



Comments of Shaw Communications Inc.

Consultation on Releasing Millimetre Wave Spectrum to Support 5G

Canada Gazette, Part I, June 17, 2017, Notice No. SLPB-001-17

September 15, 2017

I. INTRODUCTION & EXECUTIVE SUMMARY

1. The following constitutes the initial comments of Shaw Communications Inc. (“Shaw”) on behalf of itself and its wholly-owned subsidiary, Freedom Mobile Inc., to Innovation, Science and Economic Development Canada (“ISED” or “Department”) in connection with the proceeding (“Consultation”) initiated by *Consultation on Releasing Millimetre Wave Spectrum to Support 5G*, Notice, No. SLPB-001-17 (“Consultation Document”).
2. As a new competitor in the wireless industry, Shaw welcomes the opportunity to participate in this proceeding to enable and ensure Canada’s readiness for 5th generation (“5G”) telecommunications technology and applications. The development of 5G standards represents the next major wave of innovation for the telecommunications sector. With forecasted use cases including enhanced/ultra-fast mobile broadband, massive machine type communications, and ultra-reliable/low latency communication, 5G technology and applications have the potential to disrupt and advance business models throughout the Canadian economy and bring transformative economic and social benefits to Canadians.
3. It is important that we set the stage for forward planning around millimetre wave (“mmW”) spectrum and the deployment of 5G in Canada. This is necessary to realize the Government’s Innovation and Skills Plan, which seeks to promote innovation-led growth across all sectors of the Canadian economy.¹ Forward planning also supports the Minister of ISED’s mandate² to help Canadian businesses grow, innovate and export, while maintaining Canada’s position at the leading edge of the digital economy through support for competition, choice, and availability of services, and fostering a strong investment environment for telecommunications.
4. Policymakers across the globe are currently searching for ways to drive the development of 5G technologies in their respective countries. The United States, for example, took steps to support the development of 5G when the U.S. Federal Communications Commission (“FCC”) adopted its 2016 *Spectrum Frontiers Order* establishing a general

¹ Government of Canada, Canada’s Innovation and Skills Plan (22 March 2017), <http://www.budget.gc.ca/2017/-docs/themes/innovation-en.html>.

² Letter from Justin Trudeau, Prime Minister of Canada, to Navdeep Bains, Minister of Innovation, Science and Economic Development, <http://pm.gc.ca/eng/minister-innovation-science-and-economic-development-mandate-letter>.

framework for flexible use of certain spectrum bands, many of which are also identified in the Consultation Document.³ Specifically, the FCC adopted flexible use licensing in the 28 GHz and 37-40 GHz bands and authorized unlicensed use of the 64-71 GHz band. Policymakers in Europe and Asia are similarly examining ways to develop 5G mobile services.⁴

5. Not all use cases for 5G technology are known. Moreover, equipment, standard setting and international regulatory developments have the potential to evolve rapidly in the coming months and years. However, the importance of high-frequency mmW spectrum to the future of 5G is clear. High-frequency mmW spectrum complements existing lower-band spectrum currently used by mobile carriers for the provision of mobile services.
6. The Department has recognized the key role that mobile wireless carriers will play in the provision of 5G services. In the Consultation Document, ISED proposes to release 850 MHz of 28 GHz band spectrum on a licensed basis, 2,400 MHz of 37-40 GHz band spectrum on a licensed basis and 7,000 MHz of 64-71 GHz band spectrum on an unlicensed basis for 5G deployment. As ISED states, this proposal represents an “opportunity to support investment and improve services for both existing and potential new wireless services providers. In addition, it presents a key opportunity to support competition and the provision of high quality and innovative wireless services to Canadians.”⁵
7. Shaw fully supports the policy objectives that ISED has emphasized as it starts these consultation processes for 5G.⁶ In short, these objectives emphasize competition, investment and innovation. As a new player in the wireless sector that has invested

³ *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, Federal Communications Commission, Report and Order and Further Notice of Proposed Rulemaking, 31 FCC Rcd 8014 (2016) (“*Spectrum Frontiers Order*”) (Specifically, the FCC adopted flexible use licensing in the 28 GHz and 37-40 GHz band and authorized unlicensed use of the 64-71 GHz band.).

⁴ GSMA, *The Mobile Economy North America 2016*, at p. 3 (2016), <https://www.gsmaintelligence.com/research/-?file=28a21e457f1b516b804f8b0f6cef5815&download>.

⁵ ISED, *Consultation on Releasing Millimetre Wave Spectrum to Support 5G*, Notice, No. SLPB-001-17, at para. 2 (June 2017) (“Consultation Document”).

⁶ *Id.* at para. 6.

billions of dollars over the last eighteen months, Shaw is committed to being a strong source of competition in Canada over the long term.

8. In 2016, Shaw acquired Wind Mobile and subsequently rebranded it as “Freedom Mobile.” Since this acquisition, Shaw has made significant and increasing investments in developing an innovative, high-quality wireless connectivity experience for Canadians that will offer a true, differentiated alternative to the entrenched wireless incumbents,⁷ Bell, Rogers and Telus. We have launched our LTE-Advanced network in Calgary, Edmonton, Vancouver, Toronto and Ottawa, and we recently acquired 700 MHz and 2500 MHz licences from Quebecor. All of these investments are essential to establishing Shaw as a sustainable competitor in the wireless marketplace.
9. Despite our significant progress and commitment to invest, Shaw continues to face very high barriers to competition that hinder us from realizing our full potential in today’s pre-5G environment. These barriers include the incumbent national wireless carriers’ head-start advantages; persistent difficulties in securing antenna tower and site lease arrangements; lingering uncertainty surrounding final mandated rates for wholesale GSM roaming services; the spectre of heightened investment risk from the issues in Telecom Notice of Consultation CRTC 2017-259; and, of particular relevance to this consultation, a crippling disadvantage in the quantity and quality of spectrum resources relative to the spectrum assets amassed by the incumbents over the last 35 years. With respect to this final point, even after Shaw’s recent purchase of licences from Quebecor, Shaw has significantly less, and significantly less diverse, spectral holdings compared to the three national incumbents.⁸ Our spectrum holdings seriously constrain our ability to compete with the incumbent national wireless carriers and to the extent that this situation persists, will significantly constrain the establishment and maintenance of sustainable competition in the Canadian mobile wireless market.
10. While Shaw is fully prepared to make the investments necessary to bring its networks forward into the next generation, it is critical that ISED’s spectral policies ensure that Shaw can gain equitable access to the various bands of mmW spectrum that will be

⁷ References to incumbent providers in these comments refer to the three largest Canadian providers: Bell, Rogers and Telus. Shaw’s discussion of “non-incumbents” refers to all other facilities-based Canadian wireless providers.

⁸ Comments of Shaw Communications Inc., Consultation on a Licence Renewal Process for Advanced Wireless Services and Other Spectrum, *Canada Gazette*, Part I, June 17, 2017, Notice No. SLPB-002-17, at para. 13 (filed 25 July 25, 2017).

uniquely suited to 5G deployments. Now and in future generations of wireless platforms, the policy environment must support new competitors like Shaw in their need for the spectral resources necessary to continue to make the investments that will not only keep Canada at the leading edge of the digital economy, but also drive choice and competition in the marketplace.

11. Therefore, as the Department lays the foundations for Canada's readiness for 5G wireless telecommunications technology and the wave of investment and innovation that it will stimulate, it is critically important to adopt policies that will accommodate robust participation in the wireless market by strong competitors that are able to offer a compelling, sustainable alternative to the incumbent wireless carriers.
12. In Shaw's view, ISED's proposal to make the 28 GHz and 37-40 GHz bands available for flexible use on a licensed basis and the 64-71 GHz bands available for licence-exempt operations strikes an appropriate balance that will support investment, innovation, and competition.⁹
13. However, in addition to following-through on these proposals, ISED must further consider, and adopt, a policy framework that ensures that a facilities-based alternative can sustainably compete with the incumbents in the 5G era. Accordingly, as further discussed below, ISED should adopt band and channelization plans, as well as appropriate pro-competitive measures, that allow for operations by a facilities-based competitor other than the wireless incumbents. These measures should be reviewed and designed in follow-up proceedings with each band in mind, as each band has unique characteristics.
14. If ISED does not adopt appropriate pro-competitive measures, the incumbents will act on their ability and incentive to foreclose new competitors like Shaw from the spectrum resources necessary to support 5G. This would have a devastating impact on the nascent competition that is emerging in Canada and deprive Canadians and Canadian businesses from a choice of providers in the next phase of connectivity services in Canada. In Shaw's view, without choice and competition in the mobile wireless marketplace, Canada cannot realize the full potential of 5G.

⁹ Consultation Document at para. 4.

15. New facilities-based competitors like Shaw offer the best chance to counter the dominance of the incumbent national wireless carriers both today, and in the next generation. There must therefore be a suitable mechanism to ensure that Shaw, and other regional alternatives to the wireless incumbents, are able to gain equitable access to the mmW spectrum that will provide the foundation for 5G.
16. In the Consultation Document, ISED has appropriately sought only “preliminary” comments on pro-competitive measures. It would be unreasonable to expect that Shaw or others could offer specific proposals for a set-aside or cap at this stage of the consultation processes given the number of foundational issues that still require determination and the evolving landscape technologically and internationally. Consistent with ISED’s request, Shaw’s comments in this proceeding are offered on a preliminary basis with respect to certain topics, particularly the design of pro-competitive measures.
17. On a related matter, we note that the FCC, in its *Spectrum Frontiers Order*, has proposed to make available a number of bands that are not included by ISED in the Consultation Document, including the 24 GHz, 32 GHz, 42 GHz, 47 GHz, 50 GHz, and several other bands from 70 GHz and higher. The FCC plans to vote on this proposal later this year.¹⁰ We recommend that ISED also consider these bands in Canada’s plans for 5G.
18. In order to maximize the social and economic benefit of the scarce public spectrum resource for Canadian consumers and businesses, the policy and licensing framework that eventually emerges from this and subsequent mmW proceedings must promote a vibrant and competitive market in which Canadians in all regions of the country have access to a strong facilities-based alternative to the incumbents in the market.

II. 5G’S POTENTIAL TO PROMOTE COMPETITION, INVESTMENT AND INNOVATION

19. As ISED notes, “[t]oday’s economy is digital.”¹¹ 5G technologies will make it more so. 5G networks will be an important tool for connecting Canadians, creating economic opportunities and promoting social development. These networks can play a role in

¹⁰ Ajit Pai, Chairman, FCC, Remarks at Mobile World Congress Americas, at 4-5 (12 September 2017), http://transition.fcc.gov/Daily_Releases/Daily_Business/2017/db0912/DOC-346666A1.pdf

¹¹ Consultation Document at para 6.

connecting rural areas to high-speed services, and can facilitate smart-city energy grids, transportation networks, and water systems that will improve energy efficiency. 5G can also improve our health and safety by improving autonomous driving vehicles and remote healthcare capabilities. By 2020, 5G is expected to add \$1 trillion to the economy of North America.¹²

20. 5G is expected to support a myriad of applications that depend on very high speed and low latency communications services. These applications will benefit from increased data capacities and will support broad uses such as data backhaul, machine-to-machine communications, and Internet of Things (“IoT”) applications. In turn, these applications will further drive increased mobile data traffic.
21. For 5G to realize its full transformative potential, however, the policy framework must stimulate investment, innovation and competition by and amongst network operators. The 2007 Spectrum Policy Framework for Canada (the “SPFC”) establishes the principles upon which the Minister of Innovation, Science and Economic Development must rely when exercising duties under the Radiocommunication Act. Specifically, the SPFC establishes the overall objective of maximizing “the economic and social benefits that Canadians derive from the use of the radio frequency spectrum resource,” and sets forth enabling guidelines for the Department’s spectrum management activities. The enabling guidelines emphasize, among other things, the importance of market forces and the efficient functioning of markets and responsiveness to changing technology and marketplace demands.¹³
22. The Minister and the Department are also guided by the policy objectives of the Telecommunications Act. These policy objectives include enhancing the efficiency and competitiveness of Canadian telecommunications innovation, deployment and the affordability of telecommunications services for Canadians.

¹² Press Release, GSMA, *Mobile Industry to Add \$1 Trillion in Value to North American Economy by 2020, Finds New GSMA Study* (1 November 2016), <http://www.gsma.com/newsroom/press-release/mobile-industry-add-1-trillion-value-north-american-economy-2020-finds-new-gsma-study/>.

¹³ Government of Canada, *Spectrum Policy Framework for Canada*, DGTP-001-07, at p. 8 (June 2007), [https://www-ic.gc.ca/eic/site/smt-gst.nsf/vwapi/spf2007e.pdf/\\$FILE/spf2007e.pdf](https://www-ic.gc.ca/eic/site/smt-gst.nsf/vwapi/spf2007e.pdf/$FILE/spf2007e.pdf).

23. As it looks forward to the advent of 5G telecommunications technology, ISED's objectives for the release of mmW spectrum are to:
- foster innovation, investment and the evolution of wireless networks through the adoption of 5G technology, to support sustained competition, so that consumers and businesses benefit from greater choice; and
 - facilitate deployment and timely availability of services across the country.¹⁴
24. Shaw supports these policy objectives, which will promote competition, investment and innovation in the mmW spectrum, consistent with the guidelines in the SPFC, the objectives of the Telecommunications Act, and the policy objectives established by the Department in other spectrum policy and licensing framework consultations¹⁵.
25. As noted above, Shaw continues to invest in significant network upgrades that provide LTE-Advanced services to its customers. To attract similar investments in 5G networks, ISED can establish a policy framework that will give facilities-based carriers, including new competitors such as Shaw, the certainty that is required to invest as 5G technology evolves.
26. Canada's policies must also provide flexibility for 5G network operators to innovate. 5G networks are expected to provide Canadian citizens with the above-referenced benefits and much more. However, we do not know how 5G services and applications will evolve. Policies must therefore provide the flexibility for facilities-based competitors to experiment and innovate in the near term with new and expanded technologies.
27. Finally, and perhaps most importantly, the policy framework must encourage robust, facilities-based competition in the provision of 5G. Competition will not only ensure the development of the most innovative and high-quality 5G services, but it will also ensure that an innovative and valuable set of choices for these services will be made available

¹⁴ Consultation Document at para. 6.

¹⁵ ISED, *Consultation on a Licence Renewal Process for Advanced Wireless Services and other Spectrum*, SLPB-002-17, at para. 5 (June 2017); ISED, *Consultation on a Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band*, SLPB-005-17, at para. 8 (August 2017); and ISED, *Consultation on a Licensing Framework for Residual Spectrum Licences in the 700 MHz, 2500 MHz, 2300 MHz, PCS and 1670-1675 MHz Bands*, SLPB-003-17, at para. 5 (July 2017).

to all Canadians, including the millions of Canadians that make up our working middle class. Competition is the key driver of affordability. This was recently recognized by the Competition Bureau which concluded, based on market evidence, that in areas of the country where the wireless incumbents “face competition from a strong regional competitor, prices are substantially lower.”¹⁶

28. Thus, it is critically important that ISED establish the means whereby new facilities-based competitors can establish and maintain sustained competition in the market so that they can be ready to provide competitive choice in 5G services to Canadian consumers and business in all regions of the country. If ISED does not craft policies that make it possible for facilities-based wireless carriers other than the incumbent national carriers to obtain access to the frequency bands in this Consultation and compete in the provision of 5G wireless service, Canadian consumers and businesses will not enjoy the full benefits of 5G. The Consultation provides ISED an opportunity to shape the future of mobile wireless competition in Canada. If ISED fails to seize this opportunity, it will perpetuate the dominance of Bell, Telus and Rogers in the next generation of wireless services.
29. Accordingly, as we elaborate upon in Section III in response to Question 9-3 below, the Department must adopt appropriate pro-competitive measures designed and implemented in each band to ensure that 5G services are available from not just the incumbents, but from facilities-based alternatives in the market as well.

III. RESPONSES TO THE SPECIFIC QUESTIONS RAISED IN THE CONSULTATION DOCUMENT

30. Set out below are Shaw’s responses to the specific questions posed by the Department in the Consultation Document. As addressed in more detail below, Shaw supports the following proposals:
- Making the 28 GHz and 37-40 GHz bands available for flexible use;

¹⁶ The Bureau conducted a thorough pricing analysis as part of its *Statement Regarding Bell’s Acquisition of MTS* and found that mobile wireless pricing is substantially lower in areas that have a strong regional competitor. Government of Canada, Competition Bureau, *Competition Bureau statement regarding Bell’s acquisition of MTS* (15 February 2017) (“Competition Bureau Statement”), <http://www.competitionbureau.gc.ca/eic/site/cb-bc.nsf/eng/04200.html>.

- A band plan utilizing smaller blocks (i.e. four 212.5 MHz blocks) in the 28 GHz band;
- A band plan utilizing 200 MHz blocks in the 37.6-40 GHz band;
- Protections for existing site-based licences in the 38.4-38.6 GHz band;
- Continued consideration of how to create opportunities for accessing spectrum in the 37-37.6 GHz band;
- Licence-exempt use in the 64 GHz band;
- Utilizing spectrum licences with service areas for competitive licensing in the 28 GHz and 37.6-40 GHz bands;
- Twenty year licence terms for licensed spectrum in the 28 GHz and 37-40 GHz bands; and
- The adoption of appropriate pro-competitive measures in licensed bands, with subsequent proceedings to design these measures, taking into account the technical and operational nature of each of the bands.

31. Shaw respectfully submits that these proposals reflect a balance of the principles of competition, investment, and innovation.

Question 4-1: Given the disruptive nature of 5G, will new business models and network applications develop that may require policy and regulatory consideration from ISED? Please describe potential new business models and network applications as well as their benefits to Canadians.

32. ISED should pursue policies that promote competition, investment, and innovation in the mmW bands. This approach will ensure the rapid deployment of a robust 5G ecosystem. ISED's goals should be to establish a regulatory environment that provides facilities-based carriers, including the new facilities-based competitors that are presently in the market, the certainty necessary to invest and innovate while allowing technology the flexibility to evolve.

33. As set out in Part II, the transformational potential of 5G to our economy and society is significant and not yet fully known. However, as we transition to this new environment, it is important that we continue to encourage investment and innovation, while setting policies that ensure sufficient competition from strong facilities-based alternatives. As discussed below, the flexible use licensing model inherently facilitates innovation, as new technologies evolve and emerge. If we strike the right balance, Canada will play a leading role in the 5G revolution and the emerging digital economy.

Question 5-1: ISED is seeking comments on developing a flexible use licensing model for fixed and mobile services in the 28 GHz and 37-40 GHz frequency bands, and allowing licence-exempt use of the 64-71 GHz frequency band ahead of WRC-19 and before 5G technology standards are finalized.

34. Shaw supports the development of a flexible use licensing model in the 28 GHz and 37-40 GHz bands and allowing license-exempt use of the 64-71 GHz band in the near term.
35. Modern technological innovations in telecommunications are resulting in enhanced mobile broadband and low-latency applications. The properties of higher frequency bands would better enable the use of some of these technological innovations, such as advanced antenna systems including MIMO and beam-forming techniques, which in turn would support enhanced and robust broadband services. These ultra-low latency and very high bit rate applications will require large contiguous blocks of spectrum. Accordingly, as part of the WRC-19, the ITU will be considering bands to identify for International Mobile Telecommunications (IMT) services under Agenda Item 1.13.¹⁷
36. Developing a flexible use model in the 28 GHz and 37-40 GHz bands in the near term will allow innovators to experiment and network operators to plan for 5G deployments. Shaw therefore agrees with ISED's proposal that Canada not wait for WRC-19 to finalize its 5G standards. Moreover, the ITU did not include the 28 GHz band in its 5G studies for WRC-19, which means that waiting for WRC-19 will not be helpful in informing

¹⁷ Resolution 238 of the World Radiocommunication Conference (Geneva, 2015) invites the ITU-R to conduct and complete in time for WRC-19 the appropriate sharing and compatibility studies, taking into account the protection of services to which the band is allocated on a primary basis, for the frequency bands: 24.25-27.5 GHz, 37-40.5 GHz, 42.5-43.5 GHz, 45.5-47 GHz, 47.2-50.2 GHz, 50.4-52.6 GHz, 66-76 GHz and 81-86 GHz, which have allocations to the mobile service on a primary basis; and 31.8-33.4 GHz, 40.5-42.5 GHz and 47-47.2 GHz, which may require additional allocations to the mobile service on a primary basis.

ISED's decision. However, the United States has already adopted a flexible use model in the 28 GHz band. In order to ensure that Canada plays a leading role in the development and adoption of 5G technology, we should not wait.

37. ISED similarly should not wait for WRC-19 to decide on the proper use of the 64-71 GHz band. Allowing licence-exempt use of the 64-71 GHz band will benefit consumers by supporting the continued development of Wi-Fi and the IoT and is consistent with the approach adopted in the U.S.¹⁸
38. As Shaw has noted in ISED's 5 GHz proceeding,¹⁹ harmonization with the United States, where practicable and aligned with Canada's specific policy objectives, is important to ensuring that we meet the substantial, growing demand for licence-exempt spectrum in Canada and that Canadians have access to the same connectivity advances and technological applications as users in the U.S. Access to larger bands of licence-exempt spectrum is also critical in order to take advantage of the synergies between unlicensed use and the provision of advanced 5G services using licensed spectrum frequencies in the other bands. Specifically, licence-exempt bands can support data traffic offloaded from licensed networks, especially in indoor situations.
39. Moreover, WRC-19 will be of limited value to ISED's deliberations because the ITU is only studying the 66-71 GHz portion of the band. Due to this limitation, and the critical importance of licence-exempt use, ISED should not wait to act. Similarly, waiting for the development of new standards will only delay benefits to Canadians that will be derived from increased investment in and deployment of 5G networks, and place Canadian innovators at a disadvantage on the global stage.
40. 5G activities are accelerating at an unprecedented pace. Telecom infrastructure and terminal vendors, together with chipset vendors, are already delivering trial systems that demonstrate fundamental technological enablers of 5G. Operators around the world are announcing 5G trials on a weekly basis. In addition to the United States, Europe, Japan, and South Korea are all moving to open up mmW bands in the near future. Sweden and

¹⁸ *Spectrum Frontiers Order*, 31 FCC Rcd at 8062-66 paras. 125-131.

¹⁹ Comments of Shaw Communications Inc., SMSE-002-17, at p. 4 (29 March 2017).

Singapore have also alluded to possibly opening up mmW bands for 5G. Now is the time to act.

Question 6-1: ISED invites comments on the changes proposed to flexible use licensing in the 28 GHz band, including consequential changes to the CTFA domestic footnotes.

41. Shaw supports the adoption of a flexible use licensing model in the 28 GHz band. Fixed and mobile services in this band should be given priority over fixed-satellite service systems which share the 27.5-28.35 GHz band on a co-primary basis. The technical characteristics of this band are suited to bringing 5G services to Canadian consumers and businesses. For example, the propagation characteristics of the band make it suitable for mobile terrestrial services. Additionally, adopting a flexible use licensing model in this band is consistent with that of the U.S.²⁰ As noted above, harmonization would allow Canadian providers to benefit from economies of scale that would not be possible if ISED were to deviate from the United States' frequency allocation for the 28 GHz band. Consequently, ISED should add C47C to the Canadian Table of Frequency Allocations.²¹

Question 6-2: ISED seeks comments on the moratorium for new site-specific fixed service licences in the 28 GHz band.

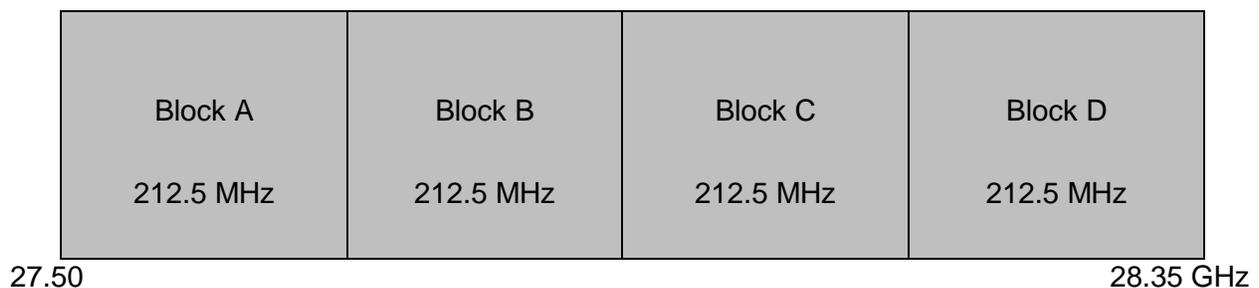
42. Shaw supports a moratorium for new site-specific fixed terrestrial service licences in the 28 GHz band during the pendency of this Consultation. A moratorium will prevent spectrum speculators from moving into the band and holding future licence holders hostage, especially in densely populated urban areas. Opportunistic site-specific fixed service filings would make it difficult for parties to deploy networks after the Consultation's conclusion and would likely require coordination with multiple licensees in multiple locations. With the moratorium in place, prospective flexible use terrestrial licensees will be able to develop their services, maximize their efficient use of the spectrum, and deploy as quickly as possible upon the conclusion of ISED's Consultation.

²⁰ *Spectrum Frontiers Order*, 31 FCC Rcd at 8031 para. 41.

²¹ Consultation Document at para. 25.

Question 6-3: ISED seeks comments on its proposal to adopt a band plan consisting of two 425 MHz blocks in the 28 GHz band.

43. The 28 GHz band will be key for mobile broadband in 5G, with several trials ongoing in the U.S. and internationally. Shaw supports ISED’s proposal to revise the 28 GHz band plan. While Shaw is generally in favor of alignment with the FCC’s *Spectrum Frontiers Order* and the importance of harmonization with international technical standards, the Canadian mobile wireless market is not as fully competitive as it should be. In order to encourage competition, it is essential that the Department establish a band plan and policy and licensing framework that accommodates an alternative facilities-based provider to the incumbents in this band, and in all mmW spectrum frequencies (and indeed, all commercial mobile wireless spectrum resources).
44. To achieve this goal, while harmonizing with the U.S. and international standards, Shaw proposes for consideration that the band be divided into four blocks, possibly consisting of four 212.5 MHz blocks. This approach would balance the need to facilitate more equitable access to the band, especially to new competitors, with the need for sufficiently large block sizes to accommodate the capacity needs of 5G. It would also continue to align with the overall parameters of the U.S. band plan. Shaw’s proposed revision to the 28 GHz band plan is depicted below:



45. Creating four blocks of spectrum in the 28 GHz band will allow more wireless entrants – especially non-incumbents – the opportunity to obtain licences. At the same time, the blocks would still be large enough to attract investment and to innovate in order to provide greater speeds, responsiveness and capacity in the 28 GHz band.
46. As we alluded to above in the Executive Summary to this submission and as discussed in further detail below in Part IV re Question 9-3, the foregoing proposal is better-suited for promoting competition and avoiding dominance of the band by the wireless

incumbents. If ISED were to follow the channelization approach adopted in the *Spectrum Frontiers Order* and split the spectrum into two 425 MHz bands, this would shut smaller providers out of the band, hobbling their ability to compete in 5G.²²

47. Smaller block sizes would help promote competition by providing additional opportunities for a variety of licensees to access the band. However, as noted above, in the Canadian context, smaller block sizes alone are unlikely to ensure that all of the benefits of competition and choice are afforded to Canadian consumers and businesses. In addition to the opportunities for participation enabled by smaller block sizes, it is also necessary to implement focused pro-competitive measures to ensure that all facilities-based carriers in the market are able to provide 5G offerings to consumers and businesses. Shaw believes that this measure should be designed, and the question of whether it should be a cap or a set aside should be resolved, through a subsequent consultation by ISED, once the overall band plan has been finalized in Canada and the United States. The wireless incumbents have the incentive to foreclose competitors from the band and from 5G, which will foreclose them from the wireless market. Regulatory measures are needed to ensure that this does not occur.

Question 6-4:

(A): ISED seeks comments on its proposal to require site-by-site coordination between proposed flexible use terrestrial stations and FSS earth stations in the 28 GHz band when a pre-determined trigger threshold is exceeded.

(B): If site-by-site trigger coordination is proposed, what coordination trigger and value would be the most appropriate?

²² Shaw notes that there is some uncertainty in this band in the United States. For example, Nextlink, a subsidiary of XO Holdings, has presented a proposal to the FCC to allocate the "remaining portions of the LMDS band" and increase the amount of spectrum being made available in the 28 GHz band. Specifically, Nextlink proposes including the 150 MHz A2 block (29.1-29.25 GHz) and to combine the A3 and B Blocks to create a new 300 MHz Block (31.0-31.3 GHz). Letter from Michele C. Farquhar, Counsel to Nextlink Wireless, LLC, to Marlene H. Dortch, Secretary, Federal Communications Commission, GN Docket No. 14-177 et al., at p. 2 (20 April 2017). The FCC had excluded the A2, A3 and B Blocks "because the bands offer considerably less than 500 megahertz of contiguous spectrum as commenters have suggested is necessary for mobile operations." *Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, Notice of Proposed Rulemaking, 30 FCC Rcd 11878, 11902 para. 70 (2015). It is noteworthy that the A1 block plan chosen is two blocks of 425 MHz, which in any case is less than 500 MHz. Shaw encourages ISED to track the developments in this band as it considers the most appropriate band plan for Canada.

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

48. Shaw has no comment on this question at this time but may wish to provide comments as part of the reply phase of this proceeding.

Question 6-5:

(A): ISED seeks comments on whether there should be restrictions on the geographic areas in which new FSS earth stations can be deployed in the 28 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.

49. Shaw has no comment on this question at this time but may wish to provide comments as part of the reply phase of this proceeding.

Question 6-6: ISED seeks comments on whether it should impose any limits on the aggregate emissions of the terrestrial services. If limits are proposed, ISED is inviting detailed proposals on why they should be implemented, and what the limits should be.

50. As stated in the Consultation Document, aggregate interference from flexible use service into space stations is unlikely.²³ The terrestrial systems envisioned for the 28 GHz band have several technical characteristics that will limit transmissions towards satellite receivers. The base stations and user equipment will likely employ dynamic power control to avoid draining batteries and to limit intersystem interference. Also, as the FCC noted in its decision to not adopt limits on aggregate emissions on terrestrial services, 5G equipment will likely incorporate antenna downtilt, suppression of side lobes and adaptive power control without the imposition of aggregate interference requirements.²⁴ The terrestrial equipment deployed in Canada is likely to share similar characteristics.

²³ Consultation Document at para. 38.

²⁴ *Spectrum Frontiers Order*, 31 FCC Rcd at 8040-41 paras. 65-66.

51. Forbearing from setting specific limits on aggregate interference also confers benefits on terrestrial operators. Terrestrial operators already have an incentive to design networks that direct signals they are transmitting to the locations of the receivers. The nature of terrestrial service in the 28 GHz band will be sufficient to limit transmissions toward satellite receivers. By not imposing these limits, terrestrial operators will have an incentive to make more intensive terrestrial use of the 28 GHz band.

Question 6-7: ISED seeks comments on its proposal to allow all existing FSS earth stations and those in applications pending approval for operation to continue to operate under the current conditions of licence.

52. ISED should only grandfather existing FSS earth station operations, specifically those licensed or applied for before the launch of the Consultation. For the same reasons discussed in response to Question 6-2, ISED should impose a temporary moratorium on the filing of new earth station applications until the policy, technical and operational issues raised in this Consultation have been resolved.²⁵
53. ISED should conduct a case-by-case evaluation of the earth station operations proposed in the pending applications to assess their impact on terrestrial use and the nature of the constraints their operations may impose. If ISED chooses to authorize pending FSS applications, the authorizations should be issued with a condition requiring earth station operators to take the necessary actions to eliminate any constraints imposed upon flexible use terrestrial operations in the future. Grandfathering existing FSS authorizations and conditioning grants of pending applications will provide the opportunity for robust deployment of 5G technology by giving terrestrial operators clear, final and necessary information about which FSS operators are entitled to continue to operate under the current conditions of their licence.

Question 7-1: ISED is seeking comments on the proposal to implement flexible use licensing in the frequency band 37-40 GHz, including the consequential changes to CTFA footnote C51, while continuing to allow for fixed-satellite service (space-to-Earth) in the band.

²⁵ See *supra* paras. 41-42.

54. For reasons similar to those supporting flexible use licensing in the 28 GHz band,²⁶ ISED should make the frequency band 37-40 GHz available for flexible use for terrestrial service.²⁷ The technical characteristics of the 37-40 GHz band make it ideally suited for the provision of 5G services to Canadian consumers and businesses. Specifically, the availability of 3 GHz of contiguous spectrum makes gigabit data rates possible with extremely low latency, providing a runway for Canadian companies to launch the technologies that will harness 5G mobile services and applications.
55. Flexible use licensing also will harmonize Canada's use of the band with that of the United States, ultimately benefitting Canadian consumers.²⁸ Harmonization would allow Canadian providers to benefit from economies of scale that would not be possible if ISED were to deviate from the United States' flexible use licensing approach. In turn, these economies of scale will allow Canadian providers, including Shaw, to continue to develop highly valuable, innovative, high-quality mobile services for all Canadians.

Question 7-2: ISED is seeking comments on whether a moratorium on the issuance of new licences under the New Licensing Framework for the 24, 28 and 38 GHz Bands and Decision on a Licence Renewal Process for the 24 and 38 GHz Bands is required at this time. <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10900.html>

56. ISED should impose a moratorium on the issuance of new terrestrial licences in the 38.4-40 GHz band during the pendency of this Consultation; however, ISED should carve out an exception to this moratorium for new stations within an existing grid cell licensee's geographic license area.²⁹ This approach strikes a balance that minimizes the risk that new licenses will become obstacles to the deployment of 5G networks while allowing existing users of the band to continue to meet the needs of their customers in their existing geographic license areas.
57. In the absence of any moratorium, the band may become encumbered by an influx of additional site-based licenses. In particular, entities may seek to get a head start on 5G deployment by obtaining new site-based licenses in strategic geographic locations

²⁶ See *supra* paras. 39-40.

²⁷ Consultation Document at paras. 47-50.

²⁸ *Spectrum Frontiers Order*, 31 FCC Rcd at 8044-45 para. 76.

²⁹ Consultation Document at 7.2.

before alternative licensing processes are implemented. These entities may be legitimate terrestrial network operators planning for 5G deployment or opportunistic speculators seeking to obtain licences in valuable geographic markets. Either way, issuing new site-based licences in areas outside of a grid cell licensee's geographic license area during the pendency of this Consultation will add encumbrances that potentially decrease the value of the bands, and potentially limit the services and applications flexible use licensees can make available to Canadian consumers.

58. At the same time, ISED must ensure that existing grid cell licensees can continue to serve the needs of their customers in their existing geographic license areas. For example, Shaw has invested significantly in developing valuable, innovative, high-quality wireless connectivity experiences for Canadians, in part using grid cell licenses. Shaw must retain the ability to continue to meet the needs of its customers and enhance its network in these areas during this pendency of this proceeding, including by obtaining new site-based licenses within Shaw's grid cell license areas. Otherwise, Shaw's customers may not be able to obtain the types of services they require as their needs evolve. Moreover, such an approach is unlikely to significantly impact the deployment of 5G services. Indeed, the propagation characteristics of the band likely will help minimize the complexity in coordinating the future shared use between existing grid cell licensees and new flexible use licensees in these limited number of geographic areas.³⁰
59. For these reasons, ISED should institute a moratorium on new licences during the pendency of this consultation; however, ISED should carve out an exception to this moratorium for new stations within an existing grid cell licensee's geographic license area.³¹

Question 7-3: ISED is seeking comments on the proposal to adopt the band plan as shown in figure 7 for the frequency band 37-40 GHz.

60. ISED should adopt a band plan that promotes competition, innovation, and investment in the Canadian 5G marketplace. ISED's proposal to model Canada's band plan after the one adopted by the United States in the 37-40 GHz band will achieve these goals.³²

³⁰ See *Spectrum Frontiers Order*, 31 FCC Rcd at 8171 para. 449 ("We also believe that the propagation characteristics of this band might help minimize the complexity of the coordination mechanism.").

³¹ Consultation Document at 7.2.

³² *Id.* at paras. 51-54.

Specifically, a Canadian band plan that is harmonized with the United States' will create larger ecosystems and economies of scale for equipment that will lower costs and help promote competition in the Canadian market. Moreover, the structure of the band plan appropriately balances the need to promote competition among multiple users while providing licensees optimally-sized spectrum blocks that will attract investment and innovation.

61. As ISED has recognized, the Canadian wireless market typically is not large enough to attract manufacturers to build equipment for unique Canadian band plans.³³ While some exceptions exist, Canada's spectrum policies often are harmonized with those of the United States to create a large market, which in turn leads to larger ecosystems and economies of scale. These economies of scale allow Canadian providers to take advantage of lower costs and greater selections of wireless handsets and equipment. Shaw supports harmonization efforts that will result in lower costs that can be passed on to Canadian consumers.
62. In addition, access to lower-priced equipment will help promote competition. As a new competitor to the Canadian wireless market, Shaw often finds itself at a disadvantage when competing against larger and more established providers, many of whom have greater access to a rich variety of devices. Harmonizing this band would help create a market of low-cost devices that would help level the playing field between incumbent wireless providers and new competitors like Shaw.
63. Subject to Shaw's comments in relation to the need for more focused pro-competitive measures in a Canadian context,³⁴ given the nascent state of facilities-based competition in the Canadian mobile wireless market, a band plan harmonized with the United States will result in a greater competitive ecosystem for 5G services, ultimately resulting in more choices and lower prices for Canadian consumers.
64. The proposed band plan strikes the correct balance between promoting competition and providing licensees with spectrum blocks large enough to attract investment and

³³ Government of Canada, Commercial Mobile Spectrum Outlook, 4.2 Potential Bands Under Consideration for Commercial Mobile Services (7 March 2013), <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf09444.html#a4.2>.

³⁴ See *supra* Executive Summary; *infra* Part IV regarding Q. 9-3.

innovate. While 5G networks are expected to provide support for a variety of different services and applications, the primary benefit identified by most industry observers continues to be the potential for these networks to provide greater speeds, responsiveness, and capacity.³⁵ To realize these greater performance characteristics, 200 MHz block sizes will help network operators optimize traffic management, data rates, and throughput capacity. These benefits are critical to the development of 5G services due to an expected tenfold increase in mobile data traffic between 2016 and 2022.³⁶ If the spectrum block sizes are made too small, it will be difficult for network operators to justify the required investment in 5G technologies.

65. In the 37.6-40 GHz band, 200 MHz channel sizes would provide the optimal balance and provide the appropriate technical characteristics to attract investment and innovation in 5G services and applications. Moreover, the availability of 2.4 GHz of spectrum in the 37.6-40 GHz band would allow ISED to make licences available to multiple operators in the band, including new competitors such as Shaw.
66. Smaller block sizes would help promote competition by providing additional opportunities for a variety of licensees to access the band. However, as noted above, in the Canadian context, smaller block sizes alone are unlikely to ensure that all of the benefits of competition and choice are afforded to Canadian consumers and businesses.³⁷ In addition to the opportunities for participation enabled by smaller block sizes, in Canada, this measure should be supplemented with further focused pro-competitive measures to ensure that facilities-based competitors in the market are able to provide 5G offerings to consumers and businesses. However, consistent with Shaw's comments above in relation to the 28 GHz band, Shaw believes that the question of whether ISED should adopt a cap or a set-aside should be resolved through a subsequent consultation by ISED, once the overall band plan has been finalized in Canada and the United States.³⁸

³⁵ See Tom Wheeler, Chairman, Federal Communications Commission, Prepared Remarks at the National Press Club, Washington, DC, *The Future of Wireless: A Vision of U.S. Leadership in a 5G World*, (20 June 2016), https://apps.fcc.gov/edocs_public/attachmatch/DOC-339920A1.pdf.

³⁶ See Oumer Teyeb et al., *Evolving LTE to fit the 5G future*, Ericsson (1 January 2017), <https://www.ericsson.com/en/publications/ericsson-technology-review/archive/2017/evolving-lte-to-fit-the-5g-future>.

³⁷ We note that we provide our comments on the proposed band plan in our response to Question 6-3.

³⁸ *Id.*

67. Finally, we note that the U.S. has adopted rules for the 37-37.6 GHz band and that it has been described as a “greenfield opportunity”.³⁹ It appears to be similarly “greenfield” in Canada. According to ISED, the range from 37 GHz all the way up to 38.4 GHz is currently “reserved for future use” and this has been the case since at least 1999.⁴⁰ And even though there is an allocation for Earth Exploration Satellite (space-to-Earth) starting at 37.5 GHz, there “is currently no satellite use, including fixed-satellite, space research, mobile-satellite, or Earth exploration-satellite services, in the frequency band 37.5-40 GHz.”⁴¹ In light of these circumstances, Shaw encourages ISED to monitor and follow the U.S. and FCC processes to ensure that Canada does not fall behind.

Question 7-4:

A. ISED seeks comments on the proposal to require site-by-site coordination between proposed flexible use terrestrial stations and FSS earth stations in the frequency band 37.5-40 GHz when a pre-determined trigger threshold is exceeded.

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

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

68. Shaw has no comment on this question at this time but may wish to provide comments as part of the reply phase of this proceeding.

Question 7-5:

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 frequency band 37.5-40 GHz.

³⁹ Letter from Rebecca Murphy Thompson, Competitive Carriers Association, to Marlene H. Dortch, FCC, GN Docket No. 14-177 and WC Docket No. 16-70, at p. 3 (30 June 2015).

⁴⁰ Consultation Document at Figure 5 and para. 41

⁴¹ *Id.* at Figure 4 and para. 46.

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?

69. Shaw has no comment on this question at this time but may wish to provide comments as part of the reply phase of this proceeding.

Question 7-6: It is proposed that, should SRS and/or MSS systems be deployed, flexible use licensees in the band 37.6-40 GHz may be subject to technical provisions to facilitate co-existence. Comments are sought. ISED notes that any such technical provisions would be established through a future consultation process.

70. Shaw has no comment on this question at this time but may wish to provide comments as part of the reply phase of this proceeding.

Question 7-7: ISED is seeking comments on:

A. the options and implications for the treatment of incumbent licensees currently holding Tier 3 licences, the percentage that would apply to option 1 and supporting rationale.

71. Shaw opposes the proposal to convert Tier 3 fixed service licences to flexible use licences for a lesser amount of spectrum on the new band plan.⁴² Rather than promote competition and innovation in the band, this proposal would hinder competition, while doing nothing to advance innovation and investment. Critically, this proposal would complicate efforts to harmonize the Canadian band plan with the United States. Specifically, it is unclear how ISED can develop a band plan comprised of twelve 200 MHz blocks while also awarding lesser amounts of spectrum to these incumbent licensees. Moreover, if ISED were to carve out one or more of the proposed 200 MHz blocks to award flexible use licences to these incumbent licensees, it would mean fewer opportunities for accessing the spectrum by competitive providers.

72. Further, the proposal to convert Tier 3 fixed service licences to flexible use licences would result in a windfall for the Tier 3 licensees, facilitating a government-created advantage for one player in the emerging 5G marketplace. Specifically, as noted in the Consultation, of the 28 Tier 3 auctioned licences, 25 are held by one licensee, TeraGo

⁴² *Id.* at para. 64.

Networks.⁴³ Awarding 25 flexible use licences to this provider would provide it with an unfair advantage in the race to deploy 5G networks and undermine the fundamentally important principle of competition.

73. Shaw supports ISED's second proposed approach, which is to issue site-specific licences for sites in operation at the end of a Tier 3 licence term.⁴⁴ Such an approach would allow ISED to implement a band plan that is harmonized with the U.S. band plan and able to promote competition, all for the benefit of Canadian consumers. Given the expected technological capabilities in this band, this approach will likely be technically feasible while utilizing spectrum in an efficient manner.

B. the options and implications for the treatment of incumbent licensees currently holding FCFS licences and supporting rationale.

74. In the Consultation, ISED proposes to allow grid cell and site-specific licensees to continue operating in the band while receiving protection from interference from new flexible use licensees.⁴⁵ Shaw supports this proposal.
75. Interference protections for existing users will help establish a regulatory climate conducive for investment. Licensees who have invested in operations and services must have the certainty to know that these investments will be respected by the regulatory process. This need for certainty is especially critical during the nascent stages of facilities-based competition in Canada, not to mention its continuation through 5G development and deployment.
76. Since completing its acquisition of Wind Mobile in 2016, Shaw has invested significantly in developing valuable, innovative, high-quality wireless connectivity experiences for Canadians. These investments include significant capital expenditures on a large fixed wireless broadband network that backhauls voice and data traffic for over one million consumers. Failure to protect these investments and existing operations could have a chilling effect on future investments, both by Shaw and others. Moreover, the significant cost of disruption caused by this regulatory uncertainty will divert resources that

⁴³ *Id.* at para. 43.

⁴⁴ *Id.* at para. 65.

⁴⁵ *Id.* at para. 67.

otherwise would have been invested in new and innovative services for Shaw's approximately 1.1 million customers.

77. As noted by ISED, the expected capabilities of 5G technology will make spectrum sharing and coordination technically feasible. Shaw therefore remains confident that this proposal will not materially hinder deployment of 5G in major urban areas, and strongly disagrees with ISED's suggestion that interference protection might limit deployment in urban areas.⁴⁶ Mitigative techniques and interference control mechanisms implemented in the 5G standards will support improved coordination between licence holders, making this option feasible.⁴⁷
78. For the above reasons, Shaw urges protection of both site-specific and grid cell licences from interference from new flexible use licensees. In order to facilitate the coordination process that will be required to guard against interference, a reasonable transition period of approximately ten years would be required.

Question 8-1: ISED is seeking comments on its proposal to designate the band 64-71 GHz for licence-exempt operations on a no-protection, no-interference basis.

79. ISED should permit licence-exempt operations in the 64-71 GHz band due to the tremendous consumer and service provider interest in short range wireless connections. These short-range connections promote the growth of applications such as WiGig, wearables, and the IoT, which have seen strong growth and will continue to boom in terms of demand for access to spectrum.
80. Permitting licence-exempt use of the 64-71 GHz band will also harmonize use with the United States, thus expanding the market for unlicensed equipment and providing more affordable consumer devices and services. The demand for licence-exempt devices and

⁴⁶ *Id.* at paras. 66-68.

⁴⁷ "For example, in the *Spectrum Frontiers Order*, the FCC concluded that the propagation characteristics of the 37-37.6 GHz band might help minimize the complexity in coordinating shared use of that band. See *Spectrum Frontiers Order*, 31 FCC Rcd at 8171 para. 449 ("We also believe that the propagation characteristics of this band might help minimize the complexity of the coordination mechanism."). Grid cell and site-specific licenses use nearby spectrum bands with similar propagation characteristics, and thus the complexity in coordinating between users should similarly be minimized." Current deployments in that band are based on point to point links, using antennas with very high directivity, that minimizes interference outside of the link direction. Furthermore, 5G technology is expected to utilize antenna systems with advanced capabilities. Use of 5G technology with adaptive antennas with beam forming and beam steering capabilities has already been demonstrated at the Mobile World Congress in February of 2016. Additional advancements have been made since.

the innovative applications will benefit from having access to this contiguous block of spectrum.

81. Popular uses for unlicensed spectrum in this band could include:⁴⁸
- Wireless docking between devices like smartphones, laptops, projectors, and tablets
 - Simultaneous streaming of multiple, ultra-high definition videos and movies
 - More immersive gaming, augmented reality and virtual reality experiences
 - Fast download of HD movies
 - Convenient public access (e.g., kiosk access points)
 - Easier handling of bandwidth intensive enterprise applications
82. International standards organizations are actively developing use cases for the next generation of WiGig, which will make use of licence-exempt spectrum to support high data rates up to 7 gigabits per second. The next generation of WiGig will bring benefits in many forms. Expected uses include backup inter-rack connectivity for data centers and mass video or data distribution to devices in Canadian classrooms, exhibition halls, and airplane and train cabins.
83. These bands are also well suited to new “hotspot” uses, whereby a portable, licence-exempt device provides 5G access to a large number of users operating in a small area.
84. The 802.11ay standard, which is the next evolution of the 802.11ad standard, should be finalized in 2019, and will allow for a transmission rate of over 20 Gbps.⁴⁹ This type of bandwidth has the potential to revolutionize many Wi-Fi applications even beyond the several 802.11ad devices that are already available for this spectrum. Because of the existing framework of standards development, licence-exempt devices would be able to take advantage of additional frequencies as soon as they are made available, thus

⁴⁸ See Wi-Fi Alliance, Discover Wi-Fi, *Wi-Fi Certified WiGig*, <http://www.wi-fi.org/discover-wi-fi/wi-fi-certified-wigig> (last visited 8 September 2017).

⁴⁹ See Mark Barrett, *How will WiGig, HaLow, White-Fi, and the other new technologies transform our wireless world?*, *Electronic Design* (26 September 2016), <http://www.electronicdesign.com/wifi/future-wi-fi-revealed>.

bringing immediate benefits to Canadian consumers. ISED therefore should make the 64-71 GHz band available for unlicensed use as soon as possible.

Question 9-1: ISED is seeking comments on:

A. Whether flexible use access in these bands should be exclusively licensed or licence-exempt.

85. Shaw generally supports a balanced approach that would make both licensed and licensed-exempt spectrum available. Specifically, Shaw supports exclusive licensing in the 28 GHz and 37.6-40 GHz bands and licence-exempt operations in the 64-71 GHz band.

B. If a licensing approach is proposed, which types of licences (radio licences, spectrum licences with user-defined licence areas, spectrum licences with service areas for competitive licensing, or others) are expected to best lend themselves to licensing flexible use in the 28 GHz and 37-40 GHz frequency bands in order to support a variety of 5G technologies, applications and business cases?

86. In the 28 GHz and 37.6-40 GHz bands, Shaw supports area licensing based on the service areas for competitive licensing. This approach will reduce the costs and complexities of coordinating licence borders, allowing providers to dedicate greater resources to innovation and deployment. In addition, these licensing areas will offer a more consistent user experience, which will be particularly important for mobile users. With the increased resources and flexibility provided by these licence areas, providers will be able to experiment with and deploy a variety of 5G technologies, applications and services.

C. Whether a licence-exempt dynamic access using data base should be implemented in all, or portions of the 28 GHz, 37-40 GHz, particularly in the band 37-37.6 GHz.

87. At this time, there is no evidence of successful deployments of systems using a licence-exempt dynamic access data-base. Shaw believes that there are significant challenges and risks associated with this approach from operational, technical and feasibility perspectives. In particular, we believe it would undermine the business case for the significant network infrastructure investments that will be required to support 5G. Accordingly, in Shaw's view, this approach should not be implemented at this time.

Question 9-2: If an exclusive licensing approach is implemented, preliminary comments are sought on the benefits and risks related to longer licence terms for these frequency bands.

88. ISED should licence the 28 GHz and 37-40 GHz frequency bands using 20 year licence terms. Longer licence terms will increase regulatory certainty and promote 5G deployment, while shorter licence terms will frustrate investment in 5G networks due to the uncertainty of a return on investment. This is particularly important today, where the 5G economic model remains in development and 5G technologies are still in their infancy.
89. Longer licence terms would enhance investment incentives and stimulate development of network infrastructure, technologies and innovation. This type of licensing will benefit Canadians the most, and enable a stable, predictable 5G ecosystem in Canada.

Question 9-3: If an exclusive licensing approach is proposed, ISED is seeking preliminary comments on possible measures that could support competition in light of the current conditions in the Canadian wireless service market and anticipated development and deployment of 5G services if flexible use licensing is developed through a spectrum licensing model.

90. As noted at the outset of these initial comments, competition is a lynchpin policy principle that should guide the Department in its forward planning for the mmW spectrum frequencies. Competition is the key to unlocking the full potential of 5G telecommunications technologies through continued investments and innovation by facilities-based carriers, including new facilities-based competitors present in the market.
91. Shaw notes that ISED is seeking “*preliminary* comments on the possible measures that could support competition.” The band-plans, technology standards and international regulatory developments relating to the mmW spectrum that will support 5G remain in development. It is therefore challenging for Shaw to provide specific proposals on what the pro-competitive measures should be in the mmW bands. However, as explained further below, it is clear that Canada’s mobile wireless market today requires focused regulatory intervention to ensure equitable access to spectrum. For the same reasons, similar interventions will be required for 5G mmW spectrum in order to ensure that Shaw and other facilities-based regional competitors are able to get the spectrum they need to

compete effectively against the three national wireless incumbents over the long-term, and thereby offer Canadians true, sustainable choice in the marketplace.

The Need for Pro-Competitive Measures

92. Canada's mobile wireless market is dominated by the three national wireless incumbents. This drives current market conditions, which are revealed in the form of higher prices, less innovative services, less customer responsiveness and fewer choices for Canadians and Canadian businesses.⁵⁰ In order to counter this dominance, Canada's policies need to help strong facilities-based competitors overcome the barriers they face in the market.
93. New facilities-based competitors, including Shaw, continue to make significant investments in spectrum acquisitions and network deployments and, as of the spring of 2014, it was estimated that new facilities-based wireless carriers had invested over \$3 billion since the 2008 AWS auction in mobile wireless assets.⁵¹ Since then, Shaw alone has spent well over \$2 billion combined in acquiring Freedom, upgrading and improving networks that led to the recent launch of its LTE-Advanced network in Calgary, Edmonton, Vancouver, Toronto and Ottawa, and, more recently, in acquiring spectrum that will allow it to more efficiently and effectively serve its footprint in Western Canada and Ontario.
94. While new facilities-based competitors continue to invest, their ability to do so as efficiently and as cost-effectively as is possible for the incumbent national wireless carriers is severely constrained by the new competitors' deficit in the quantity and diversity of spectrum holdings. The incumbent wireless providers have vast spectral holdings in comparison with new facilities-based competitors like Shaw. Indeed, the incumbents continue to control the vast majority of mobile terrestrial spectrum capacity across all bands. As an example, in the large urban markets of Toronto, Calgary, Edmonton and Vancouver, Shaw holds a maximum of 80 MHz of mobile terrestrial

⁵⁰ Kevin C. Hearle et al., *Canadian Wireless Market Performance and the Potential Effect of an Additional Nationwide Carrier*, at pp. at 41-44, The Brattle Group (12 May 2014) (regarding TNC 2014-76).

⁵¹ Margaret Sanderson, Charles River Associates, *Wireless Retail and Wholesale Services in Canada Assessing the State of Competition*, at p. 23 (May 2014) (report prepared for Bell Mobility in the proceeding initiated by Telecom Notice of Consultation CRTC 2014-76).

spectrum. Rogers holds close to or more than 200 MHz of spectrum in each of these markets, while Bell and Telus together control close to or more than 300 MHz in each.

95. In those limited instances where strong new facilities-based competitors have established themselves as alternatives to the incumbent national wireless carriers, Canadian consumers and businesses are well-served. For example, as stated previously, the Competition Bureau recently highlighted the fact that prices are lower in markets with a strong, regional competitor that can bring pricing discipline and choice as an alternative to the wireless incumbents.⁵² Furthermore, Nordicity recently reported that since 2014, average Canadian wireless telephony prices have decreased in the Level 3, 4 and 5 service baskets, for which new competitors generally provide much more competitive prices than their incumbent counterparts.⁵³
96. The key as we look forward to the future is to ensure that the Department, in partnership with the CRTC, continues to promote a policy environment that supports facilities-based competition in the mobile wireless sector.
97. The Department's next available opportunities to implement measures to bolster nascent facilities-based competition are coming up in the 2018 residual spectrum auction and the 600 MHz spectrum auction. However, the Department must also be mindful now of the risks of significant concentrations of spectrum in the 5G mmW bands.
98. Because of their significant spectral holdings and their dominant position in the market, the incumbent wireless providers are highly incented to acquire sufficient mmW spectrum in order to foreclose new competitor access to this valuable spectrum, and thus to the next generation of the market. If regulators permit this, it will restore and reinforce the entrenched incumbency of Bell, Rogers and Telus, resulting in less competition, higher prices and a less dynamic, innovative environment – exactly the opposite of what Canadians deserve from 5G.

⁵² The Bureau conducted a thorough pricing analysis as part of its *Statement Regarding Bell's Acquisition of MTS* and found that mobile wireless pricing is substantially lower in areas where a strong regional competitor is present. Competition Bureau Statement, *supra* note 16.

⁵³ NLG Nordicity Group Ltd., *2016 Price Comparison Study of Telecommunications Services in Canada and Select Foreign Jurisdictions*, prepared for the Canadian Radio-television and Telecommunications Commission, at pps. 28-30 (22 March 2016) (prepared for the Canadian Radio-television and Telecommunications Commission).

Promote Sustainable Choice through Pro-Competitive Measures in mmW Bands

99. 5G represents the next major advancement in mobile telecommunications services. Given the forecasted use cases and the technical characteristics of ultra-high bandwidth over relatively short distances, the Department's proposal for flexible use licensing allows for technological innovation while giving facilities-based carriers the certainty that they need to invest and develop their networks for 5G technology. Notwithstanding the potential for new and innovative unlicensed uses and applications, licensed networks will be at the forefront of ensuring that Canadian network infrastructure stands at the ready to deliver 5G technologies and applications to Canadian consumers and businesses.
100. There are still many unknowns regarding the technology, equipment options and international developments that will affect the deployment of 5G telecommunications technologies and applications in Canada. For example, the relevant band plans have yet to be determined.⁵⁴ Additionally, the FCC is also considering making other bands available, including the 24 GHz, 32 GHz, 42 GHz, 47 GHz, 50 GHz and several other bands from 70 GHz and higher. In light of these uncertainties, as previously stated, the Department should conduct a follow-up proceeding on releasing additional spectrum to support 5G once the critical details are determined in this Consultation.
101. While the licensing of mmW spectrum is probably some time away and is subject to various unknowns, the Department cannot take its eye off supporting the facilities-based competition that is only just taking root in the market. Access to spectrum resources is among the most critical inputs for new competitors in the mobile wireless market, and the Government must manage this finite resource in the public interest by adopting pro-competitive measures that will ensure access to spectrum resources by facilities-based competitors through the next generation of wireless telecommunications. By ensuring equitable access to the various mmW spectrum bands, Canadian consumers and businesses in all regions of the country will be able to obtain 5G services from a choice of strong facilities-based carriers in a dynamically competitive market.
102. With respect to the pro-competitive steps that ISED should take in developing a licensing framework governing the 28 GHz and 37-40 GHz bands, Shaw proposes that the

⁵⁴ We note that we provide our comments on the proposed band plan in our response to Question 6-3 in Section III of these submissions.

Department establish three preliminary guiding tenets as it moves forward to the release of mmW spectrum: (i) pro-competitive measures that can be applied to exclusively licensed bands; (ii) band plans that can accommodate competitive players, not just the wireless incumbents; and (iii) measures that take into account the unique technical and operational features of each band and that are not overly generalized through an aggregated approach to the mmW bands as a whole.

103. Consistent with the submissions above in relation to the block sizes in the 28 GHz band, the Department should not adopt policy, licensing or technical measures that would automatically preclude the participation of new facilities-based competitors in any given band of mmW spectrum. Such a framework would reinforce the dominance of the wireless incumbents, reversing the progress we have been making in bringing competition to Canada's wireless market. Accordingly, as explained above, the Department should ensure that its band and channelization plan for the 28 GHz band allows for new competitors to access this spectrum.
104. Additionally, while the experience in the United States may inform the Department's considerations in this Consultation generally, we note that the measures adopted by the FCC would not be sufficient to promote competition in Canada. For example, the FCC set an aggregation limit of 1,250 MHz covering the 28 GHz, 37 GHz and 39 GHz bands (of the total 3,850 MHz available across those bands). This limit applies to licences acquired in the competitive bidding process and could be used as a threshold for secondary market transactions.
105. If ISED were to follow a similar approach as the FCC, by adopting a generalized aggregation limit across the mmW bands, this would lead to the unacceptable result that one or two carriers could monopolize a given band of spectrum and associated developing device ecosystems. For example, under ISED's current proposals, applying the FCC's 1,250 GHz limit in Canada would mean one licensee could acquire close to 40% of the spectrum available.
106. The United States is already experiencing the deleterious consequences of this excessively permissive cap. Contrary to the intent behind the FCC's adoption of the aggregation limits, some companies are seeking to obtain monopoly control of certain bands. For example, because the FCC divided the 28 GHz band into two blocks, and

set a permissive overall spectrum aggregation limit, Verizon may soon be able to dominate the 28 GHz band through its acquisitions of Straight Path and XO Holdings that are currently pending before the FCC.⁵⁵

107. ISED runs the risk of achieving a similar outcome in Canada should it not apply appropriate pro-competitive measures along with reconfigured channelization plans that accommodate an alternative facilities-based carrier in each band of mmW spectrum that will be made available. For example, in the 28 GHz band, if the Department adopts the proposal to have two blocks of 425 MHz each,⁵⁶ there would be a maximum of two licensees for that band, and without intervention, one entity could acquire both blocks and monopolize the band. This risk to competition for facilities-based new competitors is exacerbated by the fact that at the present time it would appear that less spectrum is being made available in Canada as compared to proposals in the United States.
108. To summarize, the adoption of pro-competitive measures in the licensing framework for the various mmW bands is essential. Without these measures, Canadians and Canadian businesses will not be able to access the maximum benefits associated with 5G, namely dynamic innovation, sustainable choice and affordable prices. As such, Shaw urges the Department to implement the additional pro-competitive safeguards outlined above in respect of the channelization of certain bands. We also look forward to a subsequent proceeding to review specific pro-competitive measures that will ensure equitable access to the mmW spectrum.

IV. CONCLUSION

109. Shaw fully supports ISED's focus on competition, investment and innovation in the context of these initial proceedings relating to the release of mmW spectrum to support 5G.
110. As a new competitor to the Canadian wireless market, Shaw is committed to making continual investments and innovations that will be required to provide Canada with world-leading connectivity infrastructure that can provide the foundation for our

⁵⁵ See Competitive Carriers Association, Petition to Deny the Verizon/Straight Path Transaction, ULS File No. 0007783428, at 6 (11 August 2017).

⁵⁶ We note that we provide our comments on the proposed band plan in our response to Question 6-3 in Section III of these submissions.

innovation economy. Today, Shaw is in the process of creating a seamless, always-on, ultra-broadband experience for consumers through an innovative, customer-centric network of wireline, Wi-Fi and wireless networks. These networks utilize both licensed and licensed-exempt spectrum. As we look ahead to 5G, Shaw is committed to building on our existing networks to create a compelling next-generation connectivity experience that will drive 5G and all of its anticipated positive effects on our economy and society.

111. Investment and innovation in 5G networks by providers like Shaw will put Canada at the forefront of connectivity and technological innovation so that the Canadian economy and Canadian society can thrive. However, in order to invest in 5G networks, competitive mobile providers require equitable access to mmW spectrum, just as they require access to 600 MHz and other lower frequency spectrum bands. ISED must implement pro-competitive spectrum policies in the next generation of mobile connectivity, the specifics of which should be considered in a follow-up proceeding.
112. Flexible rules, in turn, will encourage 5G network operators to innovate. Because it is still unknown how 5G services will develop and evolve, flexibility is needed to encourage experimentation with new technologies. It is through innovation that Canadians obtain access to a wide-array of the products and services that 5G network operators can offer.
113. ISED should also open mmW spectrum for flexible use wireless and licence-exempt wireless operations. As noted above, ISED should approve flexible use licensing for terrestrial operations in the 28 GHz and 37-40 GHz bands and allow licence-exempt wireless operations in the 64-71 GHz band.

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