated in numerous consultations, including most recently in our Comments on the 3500 MHz Policy and Licensing Framework (SLPB-002-19) and the BRS Licence Renewal Process (DGSO-002-19), we continue to recommend that ISED eliminate or reduce the scope of the CoLs related to 1) research and development, 2) mandatory roaming, and 3) annual reporting. However, in the interest of accelerating the release of much needed mid-band 5G spectrum, we would support the adoption of the 3500 MHz CoLs, which did not address the problems associated with these CoLs, with only minimal changes.

²⁰² BCE Inc. Comments, paragraphs 122 to 126.

132. If Telesat's private allocation process takes place prior to the 3500 MHz auction, then it is imperative that the Minister's decisions on any transfer requests are completed at least one month prior to the commencement of the 3500 MHz spectrum auction. This timing would provide bidders in the 3500 MHz spectrum auction with certainty regarding the amount of 3800 MHz spectrum that all auction participants have secured and adjust their bidding strategies for the 3500 MHz auction accordingly.

Set-asides and/or spectrum caps distort the allocation of spectrum

133. While several commenters supported the implementation of spectrum set-asides and/or spectrum caps in the event that the Telesat proposal is adopted,²⁰³ there is an abundance of compelling evidence that these measures distort the allocation process, and are not necessary in today's highly competitive wireless market. Further, use of such measures could significantly obstruct or delay the achievement of the full benefits of 5G technologies.

134. Previous Canadian auctions employing set-asides have proven that they distort the allocation process to the significant benefit of the set-aside spectrum recipients and the detriment of Canadian taxpayers. Set-aside licences enable the favoured bidders to asymmetrically raise costs for set-aside-ineligible bidders at little risk to themselves. The Canadian auctions for AWS-1, 700 MHz and 600 MHz spectrum – all of which had spectrum set-asides – resulted in some of the highest prices paid for spectrum in the world. Another example of the distortive impacts of set-asides is the AWS-3 auction where Wind (now Shaw), QMI and Eastlink all won significant blocks of spectrum covering most of the country for a combined total of less than \$100 million or about \$0.11/MHz-Pop. In contrast, incumbents paid over \$3/MHz-Pop for comparable spectrum – about 28 times as much.

135. Rogers highlighted how out of step Canadian auction prices are with the rest of the world:

Between 2008-2016, Canadian operators paid roughly US\$350 per person to acquire spectrum at auctions, compared to under US\$200 in the United States and just over US\$50 in the United Kingdom. That figure has risen to C\$452 for Canadian operators, including recent auctions such as 2019's 600 MHz.²⁰⁴

²⁰³ BCBA Comments, paragraph 74; CanWISP Comments, paragraph 26; CCSA Comments, paragraph 30; Cogeco Comments, paragraph 77; PIA Comments, paragraphs 170 to 176; QMI Comments, paragraph 98; SaskTel Comments, paragraphs 174 and 175; Shaw Comments, paragraph 42; TekSavvy Comments, page 28; and Telus Comments, paragraphs 203 to 205.

²⁰⁴ Rogers Comments, paragraph 28.

136. After 12 years of auction-related advantages and over \$5 billion in auction-related financial subsidies, implementing spectrum set-asides and/or spectrum caps for the allocation of 3800 MHz spectrum, and other future allocations, would be gratuitous, not to mention an unnecessary Government intervention. There is an abundance of compelling evidence that today's wireless marketplace is highly competitive. All carriers compete vigorously to offer the highest speeds, widest and most reliable coverage, best customer service, support for the latest devices, and innovative product and service offerings. Further, the regional providers are demonstrably well-established, successful, in no danger of involuntarily exiting the market and have the financial means necessary to compete for spectrum.

137. Finally, spectrum set-asides and spectrum caps restrict the amount of spectrum available to service providers to the detriment of Canadians across the country. Access to large blocks of contiguous spectrum is necessary for the full benefits of 5G technologies to be realized. In addition, as Rogers observed, a set-aside will only increase fragmentation risks across the band, which will further inflate costs to deploy and jeopardize the ability of operators to acquire sufficient amounts of contiguous spectrum.²⁰⁵

Rogers' asymmetric spectrum cap proposal

138. The proposal by Rogers to apply an asymmetric spectrum cap targeting Bell and Telus is a blatant attempt to convince the Department to impose an unprecedented new rule that would allow Rogers to secure more spectrum than either of its two largest competitors. As explained below, Rogers' submission fails to articulate why regulatory intervention is necessary. Moreover, Rogers does not need any assistance from the Department to acquire spectrum and remain competitive with other network operators.

139. Rogers fails to make a clear case for the need for regulatory intervention. They themselves acknowledge that "over the last 15 years, the key dynamic driving service and price innovation in the mobile wireless industry has been competition between Rogers, Bell, and Telus."²⁰⁶ They then proceed to claim, without explanation, that past pro-competitive measures have "had unintended consequences of negatively influencing competition amongst national carriers, exacerbated by the Belus joint network." It is not clear what these negative consequences to competition are, aside from the fact that Bell and Telus have both acquired

²⁰⁵ Rogers Comments, paragraph 27.

²⁰⁶ Rogers Comments, paragraph 31.

similar amounts of spectrum at auction to Rogers at a lower cost. Rogers does not explain how this outcome is the result of a network sharing agreement between Bell and Telus, nor what its ultimate impact is to competition or to the Canadian public. Rogers does not dispute that Bell and Telus actively compete against each other in retail and wholesale markets. The primary complaint seems to be that Rogers is dissatisfied with its own business model and previous auction results. Rogers is simply seeking to use the Department's auction rules to secure a new competitive advantage for itself.

140. If adopted, such a spectrum cap would result in significant asymmetry in 5G spectrum holdings between the three national providers, and would give Rogers a major unwarranted advantage on a MHz per subscriber basis. While Rogers claims that a "network-level" spectrum cap would prevent outcomes that are "too asymmetric" between networks,²⁰⁷ it is worth noting that Rogers has more spectrum per subscriber than either Bell or Telus.²⁰⁸ In addition, in the 600 MHz auction in 2019, Rogers spent \$1.7 billion to acquire 52 of the 64 spectrum licences available for them to bid on, and CEO Joe Natale announced afterwards: "This spectrum is vital to the deployment of 5G in Canada and we are well positioned to bring the very best of 5G to Canadians."²⁰⁹ Moreover, Rogers has multiple spectrum sharing arrangements of their own, e.g., with Tbaytel and QMI,²¹⁰ and acknowledges that network sharing "can be quite beneficial."²¹¹ Rogers does not need new regulatory rules that would allow it to gain any advantage, and it does not need help acquiring sufficient spectrum to serve its subscribers and deploy 5G.

141. For all of the above reasons, Rogers' proposal to impose an asymmetric spectrum cap should be rejected.

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²⁰⁷ Rogers Comments, paragraph 36.

²⁰⁸ See Table 1 of Telus' Comments on SLPB-002-19 (Consultation on the 3500 MHz Auction Framework) at paragraph 73 which shows Rogers at 23 MHz/subscriber compared to Telus at 19 MHz/subscriber and Bell at 18 MHz/subscriber. It should be noted that none of the incumbent wireless carriers comes close to the MHz/subscriber held by Eastlink (60 MHz/subscriber), Shaw (41 MHz/subscriber) and QMI (32 MHz/subscriber).

²⁰⁹ See <https://about.rogers.com/2019/04/10/rogers-secures-new-5g-spectrum-every-province-territory/>.

²¹⁰ 2019 Annual report, page 33. Available at: https://www.annualreports.com/HostedData/AnnualReports/PDF/NYSE_RCI_2019.pdf.

²¹¹ Rogers Comments, paragraph 39.