

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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**COMMENTS
OF
BCE INC.**

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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 Comments on the proposed revisions to the 3650-4200 MHz spectrum band (referred to as the 3800 MHz spectrum band) to accommodate flexible use, as well as proposals for changes to the frequency allocation of the 3500-3650 MHz spectrum band.

2. We agree with the Department's assessment that "additional spectrum for flexible use will enable providers to increase network capacity to meet the traffic demands of higher usage rates and support the provision of next-generation wireless technologies," and that "the development and deployment of 5G technologies is essential to Canada becoming a global centre for innovation and will bring Canada to the forefront of digital development and adoption through the creation and strengthening of a world-class wireless infrastructure."¹ Thus, we fully support the Department's proposed adoption of a flexible use licensing model for fixed and mobile services in the 3800 MHz spectrum band. Like the 3500 MHz spectrum band, this spectrum band will be used for both mobile and fixed 5G services, and a flexible use model will allow operators to deploy the type of service that best fits their customers' needs. This allocation will also allow Canadians to continue to benefit from cutting-edge wireless services and applications while ensuring Canada's wireless networks remain world-class.

5G equipment ecosystem and contiguous spectrum

3. The equipment ecosystem under band class n78 (3300-3800 MHz) is at a more advanced stage of maturity than that of band class n77 (3300-4200 MHz) due to demand from markets like Europe where spectrum releases have been focused on the 3400-3800 MHz range. However, as the Department noted, the U.S. plans to release flexible-use spectrum from 3700-3980 MHz through an auction in December 2020. As a result, the ecosystem for n77 equipment is expected to develop in the near future, and will be mature by the time 3800 MHz spectrum is made available in Canada. Moreover, 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 n78 or n77.

¹ The Consultation, paragraph 5.

Operators will likely choose which band class to operate on based on their network configuration requirements and the broader device ecosystem.

4. 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 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. This requires that the Department have one Radio Standards Specification (RSS) document that relates to both the 3500 MHz and 3800 MHz spectrum bands. Such harmonization must remove any future risk of backward compatibility and performance issues. 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 auction. This will allow for a more efficient deployment of equipment and ensure that base station devices do not need to be replaced in order to access 3800 MHz when it is deployed in the network or are delayed in being brought into service due to a slow certification process.

5. While non-contiguous carrier aggregation will be a useful tool to increase channel size, contiguous spectrum offers benefits that cannot be achieved through carrier aggregation. Contiguity between the 3500 MHz spectrum band and 3800 MHz spectrum band would allow the mobile industry to maximize the benefits of 5G technology. 5G technology is designed to be optimized through the use of large contiguous blocks. While the most often cited benefit of larger channel sizes is greater peak speeds and spectral efficiency, the positive impact to latency and reliability is also significant. Although current user requirements are based on high bandwidth, latency and reliability are expected to play a vital role in real-time applications and mission-critical networks. 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. These benefits cannot be achieved to the same extent without access to contiguous spectrum.

Wireless Broadband Service and the 3650-3700 MHz spectrum band

6. We support the Department's proposal to move Wireless Broadband Services (WBS) from 3650-3700 MHz to allow for the significant benefits of having contiguity between the 3500 MHz and 3800 MHz spectrum bands. This will support the efficient use of spectrum as operators will

not need to incorporate two sets of technical specifications between the 3500 MHz and 3800 MHz spectrum bands. However, we do not support the Department's proposal to move WBS to the 3900-3980 MHz spectrum band. Instead, we recommend the Department move WBS to 3400-3450 MHz and continue with the current licensing process for WBS spectrum.

7. The 3rd Generation Partnership Project (3GPP) has defined the LTE band classes as only extending to 3800 MHz (band classes B42 and B43). As a result, existing equipment deployed by WBS operators will not support the upper portion of the 3800 MHz spectrum band. Therefore, if WBS is moved to 3900-3980 MHz, then existing equipment, including both radios and customer premise equipment, would need to be removed and replaced with new equipment. This would be both costly and time-consuming. We estimate that a WISP serving 5,000 subscribers using WBS spectrum would likely need to spend between \$15-\$20 million to replace their radios and customer premise equipment (CPE) if required to move to 3900-3980 MHz.

8. By contrast, most existing WBS equipment should be able to operate in the 3400-3450 MHz spectrum band and would not need to be replaced, thereby saving existing WBS operators the expense of replacing their entire network. In addition, the transition to 3400-3450 MHz would be quicker than relocating to 3900-3980 MHz since equipment would only need to be re-tuned to a lower frequency rather than being replaced.

Satellite-dependent areas

9. We support maintaining the primary allocation of fixed satellite services (FSS) in the entire 3700-4200 MHz spectrum band in satellite-dependent areas. Northwestel and Bell Canada rely on the C-band to provide voice and cellular service, critical Government services (e.g., healthcare and education), and aeronautical related services (e.g., Nav Canada), to satellite-dependent communities today. The C-band plays an important role in providing connectivity and critical services to the North, which we consider as rural and remote areas located in the northern part of Canada and served mostly by satellite connectivity. It is well suited for the continued provision of connectivity services in the North due to its resilience to atmospheric attenuation and existing infrastructure. It is important to protect this C-band connectivity in the North until suitable alternatives are available.

10. It is difficult to predict the timing associated with the migration away from C-band as it depends on the availability of suitable capacity at higher frequencies, among other factors. Most Low Earth Orbit (LEO) satellite networks are still in the planning phase and have not yet launched on a commercial basis. The Department should take into consideration the status of LEO network deployments and specifically their coverage of the North when assessing the ability of FSS users to migrate. Due consideration should also be given to the development of necessary infrastructure such as earth stations to support LEO satellite networks in the North. As a result, we recommend that current FSS in the C-band remain protected in the North until the migration to LEO satellite networks is feasible.

Telesat proposal

11. We support the proposal submitted by Telesat to: (i) clear the 3700-3900 MHz spectrum band on the same timeline as the 3500 MHz process; (ii) make that spectrum available via a private sale in the secondary market; and (iii) clear an additional 200 MHz of spectrum in the 3900-4100 MHz spectrum band by 5 December 2025. 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.

12. Telesat's proposal to make spectrum from 3700-3900 MHz available on the same timeline as 3500 MHz spectrum will deliver 5G services to Canadians faster and allow carriers to benefit from access to larger blocks of contiguous spectrum sooner. Provided the Department moves the WBS band from its current location as proposed, allocating the 3700-3900 MHz spectrum on the same timeline as the 3500 MHz auction would give operators the opportunity to acquire contiguous spectrum across the entire 3500-3900 MHz spectrum range.

13. Telesat's proposal also satisfies a number of the enabling guidelines of the *Spectrum Policy Framework for Canada*, including:

(a) market forces should be relied upon to the maximum extent feasible;

...

(f) spectrum management practices, including licensing methods, should minimize administrative burden and be responsive to changing technology and market place demands; and

...

(h) spectrum policy and management should support the efficient functioning of markets by:

- permitting the flexible use of spectrum to the extent possible;
- ...
- making spectrum available for use in a timely fashion;
- facilitating secondary markets for spectrum authorizations; [and]
- ...
- reallocating spectrum where appropriate, while taking into account the impact on existing services²

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

15. While we support Telesat's proposal, additional clarity is required for potential participants to effectively participate in Telesat's allocation process. The issues that require clarification include: (i) conditions of licence, service areas and licence term for the licences to be transferred from Telesat; (ii) the structure of the private sale; and (iii) the nature and timing of the Minister's assessment approach for subsequent licence transfer applications.

(i) Conditions of licence, service areas and licence term

16. Potential participants in Telesat's private sale will need to have a clear understanding of the terms and conditions of the licences they will be purchasing. 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 one exception related to the LTE deployment requirement which is discussed further in our response to Question 56. General alignment between the two sets of conditions will reduce complexity and promote a stable, predictable regulatory regime.

(ii) Structure of the private sale

17. Telesat has indicated that they would release the initial 200 MHz of spectrum for flexible use on the same timeline as the 3500 MHz transition plan. This would require Telesat's allocation process be completed prior to the end of 2021. To provide potential participants with sufficient

² ISED, DGTP-001-07 - *Spectrum Policy Framework for Canada*, June 2007, page 9.

time to prepare, they will need detailed information regarding the rules and process of the private sale. For example, Telesat must clarify whether the sale will be executed through an auction process (with or without an opportunity to revise bids) or through bilateral negotiations. In addition, the timing must be made clear – specifically, whether or not the process will begin and end prior to the 3500 MHz spectrum auction.

(iii) Nature and timing of the Minister's approval

18. We agree with Telesat that the Department's existing policies provide a "ready mechanism for the Minister and the Department to ensure that the secondary market transactions do not distort the competitive landscape"³ because the Minister must approve any spectrum transfer. However, 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.

19. 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.

Recovery of transition costs

20. Telesat has indicated that they will use the proceeds from the private sale of spectrum in the 3700-3900 MHz range to "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."⁴ Covering

³ Telesat, "Fast tracking affordable, Canada-wide 5G and universal connectivity with 3800 MHz spectrum", 5 July 2020, paragraph 43.

⁴ Telesat, "Fast tracking affordable, Canada-wide 5G and universal connectivity with 3800 MHz spectrum", 5 July 2020, paragraph 48.

reasonable transition costs 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 that makes no comment regarding the compensation of reasonable transition costs for existing satellite operators, FSS users, and WBS systems.

21. 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.

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. Allocating spectrum for 5G services in the 4000-4100 MHz frequency range is possible. For example, in April 2019 Japan assigned the 3600-4100 MHz and 4500-4600 MHz frequency ranges for nationwide use.⁵ Moreover, given that band class n77 goes up to 4200 MHz and that we expect an ecosystem that incorporates this band class to develop in the near future, 5G equipment should become available that supports flexible use in the 4000-4100 MHz spectrum band. A report published by Global Suppliers Association (GSA) in September 2020 ranks n77 as one of the top five 5G New Radio (NR) band classes having more than 150 devices announced that will support this band.⁶

23. In addition, Telesat has indicated that it will be able to provide spectrum for flexible use in the 3700-4100 MHz spectrum band by December 2025. As Telesat is the primary satellite provider of data connectivity in Canada, its conclusion that 100 MHz (4100-4200 MHz) provides sufficient capacity to continue FSS services in non-satellite-dependent areas should be given significant weight by the Department. 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.

⁵ Analysys Mason, "5G Mid-band Spectrum Global Update," March 2020, page 3.

⁶ 5G Devices, A report by Global Suppliers Association, October 2020.

24. In the remainder of our Comments, wherever there is a reference to the Department's proposal to allocate spectrum in the 3650-4000 MHz spectrum band for flexible use, we do not support this proposal and instead, we recommend that the Department allocate spectrum in the 3650-4100 MHz spectrum band.

2.0 DEVELOPMENT OF THE 5G EQUIPMENT ECOSYSTEM

Q1. ISED is seeking comments on the timelines for the development of an equipment ecosystem using 5G technologies in the 3800 MHz band. In particular:

- a) the ecosystem maturity level and readiness of equipment under band classes n77 or n78 for the Canadian market**
- b) the ability of existing or future base station radios to handle multiple technologies and band classes at the same time (i.e. whether all four band classes (B42, B43, n77 and n78) or a subset of these band classes are able to operate on the same base station radio) and how it may affect the adoption of 5G technologies in the 3800 MHz band**

25. The equipment ecosystem under band class n78 (3300-3800 MHz) is at a more advanced stage of maturity than band class n77 (3300-4200 MHz), due to demand from markets like Europe where spectrum releases have been focused on the 3400-3800 MHz range. However, as the Department noted, the U.S. plans to release flexible-use spectrum from 3700-3980 MHz through an auction in December 2020. As a result, the ecosystem for n77 equipment is expected to develop in the near future, and will be mature by the time 3800 MHz spectrum is made available in Canada.

26. 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 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. This requires that the Department have one RSS document that relates to both the 3500 MHz and 3800 MHz spectrum bands. Such harmonization must remove any future risk of backward compatibility and performance issues. 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) and network equipment made available prior to 3800 MHz auction. This will allow for a more efficient deployment of equipment and ensure that base station devices do not need to be replaced in order to access 3800 MHz when it is deployed in the network or are delayed in being brought into service due to a slow certification process.

27. Regarding the ability of base station radios to handle multiple technologies and band classes, some existing radios are able to support LTE (which includes band classes B42 and B43) and 5G at the same time, which is known as concurrent mode. Concurrent mode requires that LTE and 5G each operate over separate channels. The ability to operate both LTE and 5G using dynamic spectrum sharing is currently not supported and will take time to develop.

28. 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 n78 or n77. Operators will likely choose which band class to operate on based on their network configuration requirements and the broader device ecosystem.

Q2. ISED is seeking comments on the potential linkages between the equipment ecosystems using 5G technologies in the 3500 MHz and 3800 MHz bands. In particular:

- a) whether contiguity between the 3500 MHz band and 3800 MHz band is preferred given that 3GPP specifications allows for non-contiguous carrier aggregation**
- b) whether there are any technical or operational impediments (e.g. equipment limitations/challenges to support aggregated use of spectrum, or requirements for additional base station radios) that would be incurred if operators have a large frequency separation between frequency blocks in one or both bands, and at what point (i.e. how wide the frequency separation) such impediments would become significant**
- c) whether the equipment ecosystem deployed for the 3500 MHz band will be able to operate in the 3800 MHz band, and whether this equipment could easily be extended to 3800 MHz after being deployed**

In providing comments, respondents are requested to include supporting arguments and rationale.

29. While non-contiguous carrier aggregation will be a useful tool to increase channel size, contiguous spectrum offers benefits that cannot be achieved through carrier aggregation. Contiguity between the 3500 MHz spectrum band and 3800 MHz spectrum band would allow the mobile industry to maximize the benefits of 5G technology.

30. 5G technology is designed to be optimized through use of large contiguous blocks. While the most often cited benefit of larger channel sizes is greater peak speeds and spectral efficiency, the impact to latency and reliability is also significant. Although current user requirements are based on high bandwidth, latency and reliability are expected to play a vital role in real-time

applications and mission-critical networks. 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. These benefits cannot be achieved to the same extent without access to contiguous spectrum.

31. Using large amounts of contiguous spectrum (in comparison to carrier aggregation) will reduce both the complexity and power consumption required for radio frequency (RF) front end devices, as well as reduce processing time for 5G devices and baseband equipment. In addition, contiguous spectrum allows for increased spectral efficiency since fewer resources need to be dedicated to control channels. The Electronic Communications Committee (ECC) has stated:

By design, 5G NR [New Radio] will optimally support wideband operation, allowing operators to take full advantage of larger allocations of contiguous spectrum to increase peak rates and user experience, with manageable terminal complexity and minimal power consumption (e.g. without requiring carrier aggregation in [the] case of New Radio).⁷

32. In addition, access to large amounts of contiguous spectrum would allow operators to use innovative techniques such as network slicing without requiring carrier aggregation. The concept of network slicing is a key mechanism for 5G networks, and all 5G-related specifications have been developed by 3GPP from the beginning with the aim to support end-to-end slicing mechanisms, allowing user equipment to connect to multiple network slices at the same time.

33. Technical and operational limitations would arise if operators have a large frequency separation between blocks in the 3500 MHz and 3800 MHz spectrum bands. In scenarios where carriers hold non-contiguous 3500 MHz and 3800 MHz spectrum, they may need to use multiple radios. Existing limits of the instantaneous bandwidth (IBW) and operating bandwidth (OBW) will prevent the use of a single radio to cover the entire 3300-4200 MHz range. IBW refers to the bandwidth in which all frequency components can be simultaneously analyzed, while OBW refers to the bandwidth occupied by the base station when operated, defined by the sum of the active bandwidths of all carriers. If an operator holds spectrum blocks separated further than the IBW, then two different radio units are required. Commercially available NR base stations operating in the 3400-3800 MHz spectrum band typically have an IBW smaller than 200 MHz, and while we expect this range to be expanded over the next two to three years, the IBW will likely not grow beyond 400 MHz. Therefore, if an operator holds spectrum at the low end of the 3500 MHz

⁷ ECC Report 287, page 16. Available online at: <https://docdb.cept.org/download/3a143dbe-7cbc/ECCRep287.pdf>.

spectrum band and the high end of the 3800 MHz spectrum band, they would not be able to support both blocks on a single radio.

34. Using multiple radios increases costs and operational complexity for operators. Not only does this double the cost of equipment and installation, the need to install multiple radios can pose logistical problems on crowded towers. Many existing sites have limited available space, and a lack of sufficient room to add multiple new radios would require new towers to be built at additional time and expense. As a result, there will be technical and operational advantages to acquiring spectrum that is contiguous or that has a relatively small frequency separation.

35. Given the need for contiguity between the 3500 MHz and 3800 MHz spectrum bands, it is imperative that the 3650-3700 MHz spectrum band is available for flexible use. As a result, we support the Department's proposal to move WBS from this frequency range. However, as described in our response to Question 15, we disagree with the Department's proposal to move WBS to the 3900-3980 MHz spectrum band, and recommend instead moving WBS down to the 3400-3450 MHz spectrum band.

36. Current equipment deployed for the 3500 MHz spectrum band in Canada aligns with European standards and can operate up to 3800 MHz. Hardware limitations including the IBW, OBW and the cavity filter would prevent operators from retuning this equipment to operate on higher frequencies. As described above, the IBW and OBW restrict the bandwidth a single radio can span, with most current equipment having an IBW smaller than 200 MHz. The cavity filter is a physical filter installed on the radio, and therefore cannot be modified to allow for operation above 3800 MHz. As a result, the equipment ecosystem deployed in the 3500 MHz spectrum band will be able to extend to 3800 MHz, but not beyond.

Q3. ISED is seeking comments on how the difference in technical rules between the U.S. and EU could impact Canada's ability to leverage the economies of scale from the global 3800 MHz ecosystem. In particular:

- a) would the difference in technical rules (such as out-of-band-emission (OOBE) power limits) result in two distinct region-specific equipment ecosystems
- b) which equipment ecosystem would be more suitable in the Canadian environment (noting that Canada has, for the most part, aligned with the U.S. on low- and high-band spectrum for 5G but in the mid-band, Canada is more aligned with the EU in the 3500 MHz band (3450-3650 MHz)) and specifically, whether Canada should generally align its technical rules with the U.S. or the EU in the 3800 MHz band

In providing comments, respondents are requested to include supporting arguments and rationale.

37. We expect that the difference in technical rules between the U.S. and EU will result in two distinct region-specific equipment ecosystems, which will complicate Canada's ability to leverage economies of scale. As the Department notes, Canada is more aligned with the EU in the 3500 MHz spectrum band, and the equipment ecosystem for this set of standards is now well established. However, the EU has not yet set specifications for spectrum above 3800 MHz since they do not have near-term plans to expand the band this far. The U.S., on the other hand, has published standards for the 3700-4000 MHz spectrum band ahead of their December 2020 auction for this spectrum. As a result, we recommend that the Department align with the EU's technical rules on the lower side 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 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.

38. We note that Canadian operators will first deploy 5G technology using the n78 equipment ecosystem, and eventually migrate to n77 once 3800 MHz spectrum is made available. As a result, as indicated above, the Department must have one RSS relating to both the 3500 MHz and 3800 MHz spectrum bands to ensure harmonization between the technical requirements of the two ecosystems to promote efficient deployment.

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

Q4. ISED is seeking comments on the proposal to add a primary mobile service, except aeronautical mobile, allocation in the 3700-4000 MHz band to the CTFA and the specific changes shown in annex B.

In providing comments, respondents are requested to include supporting arguments and rationale.

39. We support the Department's proposal to add a primary mobile allocation in the 3700-4000 MHz spectrum band (or 4100 MHz in the case of the Telesat proposal), excluding aeronautical mobile service. We also support the specific changes to the Canadian Table of Frequency Allocation (CTFA) proposed in annex B.

40. We agree with the Department's assessment that making additional mid-band spectrum available for mobile use is important for the development of next-generation wireless services:

Mid-band spectrum is important for next generation wireless services due to its favourable propagation and capacity characteristics. [...] The capacity of flexible use networks in the 3500 MHz band could be further increased by making portions of spectrum within the 3650-4200 MHz band available for similar use. ISED is of the view that repurposing portions of the 3650-4200 MHz band that would allow for a similar flexible use licensing model would foster more efficient and intensive use of mid-band spectrum to facilitate and incentivize investment in next generation wireless services.⁸

41. In addition, as stated in the Consultation, allowing mobile use would align with the U.S. and facilitate the adoption of common industry equipment standards allowing for economies of scale in equipment manufacturing.

3.2 Flexible use in the 3650-4000 MHz spectrum band

Q5. ISED is seeking comments on developing a flexible use licensing model for fixed and mobile services in the 3650-4000 MHz band.

In providing comments, respondents are requested to include supporting arguments and rationale.

42. We agree with the Department's proposed adoption of a flexible use licensing model for fixed and mobile services in the 3650-4000 MHz spectrum band. Like the 3500 MHz spectrum band, this spectrum band will be used for both mobile and fixed 5G services, and a flexible use model will allow operators to deploy the type of service that best fits their customers' needs.

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

Harmonization of FSS use

Q6. Given the proposal in section 7.2 on developing a flexible use licensing model for fixed and mobile services in the 3650-4000 MHz band, ISED is seeking comments on the proposal that no new FSS earth stations be authorized in the 3700-4000 MHz band in the future and that the authorization of new FSS earth station licences be limited to the 4000-4200 MHz band.

43. We agree with the Department's proposal that no new FSS earth stations be authorized in the 3700-4000 MHz spectrum band (or 3700-4100 MHz in the case of the Telesat proposal) in

⁸ The Consultation, paragraph 50.

the future. This will facilitate the deployment of fixed and mobile services in this band. We note that the Department does not distinguish between satellite-dependent and non-satellite-dependent areas with respect to this proposal. We recommend that this restriction apply to both areas. The restriction will ensure that all new FSS earth stations operate only in the 4100-4200 MHz spectrum band which will minimize the efforts to transition FSS out of the 3700-4100 MHz portion of the band.

44. Maintaining existing satellite connectivity is essential for communities in the North. Northwestel and Bell Canada provide services to a number of satellite served communities that are located in the satellite-dependent areas identified in the Consultation. Until a suitable substitute (such as LEO satellites) for the existing satellite connectivity over C-band is available in the North, FSS should be allowed to: (i) use the entire spectrum band from 3700-4200 MHz; (ii) add new carriers on existing earth stations within this spectrum band; and (iii) move transponders within the 3700-4200 MHz spectrum band for optimization.

45. The Department is proposing that the existing authorized FSS earth stations would continue to be licensed for the entire 3700-4200 MHz spectrum band in satellite-dependent areas and support this proposal. However, existing authorized earth stations should continued to be allowed to make operational changes such as swapping RF carriers for transponder optimization. Moreover, the existing authorized earth stations in satellite-dependent areas should be allowed to add new carriers within the entire 3700-4200 MHz spectrum band. This is necessary to ensure that neither the existing arrangements nor the short- to mid-term plans for existing FSS earth station operators in satellite-dependent areas are disrupted as a result of the repurposing of the 3800 MHz spectrum band in non-satellite-dependent areas.

Guard band between flexible use and FSS

Q7. ISED is seeking comments on the proposal to implement a 20 MHz guard band between 3980-4000 MHz to protect FSS operations in 4000-4200 MHz band from proposed flexible use operations in the 3700-3980 MHz band.

46. We support the Department's proposal to implement the 20 MHz guard band at the upper end of the 3800 MHz spectrum band to protect the FSS operations.

Maintaining FSS services in satellite-dependent areas

Q8. ISED is seeking comments on the proposal to maintain a primary allocation to FSS in the entire 3700-4200 MHz band and the proposal that existing FSS earth stations in satellite-dependent areas remain licensed in the entire 3700-4200 MHz band.

47. We support the primary allocation of FSS in the entire 3700-4200 MHz spectrum band in satellite-dependent areas along with the addition of footnote CZZ as proposed in section 9.5 of the Consultation. Moreover, as indicated above in our response to Question 6, existing authorized earth stations should be allowed to add new carriers within the entire 3700-4200 MHz in these areas.

Q9. ISED is seeking comments on the future demand for C-band in rural and remote areas such as the North, including the following:

- a) the trend towards using higher frequencies by FSS operations to provide broadband connectivity**
- b) the ability of using higher frequencies to replace current C-band capacity and the potential timelines**
- c) the possibility of a trend towards using 4000-4200 MHz in combination with other connectivity options (e.g. higher frequencies satellites or wireline solutions) and when it would be expected to be available for satellite-dependent areas**

Q10. In addition to capacity requirements, ISED is seeking comments on other issues that should be considered in maintaining broadband connectivity in satellite-dependent areas.

In providing comments, respondents are requested to include supporting arguments and rationale.

48. Northwestel and Bell Canada rely on the C-band to provide voice and cellular service, critical Government services (e.g., healthcare and education), and aeronautical related services (e.g., Nav Canada), to satellite-dependent communities today. The C-band plays an important role in providing connectivity and critical services to the North. It is well suited for the continued provision of connectivity services in the North due to its resilience to atmospheric attenuation and existing infrastructure. It is important to protect C-band connectivity in the North until suitable alternatives are available.

49. As the requirement for higher bandwidth grows for subscribers in remote areas including the North, there is a trend towards increased use of higher frequencies, such as Ka and Ku bands, for FSS operations. 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. It is difficult to predict the timing associated with the migration away from C-band as it depends on the availability of suitable capacity at higher frequencies, among other factors. LEO networks are still being planned and in most cases have not been launched. The Department should take into consideration the status of LEO network deployments and specifically their coverage of the North when assessing the ability of FSS users to migrate. Due consideration should also be given to the development of necessary infrastructure such as earth stations to support LEO satellite networks in the North. As a result, we recommend that current FSS in the C-band remain protected in the North until the migration to LEO satellite networks is feasible.

50. We expect that broadband connectivity programs run by the Department and the CRTC will provide wireline connectivity to some of the communities currently served by satellite. However, very few communities will receive wireline connectivity in the next five years and thus, many communities will continue to depend on satellite connectivity. The possibility of moving all FSS operations in the North to the upper part of the band in combination with other options depends on the availability of adequate additional reliable capacity (i.e., low latency and less susceptible to atmospheric attenuation) over higher satellite frequencies, such as LEO satellite networks. This will require significant engineering effort and additional equipment. We recommend that the Department monitor the availability of these alternatives and provide adequate time for existing operations to plan and implement the move to these new satellite networks.

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

Q11. ISED is seeking comments on its proposal to remove the FSS allocation in the 3500-3650 MHz band and to suppress Canadian footnote C20 in the CTFA as detailed in annex B. In addition, ISED is seeking comments on the proposed grandfathering of the existing earth station operations listed in annex C, such that fixed or mobile stations in the 3500-3650 MHz band will be required to coordinate with these earth stations as specified in SRSP-520.

In providing comments, respondents are requested to include supporting arguments and rationale.

Q12. ISED is seeking comments on its proposal to remove the primary FSS allocation from 3650-3700 MHz and suppress Canadian footnote C33 in the CTFA as detailed in annex B.

In providing comments, respondents are requested to include supporting rationale and arguments.

51. We support the Department's proposals to remove the FSS allocation in the 3500-3650 MHz spectrum band, remove the primary FSS allocation from 3650-3700 MHz and suppress Canadian footnotes C20 and C33 in the CTFA. We agree with the Department that these changes align with the introduction of flexible use licensing in the 3500 MHz and 3800 MHz spectrum bands.

4.0 BLOCK SIZES IN THE 3650-4000 MHZ SPECTRUM BAND

Q13. ISED is seeking comments on:

- a) establishing unpaired blocks of 10 MHz for the 3650-3700 MHz band**
- b) establishing unpaired blocks of 10 MHz for the 3700-3980 MHz band**

In providing comments, respondents are requested to include supporting rationale and arguments.

52. We agree with the spectrum block configuration proposed in the Consultation. Reorganizing the band into 10 MHz unpaired blocks will provide the necessary flexibility for providers to aggregate blocks in an efficient manner that suits their desired network deployment. It is also in line 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 "preclude ISED from licensing blocks as aggregated packages of multiples of 10 MHz blocks to facilitate large bandwidth channels for 5G technologies."⁹

5.0 TREATMENT OF EXISTING USERS

5.1 Proposal for treatment of WBS incumbents

Q14. Subsequent to changes to the spectrum utilization described in section 7 and recognizing the need to change the current WBS licensing model, ISED is seeking comments on its proposal to displace the existing WBS licensees and designate 80 MHz of spectrum available for the development of a new shared licensing process in the 3900-3980 MHz band as described in Option 2. Specifically, ISED is seeking comments on:

- a) the amount of spectrum proposed (80 MHz) under a shared spectrum licensing process**
- b) whether there should be a provision that allows certain users (e.g. existing WBS licensees) priority licensing (e.g. an initial application window before accepting applications from others)**

⁹ The Consultation, paragraph 80.

53. We support the Department's proposal to move WBS from the 3650-3700 MHz spectrum band. This will support the significant benefits of having contiguity between the 3500 MHz and 3800 MHz spectrum bands and will support the efficient use of spectrum as operators will not need to incorporate two sets of technical specifications between the 3500 MHz and 3800 MHz spectrum bands.

54. However, we do not support the Department's proposal to increase the current WBS allotment from 50 MHz to 80 MHz. With access to 50 MHz of spectrum, WBS users already have a spectrum allocation that meets their needs and compares favourably to other jurisdictions. A 50 MHz block is sufficient to meet the Department's 50/10 Mbps broadband speed target. If a user is unable to acquire the entire block in a certain area, or wishes to acquire further spectrum, they have several alternatives. As the Department notes, spectrum in the 5 GHz band is available under a lightly-licensed regime for "higher power and outdoor RLAN devices." The Department has further indicated that making similar spectrum available in the 6 GHz band has been accelerated to Priority 1 in the allocation timeline. Licence-exempt access to unused television channels will also be available through the use of white space devices.¹⁰ Finally, Wireless Internet Service Providers (WISPs) operating in the WBS band are eligible to bid on the 50 MHz of set-aside spectrum available in the 3500 MHz auction.

55. When 50 MHz of WBS spectrum is combined with 50 MHz of 3500 MHz set-aside spectrum, this amounts to 100 MHz of spectrum in the 3500 MHz spectrum band, with an additional 100+ MHz of spectrum in the 5 GHz and 6 GHz bands. This compares well to allocations supporting similar applications in other countries. The Citizen Broadband Radio Service (CBRS) band in the U.S., for example, makes 70 MHz of spectrum in the 3500 MHz spectrum band available for Priority Access Licensing, and an individual licensee can acquire no more than 40 MHz in an area. This is less than the combined 100 MHz that will be available in Canada through the WBS spectrum band and the 3500 MHz spectrum set-aside, with no aggregation limit for a single operator.

56. We agree that existing WBS licensees should be allowed priority licensing within the proposed new shared band. This should be offered to licensees who have registered existing

¹⁰ The Consultation, paragraph 93.

sites in the ISED database within a timeframe defined by the Department. This would ensure existing licensees are able to continue to provide services without interruption.

Q15. Given the proposal to implement Option 2, ISED is seeking information on potential costs such as upgrading equipment, which may be incurred by WISPs that are displaced from 3650-3700 MHz to provide services using the 3900-3980 MHz band.

In providing comments, respondents are requested to include supporting rationale and arguments.

57. We do not support the Department's proposal to move WBS to the 3900-3980 MHz spectrum band. Instead, we recommend the Department move WBS to 3400-3450 MHz. 3GPP has defined the LTE band classes as only extending to 3800 MHz (band classes B42 and B43). As a result, existing equipment deployed by WBS operators will not support the upper portion of the 3800 MHz spectrum band. Therefore, if WBS is moved to 3900-3980 MHz, then existing equipment, including both radios and CPE, would need to be removed and replaced with new equipment. This would be both costly and time-consuming. We estimate that a WISP serving 5,000 subscribers using WBS spectrum would likely need to spend between \$15-\$20 million to replace their radios and CPE if required to move to 3900-3980 MHz.

58. By contrast, existing WBS equipment should mostly be able to operate in the 3400-3450 MHz spectrum band and would not need to be replaced, thereby saving existing WBS operators the expense of replacing their entire network. In addition, the transition to 3400-3450 MHz would be quicker than relocating to 3900-3980 MHz since equipment will only need to be re-tuned to a lower frequency rather than being replaced.

59. Spectrum in the 3400-3450 MHz spectrum band is currently available on a shared basis similar to spectrum in the 3650-3700 MHz spectrum band. In fact, First-Come First-Served (FCFS) licences are presently held by operators that operate in the 'A' and 'B' blocks, which correspond to 3400-3425 MHz and 3425-3450 MHz, respectively. Based on the above considerations, transitioning WBS systems to a lower frequency will be more efficient than transitioning to a higher frequency range such as 3900-3980 MHz.

60. To the extent that WBS operators incur costs to relocate (either under the Department's proposal or under Telesat's proposal), these costs should 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 by WBS operators. WBS operators are also not expected to receive any financial return from the expenditures required for the transition – it is capital that will no longer be available for investments that deliver connectivity benefits to Canadians.

5.1.1 Proposed transition period for the displacement of WBS licensees

Q16. Based on the proposal to implement Option 2, ISED is seeking comments on the proposed displacement deadlines, with WBS operations in urban areas being displaced by December 2023 and all others by December 2025. Respondents are invited to propose other protection and displacement options for consideration, provided they include a strong rationale.

Q17. ISED is seeking comments on the Tier 4 service areas that would be considered urban as defined above and as listed in annex D.

In providing comments, respondents are requested to include supporting rationale and arguments.

61. It is critical that the Department provides timely access to flexible use spectrum to facilitate the introduction of 5G technologies for Canadians. We recommend that the Department's proposed displacement date of December 2023 apply to both urban and rural areas. 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. Moreover, if the Department accepts our recommendation to move WBS to 3400-3450 MHz, the displacement could occur even quicker since new equipment would not need to be installed by existing WBS licensees.

62. We support the Department's proposal to define the Tier 4 service areas listed in annex D of the Consultation as urban. This definition of an urban area is consistent with the service areas with large urban population centres used as part of the transition plan for incumbents of the 3500 MHz spectrum band.

5.1.2 Moratorium on new WBS station deployments

Q18. ISED is seeking comments on whether the moratorium should be extended to include all Tier 4 service areas.

In providing comments, respondents are requested to include supporting rationale and arguments.

63. We agree with placing a moratorium on net new WBS station deployments in all Tier 4 service areas. Given the anticipated future widespread use of the band to accommodate 5G services, adoption of a moratorium on the deployment of new WBS stations is prudent at this point to ensure that the band is not further encumbered.

64. 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 it does not result in the deployment of new stations. This would support the continued operation of existing services.

5.1.3 Initial consideration of the shared spectrum licensing process for the 3900-3980 MHz spectrum band

Q19. ISED is seeking preliminary comments on the future spectrum licensing process for 3900-3980 MHz, including the following:

- a) what type of applications are envisioned for this spectrum
- b) what type of shared licensing process ISED should consider (e.g. database approach, licensee to licensee coordination)
- c) what additional measures ISED should consider employing to manage access to the band in high demand areas, such as major metropolitan centres
- d) what technical restrictions should be considered (e.g. technical rules similar to adjacent 3500 MHz flexible use band with reduced power levels, a guard band between new flexible use systems below 3900 MHz, shared use above 3900 MHz, etc.)
- e) what type of eligibility criteria, if any, should be established

In providing comments, respondents are requested to include supporting rationale and arguments.

65. We agree with the Department that the expected use cases for WBS will continue to include fixed wireless access systems, private networks and private broadband networks on enterprise campuses.

66. The use of a database to help mitigate interference issues works with the current WBS licensing process which allows WBS spectrum to be used for fixed and mobile systems on a shared all-come, all-served basis. The database also facilitates licensee to licensee coordination which has worked well to date. Other than keeping the database up to date to allow for licensee to licensee coordination, there are no additional measures the Department needs to employ in order to manage access to WBS spectrum in high demand areas. Thus, we recommend that the Department continue with the current licensing process for WBS spectrum.

67. However, as indicated above, existing WBS licensees should be provided with priority licensing within the proposed new shared band. This should be offered to licensees who have registered existing sites in the ISED database within a timeframe defined by the Department.

68. Technical rules similar to those used in the adjacent 3500 MHz flexible use band would ensure flexible use licensees in the 3500 MHz spectrum band can get access to the existing ecosystems in U.S. and Europe. Imposing any guard band would negatively impact the overall spectral efficiency of the band as the guard band spectrum would not be effectively used for data transmission. Therefore, a guard band is not recommended. Time division duplex (TDD) synchronization can also be promoted amongst operators to mitigate possible interference.

69. We recommend that the Department maintain the existing eligibility requirement for WBS licensees which states "entities applying for spectrum licences for WBS spectrum licences must meet the following criteria: entities intending to operate as radiocommunication users or service providers must meet the eligibility criteria set out in section 9(1) of the *Radiocommunication Regulations* prior to being issued a licence; entities intending to operate as radiocommunication carriers must meet the eligibility criteria set out in section 10(2) of the *Radiocommunication Regulations*."¹¹

¹¹ CPC-2-1-26 — *Licensing Procedure for Wireless Broadband Services (WBS) in the Frequency Band 3650-3700 MHz*, section 6.2.

5.2 FSS earth station in the 3650-3700 MHz spectrum band

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

Q20. ISED is seeking comments on its proposal that existing FSS earth stations licensed in 3650-3700 MHz after June 11, 2009, be permitted to continue to operate on a no-protection basis with respect to proposed new flexible use operations.

In providing comments, respondents are requested to include supporting rationale and arguments.

70. We support the Department's proposal that existing FSS earth stations licensed in 3650-3700 MHz after 11 June 2009 be permitted to continue to operate on a no-protection basis. As this does not alter their current conditions of licence, there should be no impact on the FSS operators. In addition, since these FSS earth stations will operate on a no-protection basis, they will not interfere with the deployment of new flexible use operations.

5.2.2 Definition of satellite-dependent areas

Q21. ISED is seeking comments on whether the Tier 4 service areas identified for exemption of certain provisions in GL-10 for mmWave bands as listed in annex E would be appropriate to apply for FSS operations in the 3700-4200 MHz band. ISED invites alternative proposals for areas that would be considered satellite-dependent (e.g. based on Tier 5 categories).

71. We support the Department's proposal that the Tier 4 service areas listed in annex C of GL-10 areas be defined as satellite-dependent. The use of larger areas such as Tier 3 would result in either defining satellite served communities in non-satellite-dependent areas, or defining urban centres such as Winnipeg as satellite-dependant. The use of smaller areas such as Tier 5 is too cumbersome and grouping them could lead to a longer boundary with more edges between satellite-dependant and non-satellite-dependant areas resulting in more interference related issues. The proposed Tier 4 areas capture satellite communities and remote areas while leaving out major urban centres. The proposed definition correctly supports service in areas that require continued FSS and thus, serves the general public interest.

Q22. ISED is seeking comments on whether certain remote industry operations, for example offshore oil drilling platforms, should be included in the definition of satellite-dependent areas.

In providing comments, respondents are requested to include supporting rationale and arguments.

72. We believe that remote industry operations should not be included in the definition of satellite-dependent areas. The requirement to include remote industry operations in satellite-dependent areas only arises in cases where they fall within non-satellite-dependent areas. Such operations could be located close to urban centres as mentioned in the consultation and defining them as satellite-dependent would lead to geographic holes that would affect the performance of flexible use systems.

73. Remote industry operations could be restricted to operate within 4000-4200 MHz in non-satellite-dependant areas consistent with all other FSS operations in those areas. The creation of an exception for such remote industry operations is inconsistent with the intent to allocate spectrum in non-satellite-dependant areas for flexible use and it will lead to unnecessary coordination issues.

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

Q23. ISED is seeking comments on its proposal to modify the existing FSS satellite authorizations to limit FSS operations in 3700-4000 MHz in non-satellite-dependent areas of Canada to a no- interference basis. ISED is also seeking comments on the proposal to adjust the conditions of licence for FSS operations to reflect the proposals as of the FSS transition deadline, including the possible removal of a high expectation of renewal for the 3700-4000 MHz portion of the band.

Q24. ISED is seeking comments on its proposed date of December 2023 as the Canadian FSS transition deadline.

74. We support the Department's proposals to: (i) modify the existing FSS satellite authorizations to limit FSS operations in 3700-4000 MHz in non-satellite-dependent areas to a no-interference basis; and (ii) to adjust the conditions of licence for FSS operations to reflect the FSS transition deadline, including the removal of a high expectation of renewal for the 3700-4000 MHz portion of the band. These proposed changes are designed to facilitate the deployment of flexible use spectrum and 5G services in non-satellite-dependent areas. This is a requirement for the transition of FSS services to the 4000-4200 MHz portion of the spectrum band

in non-satellite-dependent areas so that the lower portion of the band is cleared for use by flexible use services without any need to coordinate with FSS services by the deadline. Additionally no expectation of protected FSS use within the 3700-4000 MHz portion of the band after the deadline will incent FSS operations to migrate out of the 3700-4000 MHz portion of the spectrum band in non-satellite-dependent areas.

75. As indicated in our response to Question 53 below, we recommend the Department adopt Telesat's proposal and their proposed transition timelines. However, if the Department decides not to accept Telesat's proposal, then we support the Department's proposed date of December 2023 as the Canadian FSS transition deadline. The December 2023 deadline aligns with the FCC's accelerated clearing timeline and FSS operations within the entire 300 MHz from 3700-4000 MHz would be cleared in the contiguous U.S. by that timeline. Canadian alignment with the FCC's timeline will ensure that the U.S. broadcasting content has transitioned out of the lower 300 MHz of the C-band by the deadline.

76. Telesat proposes to manage the relocation of affected satellite users through coordination and reimbursement of reasonable costs. If the Telesat proposal is not accepted, then an earlier deadline in Canada could result in loss of U.S. broadcast signals that have not transitioned out of the lower 300 MHz of the 3800 MHz spectrum band due to the signals being blocked by flexible use systems in Canada. A deadline later than December 2023 could lead to unused spectrum as we expect a major part of the FSS spectrum to be cleared by that deadline due to the U.S. transition. The December 2023 deadline gives affected operations enough time to plan and migrate out of the 3700-4000 MHz portion of the spectrum band.

Q25. ISED is seeking comments on how the U.S. transition will impact the availability of FSS capacity in Canada.

In providing comments, respondents are requested to include supporting rationale and arguments.

77. FSS in Canada is used to provide broadcasting distribution and data connectivity services. The U.S. transition plan will primarily affect broadcasting distribution and the repacking of broadcast signals into 4000-4200 MHz as part of the U.S. plan will reduce the available capacity within 4000-4200 MHz spectrum band for other applications. However, it is clear from the FCC decision that the repacking will be achieved by launching additional satellites, which will enhance the FSS capacity within the 4000-4200 MHz spectrum band through frequency reuse. Canada stands to benefit from the additional capacity from these new satellites. Concerning the satellite-

dependent areas as proposed by the Department, the entire 3700-4200 MHz spectrum band will remain available and we do not foresee any impact on available FSS capacity for data connectivity in those areas. Thus, there should be sufficient FSS capacity in Canada.

Q26. ISED is requesting information to assist with the consequent decision following this consultation. This information includes satellite transponder migration plans, frequencies, and how satellite operators serving the Canadian market will accommodate all Canadian customers, and on which frequencies. Requested information could include, but is not limited to:

- **the names and number of satellites that will need to migrate to the 4000-4200 MHz band**
- **the number of new satellites that may be required to serve the Canadian market**
- **the locations of earth stations communicating with these satellites**
- **the number of antennas and locations of associated earth stations that will need to be retuned and/or repointed**
- **the flexibility of existing satellites to modify operations according to the different areas of Canada**

78. As we are not a satellite operator we have no response to this question.

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

Q27. ISED is seeking comments on its proposed transition deadline of December 2023 for FSS earth stations, in which existing FSS earth station licences would be modified to 4000-4200 MHz in the relevant areas.

79. An earlier transition of 3700-4000 MHz spectrum would offer potential benefits to Canadian consumers through faster deployment of 5G services. We believe that the deadline for this transition in non-satellite-dependent areas can be aligned with the U.S. timelines set by FCC. FSS operations in non-satellite-dependant areas are mostly broadcasting services. The accelerated U.S. clearing will automatically lead to the band being cleared of broadcast signals that are most commonly distributed in Canada. Aligning the Canadian timeline with the FCC deadline of December 2023 allows the FSS operators in non-satellite-dependent areas enough time to plan the migration.

Q28. ISED is seeking comments on making amendments to the relevant conditions of licence and technical rules in the 3700-4200 MHz band as well as the 3450-3700 MHz band in order to implement the following proposals with respect to protection from interference:

- a) prior to the transition deadline, existing licensed FSS earth stations may operate in the entire 3700-4200 MHz band in all areas and be protected from interference from flexible use operations both in-band (3700-3980 MHz) and the adjacent 3450-3700 MHz band
- b) after the transition deadline, existing licensed FSS earth stations may continue to operate in the entire 3700-4200 MHz band in satellite-dependent areas and be protected from interference from in-band flexible use operations in 3700-3980 MHz, but would not be protected from flexible use operations in the adjacent 3450-3700 MHz band; however, ISED also proposes that flexible use licensees deploying stations in the 3450-3700 MHz band within 25 km of an existing licensed FSS earth station in the 3700-4200 MHz band be required to provide a notification to these operators, one year prior to the deployment of fixed or mobile stations
- c) after the transition deadline, FSS earth stations would only be licensed to operate in the 4000-4200 MHz band in non-satellite-dependent areas and would be protected from flexible use operations in the adjacent 3700-3980 MHz band
- d) after the transition deadline, FSS earth stations operating in 3700-4000 MHz, in all areas, which are not eligible for licensing could continue to operate as a licence-exempt station without protection from flexible use operations both in-band and adjacent band(s)

80. We support the Department's proposals to minimize interference issues and recommend that the coordination between flexible use operations in the adjacent band should only be required with existing FSS earth stations in satellite-dependent areas that will operate in the entire 3700-4200 MHz spectrum band after the transition. If the Department adopts Option 1 with respect to WBS operations, then WBS operations in satellite-dependent areas will remain in the 3650-3700 MHz spectrum band and co-existence with FSS in 3700-4200 MHz will continue to be governed by SRSP 303.65. However, if the Department intends to harmonize WBS operations across the country into the 3900-3980 MHz spectrum band by adopting Option 2, then this could lead to potential co-channel interference with existing FSS earth stations in satellite-dependent areas. In such a case, a mechanism will need to be developed to ensure co-existence between WBS and FSS in satellite-dependent areas.

Q29. ISED is seeking comments on the proposed change to the CTFA to add the new footnote CZZ proposed above and shown in annex B.

81. We support the Department's proposal to change the CTFA by adding the new footnote CZZ as indicated in annex B of the Consultation.

Q30. ISED is seeking comments on how to ensure the continued operation of gateways that support the provision of services in satellite-dependent areas, specifically:

- a) how much spectrum would be required at these gateway sites
- b) if these stations could be consolidated into two sites, away from major population centres, and where the best locations for those sites would be

In providing comments, respondents are requested to include supporting rationale and arguments.

82. As users of satellite connectivity, we use a portion of the C-band spectrum at such gateways. However, other users also use the remaining spectrum at these gateways and the satellite operators are in the best position to comment if all the users can be moved to 4000-4200 MHz, or 4100-4200 MHz under the Telesat proposal. If this is the case, then there is no need to consolidate and relocate the gateways.

83. If consolidation of these stations into two sites is required, we believe that a few factors should be considered. First, the sites must be located a sufficient distance away from population centres and protected from interference, and second, the locations should have access to reliable fibre-based connectivity. In addition, the new consolidated gateways must have enough capacity to support existing demand from FSS in satellite-dependent areas. In terms of location, we do not have a specific preference, but do expect one to be located in eastern Canada and the other located in western Canada.

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

Q31. ISED is seeking comments on its proposal to issue interim authorizations for certain existing licence-exempt earth stations in the 3700-4200 MHz band.

84. We support the Department's proposal and agree that these authorizations should be restricted only to existing earth stations operated by enterprises, such as broadcast distributors, rather than by individuals. The interim authorizations are necessary to protect certain earth stations in the 3700-4200 MHz spectrum band and will assist in coordination between flexible use licensees and existing licence-exempt earth stations with interim authorizations during the transition. This will minimize the administrative burden of coordination between earth stations and flexible use licensees and support the deployment of 5G services in Canada.

Q32. ISED is seeking comments on the proposed deadline of up to 90 days after the publication of a decision for submitting applications for these interim authorizations of existing licence-exempt FSS earth stations in the 3700-4200 MHz band.

85. The Department has requested information about earth stations in the 3700-4200 MHz spectrum band with a deadline of 30 November 2020.¹² As a result, the necessary information should be readily available to license-exempt earth station operators and therefore a 90 day deadline should provide sufficient time to submit the applications for interim authorizations.

Q33. ISED is seeking comments on its proposal that receive-only earth stations that are not eligible for an interim authorization or whose operators do not seek authorization, could continue to operate as a licence-exempt earth station on a no-protection basis.

86. We support the Department's proposal. Operation of non-eligible or not registered licence-exempt earth stations on a no-protection basis will not hinder the deployment of flexible use services.

Q34. ISED is seeking comments on its proposal that in non-satellite-dependent areas, existing earth stations that operate under interim authorizations receive in-band protection from flexible use operations in the 3700-3980 MHz band until the transition deadline.

Q35. ISED is seeking comments on its proposal that in satellite-dependent areas, existing earth stations that operate under an interim authorization receive in-band protection from flexible use operations in the 3700-3980 MHz band before and after the transition deadline.

87. We support the Department's proposal that in non-satellite-dependent areas, existing earth stations that operate under interim authorizations receive in-band protection from flexible use operations until the transition deadline. Similarly, we support the Department's proposal that in satellite-dependent areas, existing earth stations that operate under an interim authorization receive in-band protection from flexible use operations before and after the transition deadline.

¹² SAB-001-19 — Request for Information on Fixed Satellite Service (FSS) Earth Stations Operating in the 3700-4200 MHz Band.

Q36. ISED is seeking comments on its proposal that in all areas, existing licence-exempt earth stations that operate under an interim authorization receive no protection from adjacent band WBS stations and flexible use stations operating below 3700 MHz before and after the transition deadline.

88. We support the Department's proposal that existing licence-exempt earth stations that operate under an interim authorization receive no adjacent band protection before and after the transition deadline. The coordination requirements laid out in SRSP 520 and SRSP 303.65 should be sufficient for the co-existence of flexible use systems and WBS operations with such FSS earth stations prior to the transition deadline.

Q37. ISED is seeking comments on whether the interim authorization process should also apply to new receive-only FSS earth stations in the 4000-4200 MHz band.

89. We support the Department's proposal that the interim authorization process apply to new receive-only FSS earth stations in the 4000-4200 MHz spectrum band. While the Department is proposing to keep this spectrum frequency range for FSS, future consultations regarding changes to this portion of the 3800 MHz spectrum band will benefit from having information regarding the location and properties of the new receive-only FSS earth stations readily available.

Q38. ISED is seeking comments on the proposed conditions for interim authorizations for licence-exempt FSS earth stations in 3700-4200 MHz and new receive-only FSS earth stations in the 4000-4200 MHz portion of the band as detailed in annex G.

90. We support the Department's proposed conditions for interim authorizations as detailed in annex G.

Q39. ISED is seeking comments on the proposed eligibility of licence-exempt stations that could apply for an interim authorization.

In providing comments, respondents are requested to include supporting rationale and arguments.

91. We support the proposed eligibility criteria that only enterprises such as broadcast distribution be allowed to apply for interim authorizations. This criteria provides the appropriate balance between protecting critical applications being run by enterprises and limiting the protected earth stations to a reasonable number during the transition. This will enable the possibility of early deployment of flexible use systems in most areas, leading to potential benefits of quicker 5G deployment to Canadian consumers.

5.6 Fixed service in the 3700-4200 MHz spectrum band

Q40. ISED is seeking comments on its proposal to no longer issue new licences for fixed services to operate fixed point-to-point applications in the 3700-4000 MHz band.

92. We agree with the proposal to no longer issue new licences for fixed services to operate fixed point-to-point applications in the 3700-4000 MHz spectrum band, or 4100-4200 MHz under the Telesat proposal. There is limited demand for these applications. As noted in the Consultation, there are currently only two licensed systems operating in Canada.¹³

Q41. ISED is seeking comments on whether to allow new licences for fixed services to operate fixed point-to-point applications in the 4000-4200 MHz band.

93. New licences for fixed point-to-point applications should be allowed to operate in the 4000-4200 MHz frequency range or 4100-4200 MHz under the Telesat proposal. As the Department notes, fixed links and FSS earth stations can coexist, and the likelihood that fixed services would complicate the repacking of the FSS operations is low.

Q42. ISED is seeking comments on the proposal to grandfather existing point-to-point operations in the 3700-4000 MHz band under existing licences for fixed service (as identified in annex A), such that flexible use systems in these two tiers may not claim protection from, nor cause interference to these fixed service stations.

In providing comments, respondents are requested to include supporting rationale and arguments.

94. We support the proposal to exempt existing fixed point-to-point operations in the 3700-4000 MHz spectrum band. Given the remote locations of these systems and the fact that only two are in operation, they are highly unlikely to pose a significant challenge to the deployment of flexible use systems.

¹³ The Consultation, paragraph 156.

6.0 TECHNICAL CONSIDERATIONS

6.1 Coexistence between flexible use systems

Q43. ISED is seeking comments on the proposal to rely on technical limits and coordination procedures rather than mandate specific technology solutions (e.g. TDD synchronization between systems) to address interference issues between TDD flexible use systems in the 3650-3980 MHz band.

95. While we support the use of TDD synchronization and coordination procedures to minimize interference, we do not recommend the Department mandate a specific technological solution. The 3650-3980 MHz spectrum band (or 3650-4080 MHz in the case of the Telesat proposal) will require synchronization in order to limit interference issues. Synchronization refers not only to sharing a common clock signal, but also employing the same uplink/downlink ratio across the band. This will involve significant coordination between all adjacent operators (adjacent in both frequency and geography). The more operators involved and the more fragmented the spectrum or licence areas, the more complex this task becomes. Despite the challenges, synchronization is preferable to other methods of limiting interference, such as implementing additional guard bands. In an industry that thrives on innovative solutions and technology, mandating a specific solution would restrict the ability of the concerned parties to choose a solution that is most appropriate to their needs and would restrict the development of other innovative solutions in Canada.

Q44. ISED is seeking comments on whether any additional measures should be taken to limit potential interference issues between flexible use systems in the 3650-3980 MHz band.

In providing comments, respondents are requested to include supporting rationale and arguments.

96. If the Department does not accept Telesat's proposal and instead decides to implement its own proposal then we recommend that technical requirements such as power limits and Out Of Band Emission (OOBE) limits be aligned with those set by the FCC. This will limit potential interference issues. Moreover, this would allow Canadian operators to make use of the U.S. equipment ecosystem and benefit from economies of scale.

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

Q45. ISED is seeking comments on whether specific technical measures should be adopted to address potential interference issues between flexible use systems and WBS systems until the displacement deadline.

- a) For co-channel flexible use and WBS operations in the 3650-3700 MHz band, what specific measures may be needed to protect WBS? For example, should new flexible use stations be required to coordinate with WBS stations within a specified distance prior to deployment? Alternatively, should a technical parameter such as a power flux density (pfd) trigger for coordination measured at the WBS receive antenna be adopted? Are there other more appropriate measures that ISED should consider? Should multiple measures, such as a combination of distance and pfd trigger for coordination, be adopted? How would these requirements impact the deployment of new flexible use stations?**
- b) For adjacent band flexible use systems, is there a need to adopt any additional measures, beyond what is currently specified in RSS-192 and SRSP-520, to further address coexistence between these flexible use and WBS systems? If so, what should they be? How many flexible use frequency blocks (or MHz) immediately adjacent to the 3650-3700MHz band could potentially affect WBS systems? How would these requirements impact the deployment of flexible use stations?**

In providing comments, respondents are requested to include supporting rationale and arguments.

97. Earlier deployment of flexible use systems is beneficial to Canadian consumers and therefore measures should be taken to promote it. This could potentially mean co-existence of flexible use systems with WBS deployments during the transition. WBS and flexible use co-channel operations can be managed through coordination guidelines as laid out in SRSP 520 and RSS 192. No additional measures beyond SRSP 520 and RSS 192 are needed for adjacent band co-existence as these issues are already addressed. However, WBS site data should be present and updated in the ISED database for successful coordination to take place. Therefore, we recommend that adjacent channel protection should not be offered to WBS stations that are not registered in the ISED database.

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

Adjacent band

Q46. Until the transition deadline, in all areas for flexible use in the 3650-3700 MHz band: ISED is seeking comments on the proposal that until the transition deadline, those flexible use licensees deploying stations in 3650-3700 MHz within 25 km of a licensed FSS earth station (not including interim FSS authorization) in the 3700-4200 MHz band will be required to coordinate with the operators in these earth stations.

98. We support the Department's proposal that until the transition deadline, flexible use licensees deploying stations in 3650-3700 MHz within 25 km of a licensed FSS earth station in the 3700-4200 MHz spectrum band will be required to coordinate with the operators in these earth stations. This is consistent with SRSP-520 for flexible use licensees planning to deploy any site in the 3450-3650 MHz spectrum band.

Q47. After the transition deadline, in all areas for flexible use in the 3450-3650 MHz band: ISED is seeking comments on its proposal that the current SRSP-520 coexistence requirements for flexible use operations in the 3450-3650 MHz band to protect FSS operations in the adjacent band 3700-4200 MHz be removed.

99. We support the Department's proposal to remove the coexistence requirements after the transition deadline as co-existence would not be required in non-satellite-dependent areas once FSS services migrate to the upper portion of the 3800 MHz spectrum band.

- Q48. For FSS earth stations licensed in the 4000-4200 MHz band and flexible use in the 3800 MHz band, in all areas: ISED is seeking comments on adjacent band coexistence measures, taking into account the coexistence measures adopted by the EU (i.e. a stringent OOB limit) and the U.S. (i.e. a combination of guard band, a typical OOB limit, pfd limits, and baseline minimum filter specifications for earth station operations) and the current Canadian requirements (i.e. a typical OOB limit and coordination distance):**
- a) What are the benefits and technical limitations associated with the above coexistence measures?**
 - b) Which set of coexistence measures above (i.e. EU, U.S., Canada) is preferred? If applicable, comments are sought on the values of the limits in relation to the supported measures.**
 - c) Given the proposal in section 9.1 to displace WBS in 3650-3700 MHz and identify 3900-3980 MHz for shared use, are there any additional considerations that may impact the response to a) and b) above?**
 - d) Which portion of the 3800 MHz band should the above measures be applied to in order to protect FSS in the 4000-4200 MHz band (i.e. how many frequency blocks or MHz)?**

100. We recommend that the Department adopt technical requirements that are aligned with those established for the C-band in the U.S. This would allow Canadian operators to have access to the U.S. equipment ecosystem and benefit from the associated economies of scale. This will also facilitate cross-border coordination with FSS operations. Furthermore, the EU does not have an assignment above 3800 MHz and as the proposed band plan is aligned with the U.S., we recommend that the U.S. measures be adopted.

101. We do not recommend any additional coexistence measures other than those already adopted by the FCC. We support the use of the guard band and OOB limits despite the fact the Department is proposing that 3900-3980 MHz will be used for WBS and shared use. The U.S. measures are adequate and necessary for the protection of FSS operations irrespective of flexible use or shared use in the 3900-3980 MHz spectrum band. The use of the 20 MHz guard band, PFD limits and use of filters at earth stations are sufficient for coexistence.

Co-channel

Q49. ISED is seeking comments on what technical requirements should be imposed to ensure co-channel protection of FSS earth stations from flexible use systems, in the relevant scenarios and timeline as stated in sections 9.5 and 9.6. For example, could the pfd limit of -124 dBW/m²/MHz measured at the earth station antenna proposed by FCC above be used to protect co-channel FSS earth station? Alternatively, should other measures be adopted, such as a separation distance as described in section 7.3? Or should a combination of measures be adopted? If applicable, what are the specific values that should be adopted?

102. We support the use of a PFD limit of -124 dBW/m²/MHz measured at the earth station antenna to ensure co-channel protection of FSS earth stations from flexible use systems. The limit has already been set by the FCC in the U.S. after an extensive review and is well understood by the satellite operators. However, we recommend that the Department allow the possibility to depart from these limits through negotiations between earth station operators and flexible use operators as currently allowed by the FCC. Additional measures for co-channel protection are not necessary and will hinder the early deployment of 5G services across Canada.

Earth station technical parameters

Q50. ISED is seeking comments on whether the assumptions made by the FCC about earth stations, including baseline minimum filter specifications for earth station operations as stated above, are applicable to Canadian operations. Is there any additional information that ISED should consider in the development of appropriate technical rules to enable coexistence both co-channel and in adjacent bands?

In providing comments, respondents are requested to include supporting technical arguments and rationale.

In providing comments to Q46-Q49, respondents are requested to consider the coordination burdens such coexistence and protection measures could impose on either flexible use services or FSS earth stations.

103. The measures adopted by the FCC to protect FSS operations in 4000-4200 MHz are adequate and well understood by FSS operations. We recommend that the Department adopt the receiver blocking PFD limit of -16 dBW/m²/MHz for base stations and mobile devices as measured at the earth station antenna for all emissions in the 3650-3980 MHz spectrum band in addition to the use of filters at FSS earth stations. We support the filter specifications approved by the FCC and adopting these specifications will enable Canadian FSS operations to benefit from the U.S. ecosystem. We recommend that in cases where the FSS earth station has not installed a filter and the flexible use licensee can demonstrate that it satisfies the blocking PFD limits, the earth station operator must accept interference. This is also endorsed by the FCC. Additional measures could lead to underutilization of the spectrum and the requirement to develop

a Canada-specific equipment ecosystem which would result in higher equipment costs and/or delays in equipment availability for Canadian deployments. Therefore, we urge the Department to adopt the U.S. guidelines only.

6.4 Coexistence between flexible use systems and aeronautical radionavigation systems

Q51. ISED is seeking comments on its proposal to not implement any technical requirements for the coexistence between flexible use operation in the 3650-3980 MHz band and radionavigation operations in the 4200-4400 MHz band, noting the 220 MHz frequency separation between the bands of operation. If this is not sufficient for coexistence, what other measures would be appropriate?

In providing comments, respondents are requested to provide technical analysis to substantiate such proposals.

104. We support the Department's proposal not to implement any technical requirements for the coexistence between flexible use in the 3800 MHz spectrum band and radionavigation operations in the 4200-4400 MHz spectrum band.

7.0 LICENSING PROCESS FOR THE NEW FLEXIBLE USE LICENCES

Q52. ISED is seeking comments on the use of an auction as the licensing process for the flexible use spectrum that would be considered as the 3800 MHz band, noting a separate consultation process would be issued, if required, to determine the licensing framework for the range 3900-3980 MHz.

In providing comments, respondents are requested to include supporting arguments and rationale.

105. 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. As the Government's *Framework for Spectrum Auctions in Canada* notes, "auctions are an efficient market-based means of assigning spectrum licences, through a fair and transparent process, to those that value them most".¹⁴ Moreover, the Department has extensive experience running complex auctions and has effectively done so in the past. 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.

¹⁴ ISED, *Framework for Spectrum Auctions in Canada*, Issue 3 March 2011, page 7.

8.0 PROPOSED ACCELERATED SPECTRUM CLEARING APPROACH

Q53. ISED is seeking general comments on the proposal submitted by Telesat found in annex H, including whether such an approach would be in the best interest of Canadians and more specifically, whether it would result in the faster deployment of 5G services in the affected frequencies; more efficient use of spectrum and what the implications of this repurposing plan would be for other users of the band.

Q54. ISED is seeking comments on whether the Telesat proposal meets ISED's policy objectives outlined in section 3, including:

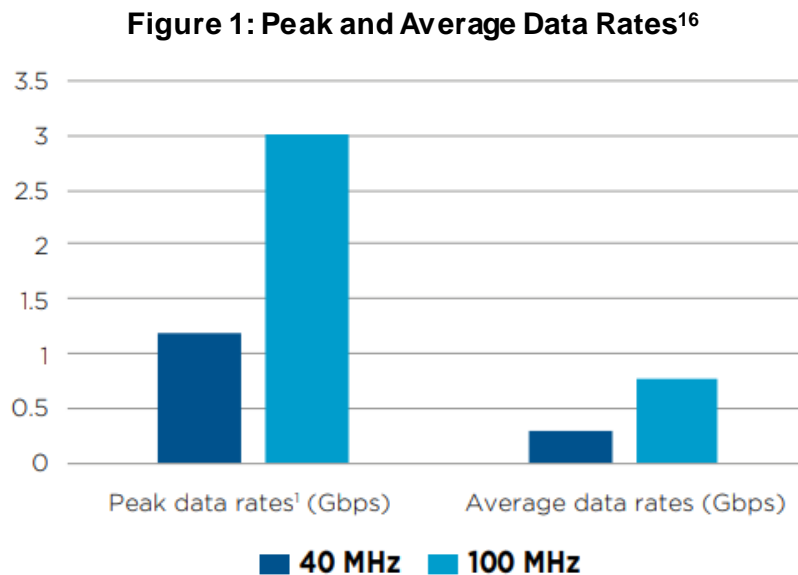
- a) supporting rural/remote connectivity**
- b) promoting competition in mobile services**
- c) making more mid-band spectrum available to support 5G services**

106. We support the proposal submitted by Telesat to: (i) clear the 3700-3900 MHz spectrum band on the same timeline as the 3500 MHz process; (ii) make that spectrum available via a private sale in the secondary market; and (iii) clear an additional 200 MHz of spectrum in the 3900-4100 MHz by 5 December 2025. 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.

107. In combination with the Department's planned auction of the 3500 MHz spectrum band, the Telesat proposal would result in 600 MHz of spectrum available throughout Canada for flexible use and the provision of 5G services. This would allow multiple providers to have an opportunity to access 100 MHz or more of mid-band spectrum.

108. Telesat is proposing to make the initial 200 MHz 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 200 MHz in the 3800 MHz spectrum band prior to the Department's proposed clearing date of 5 December 2023.

109. There are significant advantages to both opening up more spectrum for 5G services and to making this spectrum available sooner. The more flexible use spectrum available, the more opportunity there is for operators to acquire a block of at least 100 MHz. While LTE was designed for peak efficiency when employed with 20 MHz bandwidths, 5G for 3800 MHz reaches its peak efficiency in 100 MHz channels. As Figure 1 shows, 100 MHz provides significantly higher peak and average data rates relative to having access to 40 MHz. According to the GSMA, access to 60 MHz would require a 64% increase in the number of cell sites relative to having access to 100 MHz thus increasing the costs of deploying 3800 MHz spectrum.¹⁵



110. Further, Telesat's proposal to make spectrum from 3700-3900 MHz available on the same timeline as 3500 MHz spectrum will deliver 5G services to Canadians faster and allow carriers to benefit from access to larger blocks of contiguous spectrum sooner. Provided the Department moves the WBS band from its current location as proposed, allocating the 3700-3900 MHz spectrum on the same timeline as the 3500 MHz auction would give operators the opportunity to acquire contiguous spectrum across the entire 3500-4000 MHz spectrum range, or 3500-4100 MHz in the case of the Telesat proposal.

111. As stated above in response to Question 2, there are particular advantages to contiguous spectrum despite the existence of techniques like non-contiguous carrier aggregation to combine non-contiguous spectrum into larger channel sizes. In addition to the benefits to peak speeds,

¹⁵ GSMA, "5G Spectrum: GSMA Public Policy Position", Figure 2.

¹⁶ GSMA, "5G Spectrum: GSMA Public Policy Position", Figure 1.

large contiguous channels allow for greater reliability and reduced latency, and will enable operators to use innovative techniques such as network slicing without needing to deploy multiple carriers. Using contiguous spectrum also increases spectral and operational efficiency, and would decrease the chances that an operator would need multiple radios, resulting in significant cost savings. These benefits support competition and affordability in mobile services and promote rural and remote connectivity.

112. As indicated in the Consultation, other countries are just beginning to make the 3800 MHz spectrum band available for flexible use.¹⁷ The timeline proposed by Telesat provides an opportunity for Canada to be a world leader with respect to releasing mid-band spectrum for 5G service deployment. To date, Canada has been a laggard in terms of releasing 5G spectrum.¹⁸

113. Telesat's proposal would also 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."¹⁹ Deploying a substitute for C-band spectrum and covering reasonable 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.

114. With respect to existing users of the 3800 MHz spectrum band, Telesat's proposal is likely to have a smaller impact than the Department's proposal. If Telesat's proposal is adopted, they will work with other satellite operators and "take responsibility for managing and coordinating (and, to the extent necessary, implementing) any service and equipment changes necessary to protect service continuity for Eligible Earth Stations."²⁰ This coordination management function in combination with the payment of reasonable expenses incurred by existing earth stations will

¹⁷ The Consultation, section 5.1.

¹⁸ Analysis Mason, "Global Race to 5G – Update", April 2019.

¹⁹ Telesat, "Fast tracking affordable, Canada-wide 5G and universal connectivity with 3800 MHz spectrum", 5 July 2020, paragraph 48.

²⁰ Telesat, "Fast tracking affordable, Canada-wide 5G and universal connectivity with 3800 MHz spectrum", 5 July 2020, paragraph 48.

reduce any negative impact that Telesat's proposal may have on existing users of the 3800 MHz spectrum band.

115. As indicated in our response to Question 28, 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 and Telesat has anticipated the Department's willingness to maintain FSS in satellite-dependent areas. As Telesat noted in their proposal, they understand that "the Minister would retain the discretion to delay either or both stages of the transition in designated geographic areas if necessary to maintain continuity of existing services, particularly in satellite-dependent communities in the North."²¹ Thus, existing users of 3800 MHz spectrum in satellite-dependent areas can also be protected under Telesat's repurposing plan.

116. Telesat's proposal also satisfies a number of the enabling guidelines of the *Spectrum Policy Framework for Canada*, including:

- (a) market forces should be relied upon to the maximum extent feasible;
- ...
- (f) spectrum management practices, including licensing methods, should minimize administrative burden and be responsive to changing technology and market place demands; and
- ...
- (h) spectrum policy and management should support the efficient functioning of markets by:
 - permitting the flexible use of spectrum to the extent possible;
 - ...
 - making spectrum available for use in a timely fashion;
 - facilitating secondary markets for spectrum authorizations; [and]
 - ...
 - reallocating spectrum where appropriate, while taking into account the impact on existing services²²

²¹ Telesat, "Fast tracking affordable, Canada-wide 5G and universal connectivity with 3800 MHz spectrum", 5 July 2020, paragraph 38.

²² ISED, *Spectrum Policy Framework for Canada*, DGTP-001-07, June 2007, page 9.

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

Q55. ISED is seeking comments on what elements from sections 7 to 10 of this consultation would still apply or need to change if ISED were to implement the Telesat proposal, in particular:

- a) the proposal for maintaining the primary allocation for FSS in the 3700-4200 MHz band**
- b) the proposed implementation of an exemption to transition for satellite-dependent communities and the proposed changes to satellite licenses to apply it**
- c) the proposal for treatment of WBS incumbents**
- d) the proposal to issue interim authorizations for certain existing licence-exempt earth stations in the 3700-4200 MHz band**
- e) technical considerations for coexistence between FSS and flexible use**
- f) technical considerations for coexistence between FSS and aeronautical radionavigation systems**
- g) the overall impact on existing users in the 3700-4200 MHz band**

118. Our responses regarding the above elements would not change and to the extent necessary already include our recommendations if the Department were to implement the Telesat proposal. As we indicated above, Telesat's proposal meets the Department's policy objectives and maximizes the benefits of the 3800 MHz spectrum band to Canadians.

119. However, if the Department implements the Telesat proposal and accepts our recommendation to move WBS to 3400-3450 MHz, then the 3650-3700 MHz spectrum will need to be auctioned by the Department. Given that Telesat has proposed to follow the 3500 MHz transition timelines, we recommend that the Department include the 50 MHz from 3650-3700 MHz as open blocks in the 3500 MHz spectrum auction. The inclusion of this spectrum will not significantly increase the complexity of the auction process and will ensure contiguity between the 3500 MHz and 3800 MHz spectrum bands.

Q56. If ISED were to implement the Telesat proposal, ISED would need to consider the licensing framework for the 3700-3900 MHz band. Thus, ISED is seeking comments on:

- a) whether it should, as proposed by Telesat, issue flexible licences in the 3700-3900 MHz band using the same conditions of licence as those contained in annex H of the 3500 MHz Framework, noting that some conditions may need to be adjusted to reflect the differences in the two bands and the decisions resulting from this consultation process**
- b) whether it should issue a single Tier 1 flexible use licence as proposed by Telesat or align with the 3500 MHz band and issue Tier 4 licences**
- c) what deployment conditions should apply to these licences including Telesat's proposal that the deployment requirements would only come into force after the Minister approves a transfer**
- d) any additional conditions of licence that should apply given the nature of the proposal**

120. While we support Telesat's proposal, additional clarity is required for potential participants to effectively participate in Telesat's allocation process. The issues that require clarification include: (i) conditions of licence, service areas and licence term for the licences to be transferred from Telesat; (ii) the structure of the private sale; and (iii) the nature and timing of the Minister's assessment approach for subsequent licence transfer applications.

(i) Conditions of licence, service areas and licence term

121. Potential participants in Telesat's private sale will need to have a clear understanding of the terms and conditions of the licences they will be purchasing. 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 one exception related to the LTE deployment requirement discussed below. General alignment between the two sets of conditions will reduce complexity and promote a stable, predictable regulatory regime.²³

122. 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. These additional obligations are unduly punitive

²³ 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.

to Canada's LTE service providers, and are excessively proscriptive given the remaining unknowns about how 5G will be used.

123. Canada's national LTE networks provide coverage to over 99% of Canadians, including to rural and remote regions across the country. This outcome is the result of years of network building and billions of dollars in investment. Regional providers, however, have not achieved coverage levels similar to the national carriers. As a result, if they acquire spectrum outside their existing LTE service area, they would not be subject to the same requirement to promptly deploy a 5G network. This essentially penalizes national networks for having invested heavily in improving network coverage and puts them at a regulatory disadvantage.

124. The 3500 MHz LTE deployment rule provides a loophole by which many licensees will not be required to provide timely 5G coverage in rural areas because they had not previously invested in providing LTE coverage to these areas. In essence, this counter-intuitive requirement rewards service providers for failing to build out their networks to rural areas.

125. Moreover, 3500 MHz is mid-band spectrum and not suitable for covering large geographic areas like low-band spectrum used for LTE. For example, 3500 MHz has a shorter range than 700 MHz spectrum and thus, it is more challenging to build out coverage in rural areas to meet the LTE deployment requirement.

126. Requiring such high levels of 5G network coverage within five years of the initial issuance of licences is unrealistic and does not reflect a flexible approach to a developing network technology. By requiring broad coverage within the earliest years of 5G deployments, the Department's rules would severely constrain service providers and prevent them from organically responding to market demand. As the Department itself acknowledged, 5G is still a developing technology, and "it is unclear at this time which business cases will drive ongoing investment in 5G networks, and which services and applications will deliver the greatest benefit to Canadians."²⁴ Given these unknowns, it would be premature and excessively proscriptive to apply such a rigorous deployment requirement in the short-term.

127. We agree with the proposal to issue a single Tier 1 flexible use licence to Telesat. In order to support a quick allocation of spectrum and to align with the 3500 MHz timing, we recommend

²⁴ The Consultation, paragraph 6.

that this licence have a short licence term (e.g., one year). This will provide sufficient time for Telesat to complete their private sale and for the Department to approve the spectrum transfers. In accordance with the CPC-2-1-23 — *Licensing Procedure for Spectrum Licences for Terrestrial Services*, this licence would be divisible by both geography and frequency, enabling Telesat to divide and transfer the licence as needed. We note that any deployment CoL should still be applied on the Tier 4 level to ensure synchronization with the 3500 MHz obligation.

128. Given that the 3500 MHz spectrum and the 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.

129. There are limited efficiencies to be gained by harmonizing the expiry date of all licences within the 3500 MHz and 3800 MHz spectrum bands and there will be numerous situations where harmonization would lead to licensees not receiving the full value of the spectrum because of differing transition periods. For example, in rural service areas without a population centre of 30,000 people or greater, existing users will not be required to transition until three years after the date of the initial issuance of a 3500 MHz flexible use licence. As a result, in areas with a three-year protection period, 3800 MHz licensees will only be acquiring a 17 year licence rather than a 20 year licence.

(ii) *Structure of the private sale*

130. Telesat has indicated that they would release the initial 200 MHz of spectrum for flexible use on the same timeline as the 3500 MHz transition plan. This would require Telesat's allocation process be completed prior to the end of 2021. To provide potential participants with sufficient time to prepare, they will need detailed information regarding the rules and process of the private sale. For example, Telesat must clarify whether the sale will be executed through an auction process (with or without an opportunity to revise bids) or through bilateral negotiations. In addition, the timing must be made clear – specifically, whether or not the process will begin and end prior to the 3500 MHz spectrum auction.

131. In addition, potential participants will need to know whether or not the Department will require a spectrum set-aside or a spectrum cap as a condition for approving Telesat's proposal. As described in our response to Question 57, the use of a pro-competitive measure like a spectrum set-aside or spectrum cap is not necessary to protect competition. Instead, such measures will only distort the allocation process and hinder the achievement of the full benefits of 5G technologies.

(iii) Nature and timing of the Minister's approval

132. We agree with Telesat that the Department's existing policies provide a "ready mechanism for the Minister and the Department to ensure that the secondary market transactions do not distort the competitive landscape"²⁵ because the Minister must approve any spectrum transfer. However, 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.

133. 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.

²⁵ Telesat, "Fast tracking affordable, Canada-wide 5G and universal connectivity with 3800 MHz spectrum", 5 July 2020, paragraph 43.

Q57. In its proposal, Telesat indicates that it takes no position on ISED imposing a pro-competitive measure such as a spectrum cap or set-aside on the 3700-3900 MHz licences. ISED would review any request for transfer in accordance with provisions related to commercial mobile spectrum through section 5.6 of CPC-2-1-23, *Licensing Procedure for Spectrum Licences for Terrestrial Services*. However, ISED would also consider the competitive implications on the 3500 MHz and 3800 MHz bands and consider pro-competitive measures in accordance with the *Framework for Spectrum Auctions in Canada*. As such, ISED is seeking comments on:

- a) the need for a pro-competitive measure (e.g. spectrum cap or set-aside)**
- b) the type of competitive measure that should be applied**
- c) the amount of spectrum that should be considered under any such competitive measure**

134. Measures like spectrum set-asides or spectrum caps 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.

Spectrum set-asides distort the allocation process

135. 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. This asymmetry – wherein the bids of set-aside-eligible bidders can affect the prices of ineligible bidders, but the reverse does not hold – makes it probable that set-aside eligible bidders will raise their rivals' costs, thereby distorting prices. When spectrum costs are driven up, consumers end up paying more. "Pro-competitive" measures that increase costs are incongruent with the Government's objective of lowering wireless prices.

136. The regional service providers have been the recipients of several auction windfalls in the last decade. In the AWS-1 spectrum auction new entrant bidders were able to bid on both set-aside spectrum and non-set-aside spectrum, which allowed them to minimize their own costs of acquiring spectrum while inflating others' costs. There were a number of circumstances where a new entrant bid on non-set-aside spectrum even though equivalent set-aside spectrum was available at a much lower price. As a result, the price for set-aside spectrum ended up being far lower than the price for equivalent non-set-aside spectrum.

137. 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. Canaccord Genuity put the result into perspective:

...the national incumbents won 670 [million] MHz PoPs of spectrum for \$2.01 billion or \$3.00 per MHz PoP, while the new entrants purchased 934 [million] MHz PoPs for only \$98 million or \$0.105 per MHz PoP. If the Government had sold the whole auction at \$3.00 per MHz PoP (which would still have been at a discount to the C\$3.42 MHz PoP for the equivalent spectrum in the U.S.), total proceeds would have been \$4.8 billion rather than the actual \$2.1 billion, implying a new entrant "subsidy" of \$2.7 billion.²⁶

138. A similar result occurred in the recent 600 MHz spectrum auction. Non-set-aside spectrum licences were acquired for \$1.89 per MHz-Pop on average, which is more than twice the \$0.81 per MHz-Pop paid on average for set-aside spectrum. This implies a subsidy of over \$1 billion to set-aside eligible bidders.

139. 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. These outcomes were the direct result of an auction framework that employed set-asides which limited the number of eligible bidders and shielded the eventual set-aside spectrum winners from a fully competitive auction. We estimate that since the AWS-1 auction in 2008, more than \$5 billion in spectrum subsidies have been given to wireless entrants through spectrum set-asides.

140. In other situations, the shareholders of set-aside eligible spectrum licensees were able to benefit from financial windfalls at the expense of Canadian tax payers. For example, Public Mobile was acquired by Telus for close to five times Public Mobile's original spectrum cost, and Wind's business was purchased by Shaw from private equity firms for \$1.6 billion²⁷ or almost six times the amount they paid for it.²⁸ The latter situation is also an example of Shaw's financial ability to purchase spectrum without further Government subsidies. These are illustrations of the unintended consequences and perverse outcomes of intrusive regulations.

²⁶ Canaccord Genuity, *Government gives wireless new entrants another huge subsidy*, 9 March 2015, page 4.

²⁷ See <https://www.theglobeandmail.com/report-on-business/shaw-buying-wind-mobile-for-16-billion/article27791628/>.

²⁸ Montreal Economic Institute, *The State of Competition in Canada's Telecommunications Industry – 2016*, pages 21 to 23.

141. Furthermore, spectrum set-asides can delay the allocation of valuable spectrum. After originally going unsold, the set-aside spectrum in the areas of Manitoba, Saskatchewan and the North in the first AWS-3 auction had to be put up for auction again by the Department without the set-aside restriction. Similarly, in the recent 600 MHz auction, certain set-aside licences in Newfoundland and Labrador, Northern Ontario, Manitoba and the North all went unsold.

Pro-competitive measures are not necessary to protect competition

142. 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.

143. The corporate beneficiaries of the Government's largesse do not need taxpayer-funded subsidies. QMI's market capitalization is over \$8 billion while Shaw's is nearly \$13 billion.²⁹ Since these corporations became wireless service providers their market value has soared. Both companies are: (i) large; (ii) offer a full suite of communication services that compete with the broadband, telecommunication and broadcasting services of Rogers, Telus and ourselves; and (iii) profitable.

144. While some have argued that the national wireless service providers received their non-auctioned spectrum for free, this is incorrect and misleading. Annual spectrum licence fees are payable on all non-auctioned spectrum. Current annual spectrum licence fees are in excess of \$189 million per year and the total amount paid between 1987 and 2018 is approximately \$3.7 billion.³⁰

²⁹ As of 7 October 2020.

³⁰ CWTA Facts and Figures, available at <https://www.cwta.ca/facts-figures/>.

145. The 600 MHz auction demonstrated that the regional providers have access to the financial resources necessary to compete in an open auction. For example, Shaw made supplementary round bids indicating a willingness to pay for various packages of spectrum licences ranging from \$869 million to \$1.46 billion.³¹ Similarly, QMI was willing to pay \$662 million to \$1.12 billion for various packages of spectrum. The bidding history of set-aside eligible bidders indicates their willingness and ability to pay over one billion dollars in any given auction and contributed to the excessively high prices for non-set-aside spectrum.

146. Instead of creating further subsidies for well-established competitors who are capable of competing for spectrum, the Department should support a market-based approach to the allocation of 3800 MHz spectrum such as adopting Telesat's proposal without imposing spectrum set-asides or spectrum caps. Such an approach would align with the *Spectrum Policy Framework for Canada's* enabling guidelines (a) and (d) which state that market forces should be relied upon to the maximum extent feasible, and regulatory measures, where required, should be minimally intrusive, efficient and effective, respectively.³² Market forces will ensure that those willing to put the spectrum to its best use will bid for and acquire it.

Spectrum set-asides and caps will hinder the realization of 5G's full benefits

147. 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. This is, in part, because the benefits associated with 5G result from its ability to support larger bandwidths than LTE. Whereas LTE was designed for peak efficiency when employed with 20 MHz bandwidths, 5G for 3800 MHz reaches its peak efficiency in 100 MHz channels. As described above in our response to Questions 53 and 54, having at least 100 MHz of spectrum allows for higher data rates and fewer cell sites.

148. Only 200 MHz of spectrum will be made available in the 3500 MHz spectrum band and much less than this will be available for auction. In fact, the proposed auction set-aside will result in no spectrum being available for set-aside ineligible bidders in some service areas. The 200 MHz that Telesat proposes to auction is therefore crucial to ensure there is adequate spectrum available for the realization of high quality 5G networks. The adoption of spectrum set-

³¹ 600 MHz auction bidding information available at http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/h_sf11331.html.

³² Industry Canada, *Spectrum Policy Framework for Canada*, June 2007, available at <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf08776.html#s44>.

asides and/or spectrum caps would only hinder the ability of national operators to acquire sufficient spectrum to meet Canadians' 5G needs.

149. A report by Analysys Mason ranked Canada last in '5G readiness' out of 14 benchmark countries, while countries like the U.S., China, Japan and South Korea received top marks.³³ Reducing the amount of 5G spectrum to several key providers will further undermine Canada's 5G readiness.

Q58. ISED is seeking comments on Telesat's proposals for the transition of FSS earth stations and whether any additional measures are required to ensure a smooth transition.

150. Telesat does not provide a detailed proposal for the transition of FSS earth stations and thus, it is not possible to provide specific comments. However, we agree that Telesat should provide transition support to its own customers as well as to Canadian customers of other satellite operators.³⁴ We also support Telesat's conclusion that "the transition can only be accomplished on the proposed highly accelerated timeline if, as in the U.S., satellite operators receive value in exchange for their critical role in the process and the substantial costs they will incur in managing the migration of existing users to new satellite facilities, facilities required to ensure continuity of these users' critical services."³⁵

151. Telesat is in the best position to lead this transition as they provide the majority of data services across Canada using the C-band. It is essential that Telesat include foreign satellite operators and takes responsibility of transitioning the services offered by those foreign satellites. Telesat proposes to free up 220 MHz of spectrum aligned with the 3500 MHz spectrum in Canada, which means that the 3700-3920 MHz spectrum band will be freed up in urban areas by the first part of 2022. However, the U.S. would have only freed up the 3700-3820 MHz spectrum band by this time as per the FCC's timelines. Therefore, Telesat's plan should include alternate arrangements for broadcast signals that are being aired in the 3820-3920 MHz spectrum band until it is cleared in the U.S. in December 2023.

³³ Analysis Mason, "Global Race to 5G – Update", April 2019, page 68.

³⁴ Telesat, "Fast tracking affordable, Canada-wide 5G and universal connectivity with 3800 MHz spectrum", 5 July 2020, paragraph 51.

³⁵ Telesat, "Fast tracking affordable, Canada-wide 5G and universal connectivity with 3800 MHz spectrum", 5 July 2020, paragraph 40.

Q59. Telesat's proposal includes ISED allocating an additional 80 MHz for flexible use in the 4000-4100 MHz band. ISED is seeking comments on the feasibility of making this extra spectrum available, specifically:

- a) whether there would be standardized 5G equipment available for this 80 MHz, given that it does not align with the U.S. band plan**
- b) whether there would be FSS filters available, given the reduced amount of FSS spectrum and that it would not align with the U.S. band plan**
- c) whether there would be enough capacity to continue FSS services in Canada with the proposal to reduce the amount of FSS spectrum to 100 MHz**
- d) to what degree would the requirement to protect U.S. FSS earth stations in the border areas have an impact on the ability to deploy flexible use stations near the border and to what degree would this impact the value of this spectrum**

152. As indicated in our response to Question 1 above, the ecosystem for n77 equipment is expected to develop in the near future, and will be mature by the time 3800 MHz spectrum is made available in Canada. Given that band class n77 goes up to 4200 MHz and that we expect an ecosystem that incorporates this band class to develop in the near future, 5G equipment should become available that supports flexible use in the 4000-4100 MHz spectrum band. A report published by GSA in September 2020 ranks n77 as one of the top five 5G NR band classes having more than 150 devices announced that will support this band.³⁶

153. FSS filters are designed for specific frequencies and thus, it is likely that Canada-specific filters will need to be developed. However, we expect that Canadian companies, such as Advantech Wireless³⁷ and Norsat,³⁸ will develop FSS filters that can be used to accommodate any differences between the Canadian and U.S. band plans. These companies offer a variety of filters covering portions of the C-band and Norsat even offers a filter that has 4100-4200 MHz, which is the passband aligned with Telesat's proposal.

154. As Telesat is the primary satellite provider of data connectivity in Canada and is proposing to dedicate 100 MHz of spectrum for FSS, it is likely that this provides sufficient capacity to continue FSS services in non-satellite-dependent areas. For satellite-dependent areas, reduced capacity will not be an issue since FSS will be available across the entire 3800 MHz spectrum band. With respect to broadcast content, the increased number of C-band satellites as a result of the U.S. transition and alternate terrestrial options such as fibre-based connections should be sufficient to manage the content within 100 MHz of FSS spectrum.

³⁶ 5G Devices, A report by Global Suppliers Association October 2020.

³⁷ See <https://advantechwireless.com/wp-content/uploads/2019/12/PB-AWT-IRF-C-001-19339.pdf>.

³⁸ See <https://products.norsat.com/UserFiles/NorsatDocs/5G%20Interference%20Solution%20App%20Note.pdf>.

155. Finally, we agree with Telesat's assessment that there is unlikely to be significant cross border interference issues due to the limited number of U.S. earth stations located near the Canadian border.

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