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Via email: ic.spectrumauctions-encheresduspectre.ic@canada.ca

Aline Chevrier

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Innovation, Science and Economic Development Canada
235 Queen Street, 6th floor
Ottawa, Ontario K1A 0H5

Re: Canada Gazette Notice No. SLPB-005-18: Addendum to the Consultation on Releasing Millimetre Wave Spectrum to Support 5G

Please find the reply comments of Rogers Communications Canada Inc. (Rogers) in response to *Canada Gazette*, Part I, June 16, 2018, *Addendum to Consultation on Releasing Millimetre Wave Spectrum to Support 5G* (SLPB-005-18).

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

Yours very truly,



Howard Slawner
Vice President – Regulatory Telecom
HS/pg

Attach.

Addendum to the Consultation on Releasing
Millimetre Wave Spectrum to Support 5G
SLPB-005-18

Comments of
Rogers Communications Canada Inc.
July 5, 2018



Executive Summary

- E1. Millimetre wave spectrum will be a critical input for satisfying the growth in demand for mobile broadband services in Canada. Canadians are among the heaviest users of mobile data services globally and their demand for mobile data services will continue to increase dramatically. As Canada's largest wireless provider and the leader in the Machine to Machine market, we continue to invest heavily in advanced wireless networks and, as such, Rogers requires continued access to interference free, exclusively licensed spectrum in order to satisfy its customers' growing demand for mobile data services.
- E2. Rogers supports Innovation, Science and Economic Development Canada's addendum to the consultation on releasing millimetre wave spectrum and its proposal to release an additional 1 GHz in the 26 GHz frequency band to support the deployment of fixed and mobile 5th generation services. The Department should continue to maximize the use of millimetre wave spectrum for new services using a technologically-neutral approach while ensuring reasonable protection of incumbent services in order to enable greater spectrum utilization and allow Canadian consumers to benefit from wireless innovations. Increasing and enhancing spectrum availability is vital to supporting the advanced network speeds and capacity that Canadians have come to enjoy and demand.
- E3. The Department should employ a flexible use, exclusively licensed spectrum regime for the 26 GHz band, in addition to the previously announced 28 GHz and 37-40 GHz bands, that will allow operators to deploy fixed terrestrial or fixed or mobile wireless access services based on network needs and market demands. The 26 GHz band, in conjunction with the 28 GHz band, will provide 1.85 GHz contiguous spectrum and be among the first bands used for 5th generation services. Terrestrial network operators will need to ensure access to interference-free spectrum as they deploy next-generation wireless technologies in unprecedented densities.
- E4. Rogers requires millimetre wave spectrum to compete with its primary competitors, Bell and Telus. Since 2008, Bell and Telus combine their spectrum after every auction, along with their local telecommunications wireline assets, allowing them to avoid capital costs and improve speeds. Rogers will not be in a position to match these advantages of Bell and Telus without additional spectrum. Despite this clear and persistent pattern, the affiliated and associated entities rules and the rules prohibiting collusion continue to permit their independent bidding. Ongoing coordination between bidders should be prevented so that all bidders are treated the same.

- E5. The Department should also ensure a level playing field for infrastructure access. 5th generation wireless technology will result in a large increase in network base stations and the amount of traffic they carry, all of which must be carried back to the carrier's core network. It is essential that the Department ensure that any Federal, Provincial or Municipal accesses, such as rights-of-way, that local telephone companies possess are similarly available to all types of carriers in order to increase competition for the benefit of all Canadian businesses and customers.

Introduction

1. Rogers Communications Canada Inc. (Rogers) is pleased to provide Innovation, Science and Economic Development Canada (ISED or the Department) with the following comments in response to *SLPB-005-18: Addendum to the Consultation on Releasing Millimetre Wave Spectrum to Support 5G*¹ (the Addendum), published in the *Canada Gazette*, Part I, June 16, 2018.
2. As we stated in our comments for *SLPB-001-17: Consultation on Releasing Millimetre Wave Spectrum to Support 5G*² (the Consultation), the Department should look to maximize the use of millimetre wave (mmWave) spectrum to support the deployment of 5th generation (5G) wireless networks and systems. Increasing and enhancing spectrum availability, including low, mid, high, microwave, and mmWave bands, is vital to supporting the advanced network speeds and wireless broadband capacity that Canadians have come to enjoy and demand, and supports the provision of next-generation wireless technologies. Rogers fully supports the efforts of the Department to make as much mmWave spectrum available to facilities-based terrestrial network operators through a competitive licensing process in 2021 in order to enable greater spectrum utilization and allow Canadian consumers to benefit from wireless innovations.
3. Effective spectrum policy frameworks will help Canadian network operators meet the increasing demand for data and innovative new services. Rogers has been a consistent proponent of the importance of generally making additional spectrum available to support innovation, while ensuring incumbent users are still protected. However, as the Department itself states in the Addendum, there has not even been a single earth exploration-satellite service (EESS) earth station licence applied for in the 26 GHz band and no licences issued in half of the band for any satellite service.³ We welcome the decision by the Department to consult on making additional

¹ ISED, *SLPB-005-18: Addendum to the Consultation on Releasing Millimetre Wave Spectrum to Support 5G (Addendum)*; <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11399.html>.

² ISED, *SLPB-001-17: Consultation on Releasing Millimetre Wave Spectrum to Support 5G (Consultation)*; <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11298.html>.

³ ISED, *Addendum*, para 12-13.

mmWave spectrum available to facilities-based terrestrial operators that continue to invest heavily in Canadian communications infrastructure in order to continue providing Canadians with the most advanced and innovative connectivity technology solutions.

4. Developing a flexible use licensing model for fixed and mobile services in the 26 GHz, in addition to the 28 and 37-40 GHz frequency bands, will provide facilities-based operators with additional interference free spectrum to deliver the new technology and innovations Canadians demand and expect.
5. The Department must ensure that the spectrum and licensing policies it adopts will provide fair and reasonable access to 5G spectrum for all wireless competitors. At the same time, the Department should ensure that all wireless competitors will be provided with fair and reasonable access to the public and private infrastructure that is essential to the successful deployment of small cell technology required to support 5G and the Internet of Things.
6. The remainder of Rogers' comments will respond to the specific issues raised in the Consultation.

A1: ISED is seeking comments on the development of a flexible use licensing model for fixed and mobile services in the 26 GHz band (in addition to the bands currently under consultation through the mmWave Consultation), taking into account the timing of WRC-19, 5G technology standards development, international ecosystems and harmonization of spectrum use with other countries.

7. Rogers supports the Department's proposal to develop a flexible use licensing model for fixed and mobile services in the 26 GHz frequency band ahead of the World Radiocommunication Conference 2019 (WRC-19), as we supported flexible use in the 28 GHz and 37-40 GHz frequency bands in our Consultation comments. We fully expect that the 26 GHz band will be identified as an IMT-2020 band at the upcoming WRC-19 conference. As the Department is aware, WRC-19 agenda item 1.13 will consider the 24.25-27.5 GHz range and the proposed Canadian 26 GHz band falls within this range.
8. As Rogers stated in our Consultation comments, flexible use that permits either fixed or mobile use is the optimum model for 5G in these bands. Flexible licensing will allow network operators to evaluate market conditions and deploy the best-suited technology to meet demand. As we also stated in our Consultation comments, we believe there will be significant demand in Canada for the services provided by 5G fixed and mobile services, and the potential benefits to Canadians are substantial.

Increasing the amount of spectrum available to terrestrial network operators in a timely manner will only help to promote innovation and early adoption of 5G technology and only benefit Canadian businesses and consumers.

9. The standards development organization Third Generation Partnership Project (3GPP) has continued their rapid progress on 5G standards. Since the mmWave Consultation, 3GPP has standardized two bands for 5G New Radio technology in Release 15 that will serve the proposed 26 GHz band.⁴ 3GPP band n258 will cover the range 24.25-27.5 GHz, which coincides with the proposed IMT-2020 band and has great potential to become a globally harmonized 5G band. 3GPP band n257 will cover the range 26.5-29.5 GHz and has great potential as a North American 5G band.
10. Rogers notes that the U.S. has included the 26 GHz band in the *Use of Spectrum Bands above 24 GHz for Mobile Radio Services* Third Further Notice of Proposed Rulemaking 18-73 (adopted June 7, 2018).⁵ In that NPRM, the FCC noted a growing international consensus to authorize mobile services across the entire 24.25-27.5 GHz band. The NPRM noted that the European Conference of Postal and Telecommunications Administrations (CEPT) has decided to promote this band both across Europe and indeed around the world, and that at least eight other countries (Australia, China, Hong Kong, New Zealand, Singapore, Thailand, Vietnam, and Russia) have started to authorize the range for mobile services. This suggests that an international ecosystem will emerge and that harmonization of spectrum use with other countries has already begun.
11. We applaud the Department for its continuing efforts to monitor and work closely with the international community to harmonize additional 5G spectrum, in addition to the pioneer mmWave spectrum bands identified in the Consultation. Our expectation is that the 26 GHz band will become another globally harmonized 5G band, helping to achieve maximum economic benefits by driving economies of scale for global, or regional (in particular the U.S.), equipment ecosystems and reduce costs for Canadian consumers and businesses. Canadians will benefit greatly from having domestic access to the 26 GHz band for flexible use 5G services.

⁴ 3GPP. 38.101-2 – NR; *User Equipment (UE) radio transmission and reception; Part 2: Range 2 Standalone*; <https://portal.3gpp.org/desktopmodules/Specifications/SpecificationDetails.aspx?specificationId=3284>.

⁵ FCC, *Use of Spectrum Bands above 24 GHz for Mobile Radio Services, Third Further Notice of Proposed Rulemaking 18-73* (adopted June 7, 2018).

A2: ISED is seeking comments on the changes proposed above to introduce flexible use licensing in the 26 GHz band, including the ensuing changes to the CTFA domestic footnotes and the policy on this band contained in SP 3-30 GHz, *Revisions to Spectrum Utilization Policies in the 3-30 GHz Frequency Range and Further Consultation*.

12. We support the Department's proposed changes to the Canadian Table of Frequency Allocations (CTFA) footnotes that will result in the modification of footnote C47A, and addition of a new footnote CXX. We further support the proposed changes to the policy contained in SP 3-30 GHz, *Revisions to Spectrum Utilization Policies in the 3-30 GHz Frequency Range and Further Consultation*.

13. Rogers also fully supports the Department taking any, and all, steps required to ensure "that minimal constraints are imposed on the future deployment of fixed and mobile services"⁶ in the 26 GHz band, while also facilitating continued shared access to the spectrum by satellite earth stations.

A3: ISED is seeking comments on the importance of harmonizing the Canadian band plan with the United States in the 26 GHz and 28 GHz bands, recognizing that the 26 GHz band is not available for 5G services in the United States at this time.

14. As the Department itself states, in general, harmonizing band plans with other countries allows for three broad advantages to Canadians.⁷ Canadians can benefit from larger equipment ecosystems of the latest technologies and economies of scale cost advantages. It can facilitate a superior customer experience when roaming between Canada and the international markets. Finally, harmonization tends to minimize any cross-border interference issues that could arise from using the same spectrum for different services or with different band plans, allowing for more efficient spectrum planning – especially in border areas. All of these advantages apply directly to the U.S., with its large market size, frequency of cross-border travels by businesses and consumers, and the long shared border.

15. The 26 GHz band holds great potential for both commercial mobile and fixed services. While it is true that the 26 GHz band is not available for 5G services at this time in the U.S., as we state above in our response to A1, the FCC is well along in rulemaking for this band.⁸ Further, as Rogers stated in our Spectrum Outlook

⁶ ISED, *Addendum*, para 14.

⁷ ISED, *Addendum*, para 15.

⁸ FCC, *Use of Spectrum Bands above 24 GHz for Mobile Radio Services, Third Further Notice of Proposed Rulemaking 18-73* (adopted June 7, 2018).

comments, there is already significant progress at the International Telecommunication Union (ITU) and in Europe on this band, in addition to the U.S.⁹

16. The ITU is studying this band and it is likely that it will be identified as an IMT band at WRC-19. The European Union Radio Spectrum Policy Group (RSPG) has designated the band as a “pioneer band” for 5G mobile services and recommended that harmonization measures be developed before 2020, so we expect that commercial 5G services could begin by 2022. In the U.S., the FCC has recommended moving as quickly as possible to auction the spectrum,¹⁰ suggesting that commercial 5G services could begin even earlier than 2022. Technical standards are already under development in 3GPP and we expect these to be completed on schedule, with commercial equipment that should be available by 2018-2019.
17. Rogers fully supports ISED moving quickly to make the 26 GHz band available in Canada and harmonizing with the U.S. band plan.

A4: ISED is seeking comments on the minimum block size that should be made available for the 26.5–28.35 GHz band. Is it necessary that the frequency blocks be multiples of the 3GPP channel bandwidths (50 MHz, 100 MHz, 200 MHz and 400 MHz)?

18. Rogers strongly recommends that the minimum block size across the 26.5-28.35 MHz band should be multiples of the 3GPP channel bandwidths. This will ensure that Canadian operators and users will be able to benefit from the anticipated ecosystem of 3GPP-compliant equipment in this band.
19. Our preference is that the 26 GHz and 28 GHz blocks be as large as possible, as it will allow facilities-based operators to offer very fast, reliable broadband services to Canadian businesses and consumers. Given the amount of spectrum in these bands (1000 MHz in the 26 GHz band and 850 MHz in the 28 GHz band) and the need to maintain a healthy level of facilities-based competition, Rogers recommends a block size of 200 MHz in both the 26 GHz band and 28 GHz bands. Using a 200 MHz block size in the 26 GHz band would also make the block sizes consistent with the Canadian 28 GHz band, if ISED adopts the four blocks of 200 MHz proposal made by Rogers in the initial consultation.¹¹ In addition, 200 MHz blocks would allow for operators to aggregate two or more blocks to create very wide channels.

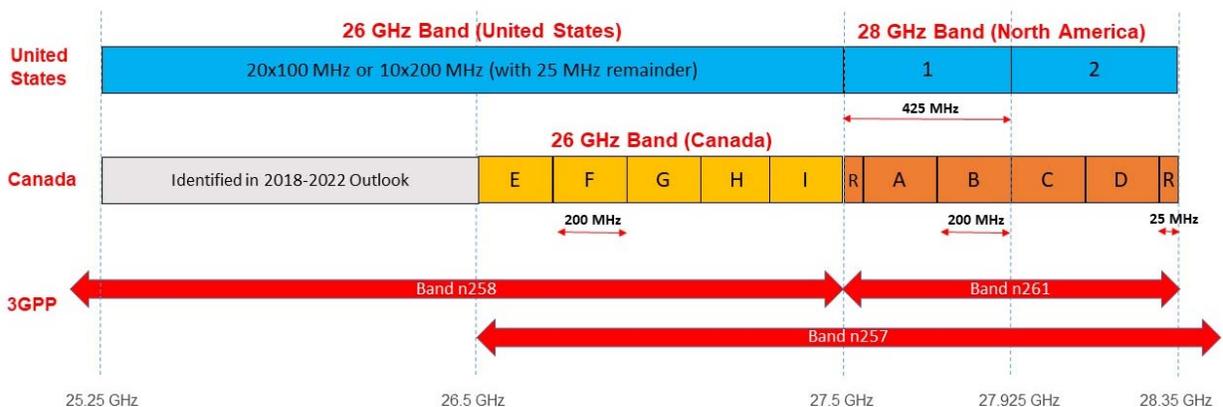
⁹ Rogers Comments, *Spectrum Outlook 2018 to 2022*, para 213-215.

¹⁰ FCC, *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services* (2nd Report & Order).

¹¹ Rogers Comments, *Consultation*, para 29.

20. Rogers is pleased to propose a band plan that we believe is well harmonized with the emerging U.S. 26 GHz band plan, with the European/CEPT 24 GHz band plan, with the ITU recommendations for IMT-2020, and with the 3GPP Release 15 standards for 5G. This proposed band plan is shown below in Figure 1, which also shows Rogers' proposed band plan for the 28 GHz band, as per our Consultation comments.
21. Rogers' proposed 26 GHz band plan divides the Canadian band into five (5) blocks of 200 MHz each. The proposed 26 GHz band falls within the tuning ranges of 3GPP bands n258 and n257, allowing Canadian operators and consumers to benefit from both ecosystems.
22. The proposed band would also be aligned with the upper portion of the U.S.'s proposed 26 GHz band. The U.S. has asked American industry to indicate if they prefer 20 blocks of 100 MHz or 10 blocks of 200 MHz channelization scheme. Canada could adopt either the five blocks of 200 MHz channelization (shown here), or a 10 blocks of 100 MHz channelization, if the U.S. selects that option. Alignment with the U.S. frequency range will be beneficial, as it will give Canadian operators and consumers access to a large ecosystem of equipment suitable for operation in the 26 GHz band. Note there is a 25 MHz "remainder" in the United States 26 GHz band that will need to be accommodated. Our proposed band plan also provides the flexibility to extend the Canadian 26 GHz band down to 25.25 GHz to both expand capacity and maintain alignment with the U.S.

Figure 1 Rogers proposed 26 GHz and 28 GHz band plans



23. To summarize, the key characteristics of our proposed Canadian 26 GHz and 28 GHz band plans includes:

- Both 26 GHz and 28 GHz bands are well aligned with U.S. band plans;
- Compatible with 3GPP bands n258, n257, and n261;

- Proposed band plans provide five (5) 200 MHz blocks in the 26 GHz band (E thru I) and four (4) 200 MHz blocks in the 28 GHz band (A thru D), along with two reserve blocks (R);
- Proposed band plans offer a large number of consistently sized blocks, which will support healthy competition and make valuation of the spectrum more straightforward than if the blocks were of different sizes; and,
- The proposed 26 GHz band will allow extension to 25.25 GHz at some point in the future, as identified in ISED's *Spectrum Outlook 2018 to 2022*.

A5: A. ISED is seeking comments on whether it should impose any limits on the aggregate emissions of the terrestrial services in the 26.5–27.5 GHz band to ensure coexistence with ISS.

B. If limits are proposed, ISED is inviting detailed proposals on what the limits should be, and why they should be implemented.

24. Rogers does not believe that any limits on aggregate emissions of the terrestrial services are required to ensure coexistence with Inter-Satellite Service (ISS) and agrees with ISED not proposing any limits on terrestrial flexible use systems at this time.

25. As the Department notes, preliminary results from the ITU indicate that harmful interference to space stations due to aggregate emissions from 5G systems is not likely.¹² Further, we highlight that in the case of the 24 GHz band, the FCC has stated they “will not adopt any operational requirements addressing limits on aggregate interference into satellite receivers at this time, as we do not believe such limits are justified by the current record, and we received no specific proposals for such a rule.”¹³ Rogers expects a similar finding and decision from the FCC when they complete rulemaking for the 26 GHz band.

¹² ISED, *Addendum*, para 21.

¹³ FCC, *Use of Spectrum Bands above 24 GHz for Mobile Radio Services, Third Further Notice of Proposed Rulemaking 18-73* (adopted June 7, 2018), para 23.

A6: A. ISED is seeking comments on the proposal to require site-by-site coordination between proposed flexible use terrestrial stations and EESS/SRS earth stations in the 26.5–27.0 GHz band when a pre-determined trigger threshold is exceeded.

B. If the proposed site-by-site coordination is supported, what coordination trigger and value would be the most appropriate (e.g. power flux density or distance threshold)?

C. ISED is also inviting proposals for specific additional technical rules for flexible use terrestrial stations and EESS /SRS earth stations (e.g. site shielding) that could facilitate more efficient sharing between terrestrial and earth stations.

26. Rogers supports the Department's proposal to require site-by-site coordination between proposed flexible use terrestrial stations and earth exploration-satellite service (EESS) and space research service (SRS) earth stations in the 26.5-27.0 GHz band when a pre-determined trigger threshold is exceeded, to ensure optimal coexistence of both co-primary services and fair access to the band for all interested operators.

27. We note that, as deployment of flexible-use services in this band is expected to require a large quantity of small base stations, the process should more appropriately be referred to as site-to-area coordination, where site refers to an EESS/SRS earth station and area refers to flexible-use terrestrial stations. Such an approach would be consistent with what we have recommended regarding the 37-40 GHz band. Further, we agree with the Department's position that earth stations should pose minimal constraints upon the deployment of fixed and mobile service systems, especially seeing as, "To date no EESS or SRS earth stations have been deployed in Canada and it is expected that the overall deployments will be limited in number."¹⁴

28. As with our views on the 37-40 GHz band, we believe a power flux density (PFD) threshold would be an appropriate mechanism for triggering coordination in the 26 GHz band, which would minimize unnecessary detailed coordination. However, we still view it as premature to conclusively determine an appropriate PFD value at this time, as 5G technology is still being developed. We recommend a study be conducted through the Radio Advisory Board of Canada (RABC) to develop an initial PFD value and coordination requirements for policy development. These values should be further refined, as needed, to reflect ongoing developments of 5G

¹⁴ ISED, *Addendum*, para 22.

technology and 5G operational parameters, as mentioned in our Consultation comments.¹⁵

29. Rogers supports the proposal to introduce certain specific technical rules like site shielding of EESS/SRS earth stations, especially for those earth stations that may be deployed near urban areas, where dense deployments of flexible use services are expected. As the FCC states in R&O 16-89, “satellite operators can substantially reduce the sizes of the exclusion zones that they require by constructing artificial site shields or by taking advantage of naturally occurring terrain features” in the 26 GHz band.¹⁶ Implementing these techniques would attenuate the amount of unwanted radiation received by victim EESS/SRS earth stations and will reduce the required exclusion zone around EESS/SRS stations.
30. Rogers recommends that stakeholders (flexible use licence holders and EESS/SRS earth station operators) collaborate within the RABC, or some other forum, to develop specific technical rules on sharing.

A7: A. ISED is seeking comments on whether there should be restrictions on the geographic areas in which new EESS and SRS earth stations can be deployed in the 26.5–27.0 GHz band.

B. If geographic restrictions on EESS and SRS earth stations are proposed, ISED is inviting detailed proposals on how they could be implemented, and what areas should be targeted.

31. Rogers recommends placing restrictions on the geographic areas in which new EESS and SRS earth stations can be deployed in the 26.5-27.0 GHz band.
32. We note that the FCC recognized in its decision the importance of not restricting “the deployment of new UMFUS (Upper Microwave Flexible User Service) systems in core urban areas and around major infrastructure where implementation of flexible use systems would be most likely.”¹⁷ Rogers believes ISED should take a similar position for the 26.5-27.0 GHz band in Canada.
33. As we believe 5G deployments will primarily be in or near urban areas, at least initially, Rogers proposes to restrict implementation of new EESS and SRS earth stations to locations that are outside major urban areas, in order to ensure that the two services can co-exist in the same band with minimal interference.

¹⁵ Rogers Consultation Comments, para 65.

¹⁶ FCC, *FCC 16-89*, para 92.

¹⁷ ISED, *Consultation*, para 59.

34. To minimize interference in the band between terrestrial flexible users and satellite operators, Rogers recommends that EESS and SRS earth stations be prohibited (not permitted) within large urban areas, defined as Census Metropolitan Areas (CMA) by Statistics Canada with core populations of >50,000. EESS and SRS earth stations should be restricted (site shielding required) within medium size and smaller urban areas, defined as Census Agglomeration Areas (CA) by Statistics Canada with core populations of >10,000.¹⁸
35. In those instances where it is necessary to implement an EESS or SRS earth station in or near a CMA or CA urban area, site shielding could be used around the EESS or SRS earth station in order to optimize coexistence between satellite and flexible use terrestrial services.
36. Rogers proposes the following specific geographic restrictions for EESS or SRS earth stations in the 26.5-27.0 GHz band:
- i. EESS or SRS earth stations should be prohibited from locations in or near large urban areas, defined as Census Metropolitan Areas by Statistics Canada;
 - ii. EESS or SRS earth stations should be permitted near medium size and smaller urban areas, defined as Census Agglomeration Areas by Statistics Canada; EESS or SRS earth stations should be located outside these areas urban cores and site shielding or other measures generally required;
 - iii. EESS or SRS earth stations should not be located in, or close to, areas where there is expected to be significant 5G mobile traffic, including event venues, major highways or roadways, mass transit systems, passenger railways, airports, or cruise ship terminals;
 - iv. There should be a limited number of EESS or SRS earth stations per region;
 - v. The EESS or SRS operator should be required to demonstrate in its licence application that interference to flexible use terrestrial stations should be below a predetermined threshold;
 - vi. If there is an existing 26 GHz Upper Microwave Flexible Use Service (UMFUS) licence holder, the EESS or SRS operator should coordinate with the licence holder to prevent interference; and,
 - vii. For locations close to the Canada-United States border, ISED and FCC should actively manage the coordination.

¹⁸ Statistics Canada, *Census metropolitan area (CMA) and census agglomeration (CA)*.

A8: A. ISED is seeking comments on the proposal to require site-by-site coordination between proposed flexible use terrestrial stations and FSS earth stations in the 27.0–28.35 GHz band when a pre-determined trigger threshold is exceeded.

B. If the proposed site-by-site coordination is supported, what coordination trigger and value would be the most appropriate (e.g. power flux density or distance threshold)?

C. ISED is also inviting proposals for specific technical rules for proposed flexible use terrestrial stations and FSS earth stations (e.g. site shielding) that could facilitate more efficient sharing between terrestrial and earth stations.

37. We support ISED's proposal to require coordination between proposed flexible use terrestrial stations and FSS earth stations in the 27.0-28.35 GHz band when a pre-determined trigger threshold is exceeded.
38. Rogers believes that it is important to establish a comprehensive site-by-site coordination process with a pre-determined trigger threshold, to ensure optimal coexistence of both co-primary services and fair access to the band for all interested operators. We again highlight that as deployment of flexible-use services in this band is expected to require a large quantity of small base stations, the process should more appropriately be referred to as site-to-area coordination, where site refers to an FSS earth station and area refers to a number of flexible-use terrestrial stations within an area.
39. Rogers views a PFD threshold as an appropriate coordination trigger in the 27.0-28.35 GHz band that would minimize unnecessary detailed coordination. However, Rogers believes that it is premature at this time to conclusively determine any such PFD value, as 5G technology is still being developed. Any PFD value agreed to at this time would require further refinement in the future to reflect the development of 5G technology, once there is a better understanding of 5G operational parameters and tolerance to interference.
40. We recommend a preliminary study to be conducted through the RABC to determine the appropriate PFD value and coordination requirements for policy development.
41. Rogers proposes that, whenever possible, use of site shielding should be implemented as it is proving to be effective in maximizing coexistence of services. Site shielding of FSS earth stations, especially those deployed close to urban areas, will reduce spilling of unwanted radiation and interference into flexible use terrestrial stations. As the FCC states in R&O 16-89, "Site-shielding of earth station antennas is a well established technique" for protecting FSS earth stations from interference.

42. In addition to site shielding of FSS earth stations, flexible use dynamic beam forming antennas is another technique available to facilitate co-channel coexistence of these services in the same area. Rogers recommends that stakeholders (flexible use licence holders and FSS earth station operators) collaborate within the RABC, or some other forum, to develop the specific technical rules on sharing.

A9: A. ISED is seeking comments on whether there should be restrictions on the geographic areas in which new FSS earth stations can be deployed in the 27.0–28.35 GHz band.

B. If geographic restrictions on FSS earth stations are proposed, ISED is inviting detailed proposals on how they could be implemented, and what areas should be targeted.

43. Rogers recommends placing restrictions on the geographic areas in which new FSS earth stations can be deployed in the 27.0-28.35 GHz band to ensure the 26 GHz and 28 GHz bands are optimized for mobile services, as per our Consultation comments on new FSS earth stations in the 28 GHz band.¹⁹ We maintain our proposal to restrict the implementation of new FSS earth stations to locations that are outside major urban areas, in order to ensure that the two services can co-exist in the same band with minimal interference.

44. To minimize interference in the 27.0-28.35 GHz band between terrestrial flexible users and satellite operators, Rogers recommends that FSS earth stations be prohibited (not permitted) within large urban areas, defined as CMAs by Statistics Canada with core populations of >50,000. FSS earth stations should be restricted (site shielding required) within medium size and smaller urban areas, defined as CAs by Statistics Canada with core populations of >10,000.

45. In those instances where it is necessary to implement an FSS earth station in or near a CMA or CA urban area (such as where an FSS operator already operates facilities), it should be a mandatory requirement for FSS operators to use site shielding around the FSS earth station, or other techniques that will achieve the same results, in order to not restrict deployment of flexible use terrestrial service.

46. Rogers proposes the following specific geographic restrictions for FSS earth stations in the 27.0-28.35 GHz band:

- i. FSS earth stations should be prohibited from locations in or near large urban areas, defined as CMAs by Statistics Canada;

¹⁹ Rogers Consultation Comments, para 42-47.

- ii. FSS earth stations should be permitted near medium size and smaller urban areas, defined as CAs by Statistics Canada; FSS earth stations should be located outside these areas urban cores and site shielding or other measures generally required;
- iii. FSS earth stations should not be located in, or close to, areas where there is expected to be significant 5G mobile traffic, including event venues, major highways or roadways, mass transit systems, passenger railways, airports, or cruise ship terminals;
- iv. There should be a limited number of FSS earth stations per region;
- v. The FSS operator should be required to demonstrate in its licence application that interference to flexible use terrestrial stations should be below a predetermined threshold;
- vi. If there is an existing 28 GHz Upper Microwave Flexible Use Service (UMFUS) licence holder, the FSS operator should coordinate with the licence holder to prevent interference; and,
- vii. For locations close to the Canada-United States border, ISED and FCC should actively manage the coordination.

A10: A. ISED is seeking comments on whether it should impose any limits on the aggregate emissions of the terrestrial services in the 27.0–28.35 GHz band to ensure coexistence with FSS space stations.

B. If limits are proposed, ISED is inviting detailed proposals on why they should be implemented, and what the limits should be.

47. Rogers believes that the Department's proposal to impose no limits on the aggregate power levels produced by terrestrial flexible use systems in the 28 GHz band to ensure coexistence with FSS space stations is still the correct option for the 27.0-28.35 GHz band.²⁰ 5G systems will employ dynamic beamforming, downward tilting antennas, and other measures to ensure that radio energy is directed towards base stations and user equipment, and not skyward towards satellite receivers. As noted above, and in our Consultation comments, the Department itself recognizes, "The FCC decided not to establish any regulatory limits on the aggregate power levels produced by UMFUS operations", as the FCC does not believe that there will likely be coexistence issues between UMFUS systems and FSS systems.²¹

²⁰ ISED, *Consultation*, para 38.

²¹ *Ibid*, para 37.

A11: A. Further to section 9 of the mmWave Consultation, are there any new considerations or suggested approaches regarding the licensing of flexible use mmWave spectrum, given the addition of the 26 GHz band?

B. ISED is also seeking comments on licensing considerations in the 26 GHz and 28 GHz bands that would encourage innovative use cases while also supporting competition for existing mobile network services.

48. As pioneer bands for 5G connectivity, ISED should provide exclusive-licences for the 26 GHz band, in addition to the 28 GHz and 37-40 GHz bands, in order to minimize the potential for interference to the next generation of communications infrastructure that Canadian consumers and businesses will rely on. Exclusively licensed spectrum bands are key inputs in current networks and will create a more certain spectral environment. This will be crucial as operators roll out the 5G infrastructure and overcome any engineering challenges that would result from the unprecedented densities and usage of mmWave spectrum.
49. These licences should be flexible for service providers to deploy different services including fixed or mobile wireless access or wireless backhaul or fronthaul, or even dynamically change between usage depending on network need and user demand. We note that the FCC, in the *Third Further Notice of Proposed Rulemaking for Bands above 24 GHz*, states "...we believe the 26 GHz band could be suitable for flexible fixed and mobile use. It is relatively near to the 24 GHz and 28 GHz bands, which we have already found suitable for fixed and mobile use."
50. Licence-exempt flexible use or any radical new approaches to spectrum management risks creating a chaotic spectral environment and harming the smooth deployment of new 5G technology. The Department is already proposing, as part of the initial Consultation, to designate 7 GHz of spectrum (64-71 GHz) as licence-exempt. Even with the additional spectrum made available in the 26 GHz band for exclusively licensed, the Department will still be making nearly 50% more spectrum available for licence-exempt use compared to exclusively licensed as part of its mmWave Consultation. As a result, this will further increase the overall amount of spectrum that the Department has made available in Canada for licence-exempt use vis-à-vis exclusively licensed commercial mobile spectrum. While operators may be able to make some use of this licence-exempt spectrum in their networks, exclusively licensed spectrum bands will continue to be a key input for ensuring service providers can offer a high quality of service that allow Canadian companies to take advantage of the latest technologies to better compete globally.
51. The Department should issue service area spectrum licences for the 26 GHz band through a competitive licensing process, as this would be best suited for licensing flexible use spectrum. With weaker propagation characteristics than high, mid or low

band spectrum, the Department should license mmWave flexible user spectrum on a Tier 4 basis. Radio licences that would require an individual licence for each individual small cell or even at a grid cell level would be an enormous administrative and engineering burden for both the Department and network operators.

52. Regarding innovation and competition, Rogers is of the view that flexible, geographic licensing is most likely to encourage innovative use cases while also supporting competition. We note that the FCC, in the *Third Further Notice of Proposed Rulemaking for Bands above 24 GHz*, states that, “Geographic area licensing may provide licensees with the flexibility to provide a variety of services, and will foster innovation and investment and thereby spur deployment.” ISED should take a similar approach and issue service area spectrum licences for the 26 GHz band through a competitive licensing process.
53. The Department should not pursue any dynamic access (nor opportunistic access) database system in the 26 GHz band, nor in the 28 GHz and 37-40 GHz bands. The main purpose of a dynamic access database is to protect incumbents that have variable usage conditions (location, time etc.). With no such incumbents in the 26 GHz band, the additional costs and complexity associated with dynamic access using database (devices, database etc.) do not appear to be justified.
54. As for supporting competition, Rogers’ view is that the 26 GHz band should be divided into a sufficient number of sub-blocks to ensure that both national and regional facilities-based operators are able to secure a large, contiguous block of spectrum. In the case of the 26 GHz band, Rogers recommends a band plan with five blocks of 200 MHz blocks, as described above. When combined with Rogers’ proposed 28 GHz band plan, there would be nine 200 MHz blocks available with two 25 MHz blocks held in reserve. Band plans that divide frequency ranges into multiple, smaller blocks that can still be aggregated allows for greater competition, more innovation, more services, and greater overall benefits to Canadians while still permitting wide, contiguous channels.
55. Rogers believes that the Department should carefully evaluate and take all the necessary steps to ensure any affiliated and associated entities rules promote a fair and efficient outcome in the both current and future auctions or any licensing processes. Rogers further believes that the Department must integrate its policies and auction rules regarding collusion and affiliated and associated entities within a single framework to ensure that unintended consequences do not benefit one or more bidders in auctions.
56. The challenges with the existing associated entity rules are clearly demonstrated by the Bell and Telus relationship. While Bell and Telus compete head-to-head for customers, they have a long-standing wireless network sharing arrangement that aligns their interest in terms of acquiring spectrum in auctions. They already have a

joint 4G LTE network and economics and technology will ensure this arrangement is extended into 5G and mmWave spectrum bands. They therefore already have in-depth knowledge of their combined spectrum needs. Yet, under the rules of recent auctions they can bid separately and be subject to individual spectrum caps while effectively combining their balance sheets for improved bidding power. Despite their common interest, the current rules provide Bell and Telus with greater bidding abilities than individual competing carriers.

57. For the last decade, the Department has been focused on competition between national carriers and regional carriers but it must be careful not to neglect policies that maintain downstream competition between the national carriers. Rogers requires mmWave spectrum to remain competitive with its primary competitors, Bell and Telus. The existing auction rules allow Bell and Telus to plan and develop their joint network, including with spectrum to be auctioned. Therefore, the Department should take all steps necessary to ensure that the rules do not provide Bell and Telus' with an unfair advantage for bidding on 5G spectrum, including the Consultation mmWave bands and 3500 MHz band. Such actions will help prevent Bell and Telus from being able to leverage both of their balance sheets to prevent the only other national network operator (Rogers) or the regional providers from being able to acquire vital 5G spectrum.
58. The Department should also recognize that 5G competitiveness will extend beyond spectrum; although, access to new spectrum in low, mid, high, microwave, and mmWave bands will be crucial. In addition, access to (wireline) local connectivity is critical to 5G deployments. The other key to 5G deployments in urban areas is access to real estate (municipal and private sector) for new micro sites (poles, lamp posts, street furniture, etc.). The Department should also ensure that any access rights to facilities and rights-of-way held by local telephone companies are made available to all other competitors in order to increase competition for the benefit of all Canadian businesses and customers. For a more fulsome discussion of regulatory enhancements for infrastructure investment and deployment, we refer the Department to our comments in the initial Consultation.²²
59. Providing Canadian wireless carriers with better and more timely access to public and private infrastructure at economical rates is critical to 5G deployments and ISED should pursue similar policies in order to support competition and the provision of high quality and innovative wireless services to Canadians.
60. Rogers thanks the Department for the opportunity to share its views and participate in this consultation process.

²² Rogers Comments, *Consultation*, para 98-101.