

Notice No. SLPB-004-18
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***Consultation on Revisions to the 3500 MHz Band to Accommodate
Flexible Use and Preliminary Consultation on Changes to the 3800
MHz Band, Notice No. SLPB-004-18***

**Comments
of
SHAW COMMUNICATIONS INC.**



July 12, 2018

I. INTRODUCTION AND EXECUTIVE SUMMARY

1. The following constitutes the initial comments of Shaw Communications Inc. (“Shaw”), on behalf of itself and of Freedom Mobile Inc. (“Freedom Mobile”), to Innovation, Science and Economic Development Canada (the “Department” or “ISED”) in connection with the proceeding (the “Consultation”) initiated by the *Consultation on Revisions to the 3500 MHz Band to Accommodate Flexible Use and Preliminary Consultation on Changes to the 3800 MHz Band*, Notice No. SLPB-004-18 (the “Consultation Document”).

A Critical Juncture for the Canadian Wireless Market

2. Shaw commends the Department for so quickly heeding the calls of Shaw and others to launch this important Consultation.¹ This Consultation comes at a significant moment for Canada’s mobile wireless market, as we begin our transition to the 5G era and as true and sustainable competition from Shaw and others begins to emerge.
3. 5G has the potential to deliver enormous benefits to Canadians, both economically and socially. The scope of the impact of 5G is expected to be far broader and more transformative than previous leaps, including that from 3G to LTE, for example. 5G is not just about faster speeds for broadband, it also holds the potential to fundamentally change how Canadians live their lives and how Canadian communities, businesses and governments manage and deliver services, infrastructure and resources. As stated in a recent report by Accenture Strategy, “By delivering up to 20 Gigabits-per-second peak data rates and a 10x decrease in end-to-end latency to <1ms, 5G will unlock entirely new ways that Canadians interact with their devices, businesses, and the world around them.”² The same report indicates that the adoption of 5G technology in Canada will propel innovation across industries, improving our standard of living and economy with an expected \$40B GDP uplift by 2026 and creation of 250,000 permanent jobs.³
4. 5G networks will facilitate smart-city energy grids, transportation networks, autonomous driving, and water systems that will improve energy efficiency and safety. However, it is

¹ Comments of Shaw Communications Inc., Consultation on the Spectrum Outlook 2018 to 2022, Canada Gazette, Part I, October 21, Notice No. SLPB-006-17 (filed February 16, 2018).

² Accenture Strategy, “Fuel For Innovation: Canada’s Path in the Race to 5G,” June 9, 2018, online: <https://www.5gcc.ca/wp-content/uploads/2018/06/CWTA-Accenture-Whitepaper-5G-Economic-Impact-Updates-WEBSITE-06-19-2018.pdf> (accessed June 28, 2018) [“Accenture Report”], at slide 1.

³ Accenture Report, at slide 2.

entirely possible that 5G's most profound impacts have yet to even be contemplated at this time.

5. It is hard to overstate the transformative impact that 5G will have on our economy and society. This new 5G environment will be characterized by ultra-connectivity, with myriad devices within our homes, automobiles, workplaces, and cities communicating with each other, all the time. In this environment, the connectivity market will play a bigger role than ever before. The Big 3 national incumbents that currently dominate Canada's wireless market know this. And they have every incentive to ensure their dominance continues and is entrenched in the 5G era.
6. If the Big 3 succeed in extending their dominance to 5G, the enormous potential of a dynamic, transformative 5G environment will be lost. Canadians and Canada will instead be left with a static, unresponsive market similar to what we've seen prior to the emergence of strong competitors like Freedom Mobile. The full benefits of 5G will only be realized if true competition takes hold in the Canadian wireless market now, at the dawn of the 5G era. We need a vibrant marketplace that includes strong, new facilities-based providers competing and innovating in the delivery of 5G services and applications.
7. Fortunately, true, sustainable competition in this market is within reach. Facilities-based competitors such as Freedom Mobile have entered various markets across the country, driving pricing discipline, service innovation and choice for Canadian consumers.⁴ Through Freedom Mobile, Shaw is making the investments to become a competitor that can disrupt the dominance of the Big 3 incumbents, bringing an unwavering focus on customers and commitment to invest in innovative networks and services.
8. However, Freedom Mobile's entry into this market is nascent and we continue to face significant barriers to competition that require targeted regulatory intervention, such as dramatic imbalances between our spectrum holdings and those of the incumbents, including in important mid-band frequencies (see Figure 1 below), and challenges accessing towers and sites for our radio antennae on reasonable terms and conditions.

⁴ See *Competition Bureau statement regarding Bell's acquisition of MTS*, February 15, 2017; More recently, the Bureau has noted, "The establishment of fourth carriers in some parts of Canada demonstrates the opportunity for a more competitive future."; see *Submission by the Interim Commissioner of Competition before the CRTC – Telecom Notice of Consultation CRTC 2018-98-Lower-Cost Data-Only Plans for Mobile Wireless Devices*, June 13, 2018.

Moreover, the incumbents continue to reap the untold gains of free spectrum and decades of operating as incumbents in the wireless market: antenna siting and network deployment; extensive, entrenched retail distribution channels; a large, relatively inert base of customers; and a high level of brand recognition and profile.

National Commercial Mid-Band Mobile Spectrum Holdings (BRS, WCS, PCS, AWS-1, AWS-3)

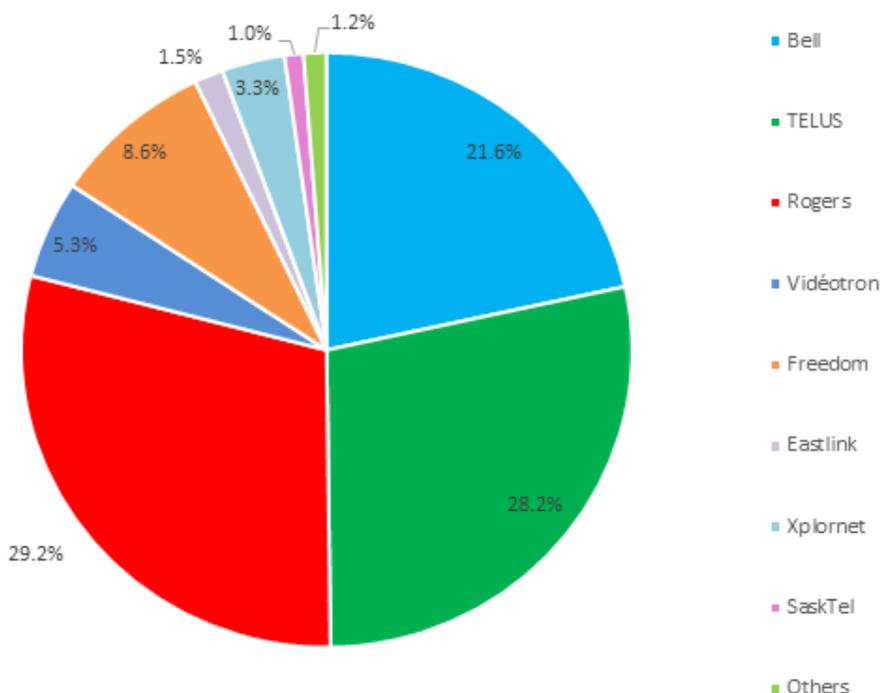


Figure 1 – National Commercial Mid-Band Mobile Spectrum Holdings (BRS, WCS, PCS, AWS-1, AWS-3)⁵

9. As such, the Big 3 continue to dominate the Canadian wireless market, as they have for decades. As of last year, these incumbents – Bell, Rogers and Telus – capture a combined 89% of Canadian mobile wireless subscribers and 91% of the industry’s revenues.⁶ Specifically, in 2017, Bell served 29.02% of subscribers, Rogers served

⁵ Weighted MHz/Pop estimate, based on licence data contained in ISED’s Spectrum Management System (online at: <http://sms-sgs.ic.gc.ca/eic/site/sms-sgs-prod.nsf/eng/home> (accessed 11 July 2018)), and ISED’s National Holdings of Commercial Mobile Spectrum, July 14, 2016 (online at: <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11210.html> (accessed 11 July 2018)), updated to reflect licence transfers approved by ISED after this date. The above also captures the results of ISED’s Auction of Residual Spectrum Licences in the 700 MHz, 2500 MHz, 2300 MHz and PCS-G Bands, June 29, 2018 (online at: https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/h_sf11312.html (accessed 11 July 2018)).

⁶ See 2017 CRTC Communications Monitoring Report, Figure 5.5.5.

33.90% and Telus served 28.36%.⁷ Recently, the Competition Bureau confirmed that market power concerns persist in the wireless industry.⁸ As a result, the wireless market has failed to deliver the value, choice, and affordable pricing that Canadian consumers require in a world that is increasingly dependent on mobile connectivity. Canadian wireless users pay too much for too little data and there is evidence to suggest that consumers are not harnessing the full potential of mobile broadband as a consequence.⁹

10. The incumbents have had a decades-long head-start, with significant spectrum advantages, making the road to sustainable facilities-based competition in the wireless market a difficult and uncertain one. Furthermore, the incumbents are economically incented to maintain their dominance of the market, and therefore have used, and will continue to use, whatever measures are available to them to foreclose access by new competitors, especially competitors like Shaw that have the strength, capacity and long-term commitment to disrupt the status quo.
11. The reality is that no matter how innovative Shaw is operationally or technologically, or how many billions of dollars we invest, our competitive efforts will always be hobbled by fundamental barriers to competition if incumbents are able to act on their incentives to preserve or leverage these barriers to foreclose competition. In recent years, Canadian regulators and policy makers have recognized the existence of fundamental barriers to competition in the Canadian wireless market and the incentives of the Big 3 incumbents to maintain these barriers. To their credit, in recent years, policymakers have implemented targeted, balanced measures to promote the emergence of strong facilities-based competitors.¹⁰ As the Competition Bureau has noted, these developments create “the opportunity for a more competitive future.”¹¹

⁷ *Ibid.*

⁸ *Submission by the Interim Commissioner of Competition before the CRTC – Telecom Notice of Consultation CRTC 2018-98-Lower-Cost Data-Only Plans for Mobile Wireless Devices*, June 13, 2018.

⁹ See, e.g., Organisation for Economic Development, “Broadband Portal,” updated June 28, 2018, online: <http://www.oecd.org/sti/broadband/broadband-statistics/> (accessed 9 July 2018), Table 1.14.

¹⁰ Recent examples include ISED’s recent decision on the licensing framework for the 600 MHz band (Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band, March 2018, SLPB-002-18) and the Commission’s March 2018 decision finalizing the rates for wholesale mobile wireless roaming (Telecom Order CRTC 2018-99, Wholesale mobile wireless roaming service tariffs – Final rates, 22 March 2018).

¹¹ See *Submission by the Interim Commissioner of Competition before the CRTC – Telecom Notice of Consultation CRTC 2018-98-Lower-Cost Data-Only Plans for Mobile Wireless Devices*, June 13, 2018

12. Freedom Mobile's transformative "Life is a Big Gig" plans demonstrate our capacity to respond to the gap in the current marketplace for generous yet well-priced data plans, in spite of our significantly disadvantaged spectrum position relative to the Big 3. These plans offer only a glimpse of the choice and innovation that Freedom Mobile could bring to the market with more equitable spectrum access.
13. As we begin our transition to 5G, regulators and policymakers must seize the opportunity to ensure a competitive 5G future by adopting policy measures designed to mitigate the risk that the static dominance of the Big 3 will continue in the 5G environment. In this regard, this consultation offers that opportunity, but also represents significant risk: if the Department sets the stage for pro-competitive spectrum policy measures that allow new competitors to bid on 5G spectrum without foreclosure from any of the Big 3, this will lay the groundwork for sustainable competition in Canada. In contrast, without these measures, the prospects of sustainable wireless competition in Canada will fade.

ISED Must Take Steps to Ensure that the 5G Environment Is Competitive

14. The 3450-3650 MHz band ("3500 MHz band") that is the subject of this Consultation will be a key part of the foundation for 5G services in Canada. This mid-band spectrum is uniquely capable of providing network capacity and coverage, making it a critical component for next-generation 5G networks. Furthermore, at this time, the 3500 MHz band is of particular importance because it is the lowest frequency band where 5G can be deployed with large channel bandwidths. As detailed in previous comments,¹² policymakers around the world have recognized this and have proceeded with the regulatory actions necessary to make the band available for mobile use.
15. Given the importance of this spectrum for 5G, combined with the significant mid-band spectrum advantage already enjoyed by the incumbents,¹³ the Big 3 national incumbents are highly incented to foreclose strong new competitors like Shaw from obtaining an equitable amount of 3500 MHz spectrum.

¹² Comments of Shaw Communications Inc., Consultation on the Spectrum Outlook 2018 to 2022, Canada Gazette, Part I, October 21, Notice No. SLPB-006-17 (filed February 16, 2018) at paragraphs 30-34.

¹³ See Figure 1, above.

16. As has been detailed by experts in past regulatory proceedings, there is strong evidence of foreclosure risk in Canadian spectrum licensing processes, given the ongoing dominance of Canada's wireless market by the Big 3.¹⁴ This risk is at an all-time high as the Big 3 seek to perpetuate their dominance in 5G services, while facing the strongest, most viable competitive threats they have ever faced. The incumbents are both incented and able to pay a premium for this valuable mid-band spectrum, denying new competitors the opportunity to access sufficient amounts necessary to support a truly competitive 5G offering. In Shaw's view, as a result of the current market conditions, this foreclosure risk extends to all of the spectrum bands currently slated for release for 5G, including valuable 3500 MHz spectrum. Absent pro-competitive policies that mitigate this foreclosure risk, the incumbents will be able to effectively block new competitors from accessing this key spectrum band at a pivotal time in order to truly challenge the incumbents' market dominance.
17. While the Big 3 would have regulators believe that they are uniquely positioned to deliver 5G services because of their scale and dominance in the national wireless market, the Department should ignore such claims.¹⁵ They merely seek to foreclose competition and preserve their market power, which has led to a static market that is unresponsive to consumer needs. Rather, the full potential of 5G will only be realized if there are strong, facilities-based competitors offering dynamic alternatives to the Big 3 incumbents in the next generation of wireless services. If the Big 3 succeed in dominating the 5G wireless market, we will see lower innovation, limited choices and higher prices, all of which are antithetical to what 5G represents.
18. Accordingly, 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 accessing this critical spectrum, thereby asserting their dominance in the 5G era, and derailing the progress that new competitors have made in driving competition for the

¹⁴ See, e.g., Peter Cramton (University of Maryland and University of Cologne), "The Critical Importance of the Set-aside in the Canadian 600 MHz Auction", October 2, 2017, report prepared for Shaw Communications Inc. in proceeding initiated by Consultation on a Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band, Notice No. SLPB-005-17.

¹⁵ In this regard, Shaw notes that in May, in collaboration with Nokia, CableLabs and Rohde & Schwarz, Shaw completed its first 5G technical trials using 28 GHz and 3500 MHz spectrum, demonstrating its commitment to be a leader in the Canadian 5G market (<http://newsroom.shaw.ca/materialDetail.aspx?MaterialID=6442452113>).

benefit of Canadians. The pro-competitive spectrum policies adopted by ISED over the past few years, which have, over time, alleviated some of the barriers to competition in this market, must be applied to spectrum that will fuel the development of 5G networks, including in the 3500 MHz and millimetre wave bands. As described further below, several of the decisions that will be made in this Consultation will affect the competitive landscape and options for pro-competitive policies in a subsequent licensing process, and must therefore be carefully considered.

Key Proposals to Drive Competition and Realize the Potential of 5G

There Should be a Substantial Reclamation of Spectrum to Support 5G Competition

19. As elaborated upon in responses to the specific questions raised in the Consultation Document, to ensure that there is opportunity for new competitors to gain access to 3500 MHz spectrum, Shaw supports a substantial reclamation of spectrum in this band. Limited, partial conversion of a reasonable amount of spectrum should only be permitted where existing licensees are using their licences to provide services to the public. Accordingly, before allowing for the conversion of existing licences, licensees should be required to furnish evidence, as of the date of publication of the Consultation Document, of *efficient* use of each spectrum block to serve commercial customers,¹⁶ in order to have such blocks be considered for partial conversion. The existence of a nominal number of customers in a given Tier 4 territory should not be a sufficient justification for partial conversion to flexible use of all of the licensee's licences in that territory.
20. If unused licences or blocks are considered to be eligible for conversion, it would reward spectrum warehousing, it would represent an unjust windfall for existing licensees, and it would perpetuate the Big 3's dominance in the band, destroying the potential for 5G competition. As demonstrated in Figure 2 below, via Inukshuk, Bell and Rogers monopolize licence holdings in the 3500 MHz band in several key urban markets.

¹⁶ Use by a licensee of different frequency channels for different antenna sectors of the same cell site would constitute *inefficient* spectrum use because current technologies such as LTE normally utilize the same frequency channel on all sectors of the cell site. The Department's policy decision should not reward sub-optimal practices designed to maximize conversion.

Consequently, converting a significant portion of the Inukshuk spectrum to mobile will represent a huge windfall and ongoing advantage to Bell and Rogers.

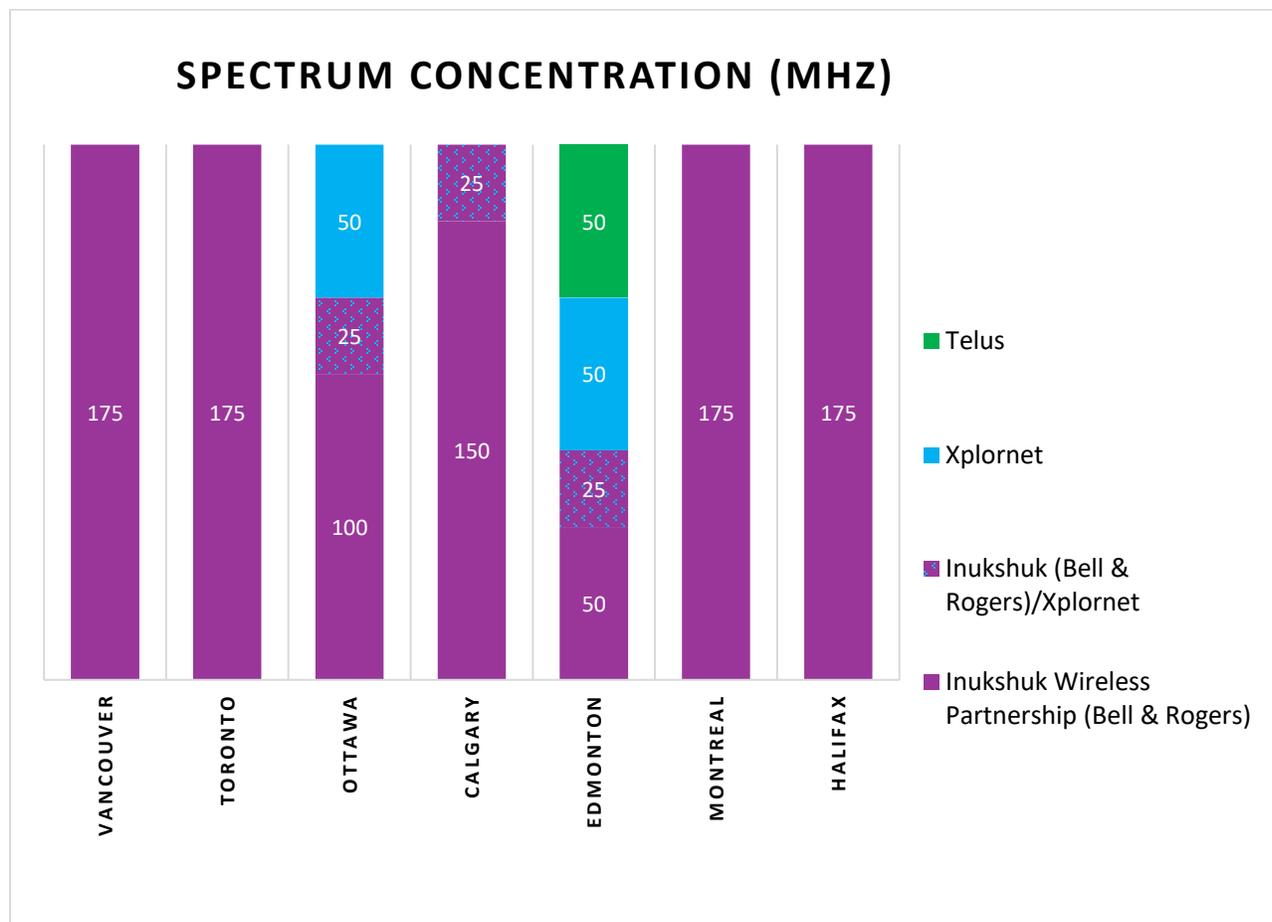


Figure 2 - Current 3500 MHz Licence Holdings in Major Urban Centres¹⁷

21. Shaw therefore supports a conversion that will allow for reclamation of as much as spectrum as possible. We believe that the Department’s proposal under Option 1 to reclaim two thirds of the currently licensed spectrum is a very reasonable accommodation of existing users – this will leave one third of the spectrum in the hands of those licensees. However, we would emphasize that it should only be available to those licensees who are currently using the relevant spectrum frequencies to provide services to a material number of consumers. Option 1 will ensure the continuation of existing services while making available spectrum in all markets for future licensing on a pro-competitive basis. Leaving

¹⁷ Based on Consultation Document, Annex A — Current licence holdings in the 3500 MHz band as of June 15, 2018.

anything less for future licensing will compromise the Department's ability to propose pro-competitive policies in the next Consultation, which will hold us back from achieving sustainable competition, as we transition to the 5G era.

Reclaimed Spectrum Should be Licensed on a Tier 2 or Tier 3 Basis

22. A principal advantage of the Department's Option 1 for the conversion of existing licences in the 3500 MHz band is that it will free up a generally uniform amount of spectrum for future licensing across the country. It would therefore be feasible for the Department to subsequently licence the reclaimed spectrum using larger tier sizes. In Shaw's view, this would be preferable for a number of reasons.
23. Firstly, Tier 4 licensing was appropriate for fixed wireless operations, which, by definition, served fixed users. However, in the mobile context, Tier 4 licences, with their greater market fragmentation and number of border areas, are far more difficult to manage than larger tier sizes. Not only do operators have the challenge of controlling interference from a greater number of adjacent licensees, with users on the move, there is also a far higher risk of service degradation due to hard hand offs at border areas, particularly for new competitors that operate without the extensive network coverage of the incumbents. As ISED has noted previously, "[L]arger geographic service areas enable the deployment of large-scale networks that can be more cost-efficient due to economies of scale, which is critical to the deployment of spectrum given that wireless mobile networks are capital-intensive."¹⁸ The Department has also observed that licensing based on larger geographic areas results in less coordination being required between adjacent licensees and allows more effective use of radio spectrum.¹⁹ For these reasons, it has been the Department's practice to licence mobile spectrum on a Tier 1, Tier 2 or Tier 3 basis and spectrum for fixed operations on a Tier 3 or Tier 4 basis. In light of the flexible use designation for this band, Shaw submits that an appropriate compromise would be to include a proposal that the reclaimed spectrum be licensed on a Tier 2 or Tier 3 basis in the follow-on consultation regarding the licensing framework.

¹⁸ Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band, March 2018, SLPB-002-18, at paragraph 62.

¹⁹ *Ibid.* at paragraph 63.

24. Licensing the reclaimed spectrum using larger tier sizes would also give the Department a better range of options for auction format, including combinatorial clock auction, which could otherwise be difficult to administer if the licences are divided on a Tier 4 basis.
25. However, the issuance of flexible use licences to existing licensees pursuant to the conversion process should be done on a Tier 4 basis, as expanding the size of such licences would result in an unjustified windfall. In this regard, Shaw notes that there is Department precedent for adopting different geographic tiers for licensing in a single band.²⁰

The Licensing Framework Must Include Pro-Competitive Measures

26. As discussed above, the Big 3 are highly incented to foreclose new competitors from gaining access to this spectrum. Even if existing holdings are reclaimed pursuant to ISED's proposal under Option 1, Bell and Rogers will still be granted automatic access to 3500 MHz spectrum for mobile use. This will provide them with an immediate advantage over new competitors with respect to the 3500 MHz band and exacerbate the imbalance that already exists with respect to mid-band spectrum holdings.
27. Furthermore, Telus will also benefit greatly from the partial conversion of this spectrum, through its comprehensive reciprocal network access arrangement with Bell, pursuant to which Telus has access to Bell's HSPA and LTE networks throughout Bell's traditional serving territory.
28. Bell and Telus entered into a Next Generation Network Reciprocity Agreement (the "Reciprocity Agreement") on October 9, 2008, which initially provided reciprocal access to the parties' respective UMTS and HSPA networks that operated on 800 MHz and 1.9 GHz spectrum. This agreement has since been modified at least five times to extend its geographical reach and to update the spectrum used such that today, Telus has seamless access to Bell's HSPA and LTE network and vice versa. The Reciprocity Agreement provides the two parties with reciprocal access to each other's RAN capacity, using a multi-operator core network architecture. The parties also provide access to each other's

²⁰ See, e.g., ISED, *Policy Framework for the Auction for Spectrum Licences for Advanced Wireless Services and other Spectrum in the 2 GHz Range*, November 2007, online: <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf08833.html> (accessed June 28, 2018).

physical RAN-infrastructure (towers, antennas and radio).²¹ According to Bell's explanation of the arrangement, "we have a network and Telus has a network and we provide reciprocal access to those networks."²²

29. Knowing they have reciprocal access to each other's RAN capacity and physical infrastructure through the Reciprocity Agreement, Bell and Telus have established a pattern of acquiring and dividing spectrum along their traditional incumbent wireless (and wireline) territories. This is particularly evident from the spectrum acquisition and subordination activities that occurred during and following the 2500 MHz and 700 MHz spectrum auctions.
30. In the 700 MHz auction, Telus and Bell primarily acquired spectrum in their traditional wireline incumbent territories.²³ Less than a year after the auction, Telus and Bell cemented this division by subordinating the spectrum licenses that they each acquired in the other partner's traditional wireline incumbent territories.²⁴ Telus subordinated all of the primary spectrum licenses for 700 MHz spectrum that it acquired in Newfoundland & Labrador, Nova Scotia & PEI, New Brunswick (together, the "Maritime Provinces"), Quebec and Ontario to Bell. Similarly, Bell subordinated all of the primary spectrum licenses for 700 MHz spectrum that it acquired in Alberta and British Columbia to Telus.
31. A similar pattern also emerges with respect to 2500 MHz spectrum.²⁵ After acquiring 40 MHz of Broadband Radio Spectrum in the 2500 MHz auction in all of the Tier 3 service areas in the Maritime Provinces, Quebec and Ontario, Telus subordinated all of its primary spectrum licenses in these service areas to Bell.²⁶ In fact, of the 122 spectrum blocks that

²¹ Telus(CRTC)3March14-8, Response to Request for Information in Telecom Notice of Consultation 2014-76, Review of wholesale mobile wireless services, 22 April 2014.

²² CRTC, Transcription of Proceedings Before the Canadian Radio-television and Telecommunications Commission, Telecom Notice of Consultation 2014-76, Review of wholesale mobile wireless services, October 2, 2014, paragraph 5694.

²³ See 700 MHz Auction (2014) Auction Results, February 13, 2014, online: https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/h_sf10598.html (accessed 12 July 2018).

²⁴ See Subordinate Licensing Application for Spectrum Licences Held by Bell Mobility Inc. (Bell) and TELUS Communications Company (TELUS), December 23, 2014 for subordination of 700 MHz licenses by Bell and TELUS respectively, online: <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10919.html> (accessed 12 July 2018).

²⁵ See 2500 MHz Auction – Final Results, May 12, 2015, online: <https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11030.html> (accessed 12 July 2018).

²⁶ See Subordinate Spectrum Licences Held by Bell Mobility Inc. and TELUS Communications Company, April 6, 2017, online: <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11271.html> (accessed 12 July 2018).

Telus acquired in the 2500 MHz auction, it has subordinated 86 spectrum blocks (70%) to Bell. Similarly, Bell subordinated all of the primary spectrum licenses that it acquired in the 2500 MHz auction in Alberta to Telus.

32. Based on the foregoing, we can expect that Telus and Bell will engage in the same pattern of behaviour with respect to 3500 MHz spectrum.
33. Given their significant advantages with respect to this band in particular, and mid-band spectrum more generally, Bell, Rogers, and Telus (by virtue of its arrangement with Bell) will be economically incented in a subsequent auction to foreclose new competitors in order to re-assert their near-monopoly over the band and ensure their continued dominance in the delivery of 5G services. It is, therefore, imperative that the subsequent licensing framework contemplate pro-competitive measures that will mitigate this foreclosure risk. The Department must be cognizant that due to their dominance, the incumbents have the capacity and motivation to bid in excess of the value of the spectrum in order to foreclose competitor entry into the 5G market and to preserve their market power. There is expert evidence that well-crafted pro-competitive measures, such as set-asides, can increase competition both in the market for mobile services as well as the spectrum auctions in which they are applied, leading to not only consumer benefits – increased innovation, accelerated deployment and enhanced choice – but also higher auction revenues and improved efficiency.²⁷
34. On the other hand, failure to set aside spectrum for exclusive bidding by new competitors will result in existing spectrum concentration barriers persisting into the 5G era, further entrenching the dominance of the incumbents and limiting the potential benefit that 5G holds for the Canadian economy and consumers. This would hurt consumers and could cost billions of dollars in consumer value that would otherwise be realized through lower prices, more valuable and innovative services, and greater choice in the 5G marketplace. In the 5G environment, these losses will extend far beyond the market for wireless voice and data services as we know it today. 5G will be the critical infrastructure gateway to the economy. Therefore, the consumer harm and economic losses stemming from the continued dominance of the Big 3 will be far more acute than ever before.

²⁷ *Supra*, note 14, at page 1.

35. The Department can best ensure a competitive landscape in the 3500 MHz band by taking the following actions:
- Prioritizing the adoption of flexible use rules in the 3500 MHz band and the release of such spectrum under pro-competitive policies;
 - Maximizing the reclamation of spectrum and, at most, instituting a limited, partial conversion of a reasonable amount of spectrum for existing licensees in the 3500 MHz band consistent with Option 1 as described in the Consultation Document;
 - Enacting safeguards to ensure that the conversion of existing fixed wireless licences in the 3500 MHz band does not reward spectrum warehousing by requiring that all converted frequencies are actually being used, efficiently and optimally, to serve a material number of subscribers;
 - Adopting a timeframe for the issuance of flexible use licences in the 3500 MHz band that places new licensees in the band on equal footing with those licensees receiving converted licences;
 - Establishing protection and notification provisions for the transition of existing fixed wireless operations in the 3500 MHz band that depend on the number of users affected by such transition rather than the population base of a licence area; and
 - Proceeding expeditiously with future consultations that consider opportunities to maximize use of the 3700-4200 MHz band for mobile wireless services while ensuring adequate protections for existing satellite users.
36. Shaw respectfully submits that these initial steps will support a more competitive landscape for Canada's connectivity market, ensuring the future success of 5G.
37. Below, we have set out our responses to the specific questions raised in the Consultation.

II. RESPONSES TO CONSULTATION QUESTIONS

THE 3500 MHz BAND

Q1 - ISED is seeking comments on its assessment of the timelines identified for the development of an equipment ecosystem for 5G technologies in the 3500 MHz and 3800 MHz bands, and whether the timelines will be the same in both bands.

38. Shaw agrees with ISED's projected timeline for development of a 5G "flagship device" ecosystem. However, in establishing its timeline for the licensing of this spectrum, ISED should build in time for the industry to plan for and deploy the network infrastructure that will be required to connect such flagship devices, as well as the myriad other devices that are expected to connect to 5G networks.
39. The development of a 5G equipment ecosystem will consist of two key components – a network infrastructure ecosystem and a terminal device ecosystem. The network infrastructure ecosystem comprises hardware-based platforms and software-based components. Hardware-based platforms are typically limited by frequency band characteristics, as well as hardware capacity for certain signal processing capabilities. For the deployment of 5G, it is necessary to have early certainty of the hardware requirements, as they are very difficult to modify after the initial deployment. For that reason, frequency requirements (including technical characteristics of the licensed band) should be determined as early as possible.
40. With respect to the terminal device ecosystem, although it appears that flagship 5G devices likely will not be available until 2020, some devices may be available as soon as next year. According to Qualcomm, the first commercial launches of 5G smartphones and networks featuring Snapdragon X50 5G NR modems are expected to be available in 2019.²⁸ A terminal device manufacturer has similarly announced that it will launch its first 5G smartphone in the second half of 2019.²⁹

²⁸ Qualcomm, "Global Mobile Operators Select Qualcomm Snapdragon X50 5G Modem for Mobile 5G NR Trials in 2018", Feb. 8, 2018, online: <https://www.qualcomm.com/news/releases/2018/02/08/global-mobile-operators-select-qualcomm-snapdragon-x50-5g-modem-mobile-5g> (accessed 28 June 2018); and, Venture Beat, "Qualcomm signs 19 phone makers and 18 carriers for global 5G launches in 2019," Feb. 8, 2019, online: <https://venturebeat.com/2018/02/08/qualcomm-signs-19-phone-makers-and-18-carriers-for-global-5g-launches-in-2019/> (accessed 28 June 2018).

²⁹ 5G.co.uk, "Huawei's first 5G-enabled smartphone: coming in 2019", Apr. 19, 2018, online: <https://5g.co.uk/news/huawei-5g-enabled-smartphone/4348/> (accessed 28 June 2018).

41. Based on previous generations of mobile technologies, we expect that the first phase of 5G device development will focus on compliance with 5G technical standard requirements. In the second phase, after technical capabilities are perfected, device developers will integrate other “flagship characteristics” with fully functioning 5G capabilities, creating powerful market devices. For that reason, 5G network infrastructure needs to be in place well in advance of the projected timeline for “flagship devices”.
42. Additionally, it is expected that the 5G terminal device ecosystem will comprise not only mobile handset markets, but also Internet of Things (“IoT”) and fixed broadband equipment. For IoT, it is not necessary to wait for flagship device development, as many IoT devices will not be communication devices per se, but devices with other primary functions (sensors, cameras, actuators), where 5G will provide the connectivity function. Similarly, fixed terminals typically have less stringent requirements for size, power consumption, and their product development timeline may be substantially shorter than for “flagship mobile devices.”
43. Based on this, if ISED’s projection that a 5G “flagship devices” ecosystem will develop around 2020 is correct, then networks will need to be ready much earlier, to support IoT, fixed terminals, and the first phase of 5G mobile devices. Canada is not late in deployments of 5G, as there are no commercial launches of 5G yet. However, we do not have a lot of time for deployment, if we want to be in the leading wave of global 5G deployments. Finally, it should also be noted that deployment of large-scale 5G networks could take at least 12-18 months, with additional optimization activities of 6-12 months.

Q2 — ISED is seeking comments on the proposals for:

- **adding a primary mobile allocation to the 3450–3475 MHz band**
- **removing the radiolocation allocation in the 3450–3500 MHz band**
- **making the corresponding changes to the Canadian Table of Frequency Allocations**

44. Shaw fully supports ISED’s proposals for adding a primary mobile allocation to the 3450-3475 MHz band, removing the radiolocation allocation in the 3450-3500 MHz band, and

making the corresponding changes to the Canadian Table of Frequency Allocations. As the Consultation Document observes, removing the priority for radiolocation use in the 3450-3475 MHz band will not negatively impact the operation of government radiolocation systems or existing fixed point-to-point operations. Indeed, there are no current radiolocation users in the 3475-3500 MHz band. On the other hand, establishing a primary allocation for mobile for the entire 3450-3650 MHz range will enable flexible use across 200 MHz of bandwidth in Canada, allowing for wider blocks, with greater utility, for licensing.

Q3 — ISED is seeking comments on the proposal to allow flexible use in the 3450–3475 MHz band.

45. Shaw supports the proposal to allow flexible use in the 3450-3475 MHz band. Applying flexible use rules to this portion of the band will bring the 3450-3475 MHz band into alignment with the rest of the 3500 MHz band. Uniform technical rules throughout the band will enhance the utility of the band and provide regulatory certainty. A flexible use designation gives operators the ability to use the spectrum for different purposes, encouraging innovation and allowing for greater spectral efficiency.

Q4 — ISED is seeking comments regarding interest in sharing spectrum between radiolocation and other services in the 3400–3450 MHz band, and options for doing so.

46. In the 3400-3450 MHz portion of the band, Shaw supports the shared use of spectrum by the radiolocation and other services. Radiolocation, given its intermittent and limited use for aeronautical and maritime radar, may allow for sharing with low powered services. Such sharing would maximize spectral efficiency and the benefits derived from the spectrum.
47. Sharing between radiolocation and mobile services can be achieved in many ways, including by applying advanced technologies and antenna systems. However, sharing can be achieved even without dependence on complex technological advancements. Today, a large portion of mobile data traffic is generated indoors, in commercial and public venues, in underground subway tunnels and in other similar locations. One of the simpler methods of spectrum sharing could be allowing mobile use of spectrum in specific indoor

and underground locations, where it would not interfere with radiolocation services. As technologies evolve, additional spectrum sharing methodologies could be implemented and validated in the field.

Q5 — ISED is seeking comments on the expected impacts of the following options with regards to the continuation of existing services, competition in the Canadian marketplace and availability of new 5G services for Canadians.

Q6 — ISED is seeking comments on alternative options for licensees to return spectrum to the Department to make available for a future licensing process. Respondents are asked to provide a rationale for any alternative proposals, including how they would meet ISED's policy objectives as stated in [section 3](#).

48. Shaw supports the substantial reclamation of spectrum in this band to support competition in the 5G marketplace and to ensure the availability of innovative 5G services for Canadians. Absent substantial reclamation of this valuable spectrum, the incumbents will continue their near-monopolization of the band in key markets. Moreover, as described further below, existing services can be sustained using less spectrum.
49. Before discussing the options presented in the Consultation Document, it is important to highlight, as discussed in Shaw's comments to the Department's Spectrum Outlook Consultation 2018-2022, that existing Tier 4 licensees should only be permitted to partially convert licences that are being used to provide services to the public. In circumstances where existing fixed wireless access licensees are not currently providing services to the public, conversion (partial or otherwise) of these licences or frequencies should not be permitted. Instead, as recommended by Shaw and others,³⁰ these licences or blocks should be returned to ISED. In cases where a licensee holds multiple spectrum licences in the same Tier 4 area, the licensee should be required to demonstrate use of the spectrum to serve the public in each of the relevant spectrum frequency blocks in the area. Moreover, the fact that a licensee provides service to the public using one spectrum

³⁰ See comments in ISED, Consultation on the Spectrum Outlook 2018 to 2022, *Canada Gazette*, Part I, October 21, Notice No. SLPB-006-17.

- frequency block in a given Tier 4 territory should not qualify all of that licensee's spectrum frequencies for licence conversion.
50. Additionally, licensees should be required to demonstrate efficient and optimized use of the spectrum they seek to convert. The Department's conversion policy must not reward inefficient use of spectrum that occupies bandwidth for the purpose of maximizing conversion, such as transmission on different frequency channels at different antenna sectors of the same cell site, when there is widely-available technology allowing for the reuse of the same frequency channel on all three sectors. Such behaviour is clearly antithetical to ISED's policy objective to maximize the economic and social benefits that Canadians derive from the use of the radio frequency spectrum resource.
 51. If unused, or inefficiently used, licences or frequencies are considered to be eligible for conversion, it would reward spectrum warehousing. In some licensed areas, such as Toronto, Vancouver, Montreal, Quebec City (subdivision), Halifax, and Calgary (subdivision), all spectrum blocks are licensed to only one entity, Inukshuk, which is a joint venture of incumbents Bell and Rogers. Accordingly, before allowing for the conversion of blocks held by existing licensees, these licensees should be required to furnish evidence of efficient use of each spectrum block by commercial customers. The existence of a nominal number of customers in a given Tier 4 area or on a frequency block is not sufficient to qualify for partial conversion to flexible use of the licences or frequencies in that area.
 52. Turning to the two options presented in the Consultation Document, the limited, partial conversion of a reasonable amount of spectrum for existing licensees, as outlined in Option 1 in the Consultation Document, is preferable. Option 1 best balances the objectives of service continuation, competition in the provision of 5G services, and the development of new and innovative 5G services. Under this option, for each Tier 4 licence area where services are being provided to a material number of customers, the existing licensee would be issued a flexible use licence for one third of its current holdings, rounded down to the nearest 10 MHz, with a minimum of 20 MHz. This flexible use licence would be issued on a Tier 4 basis, as originally licensed.
 53. Shaw agrees with the Department that with improved deployment efficiencies and new technologies, licensees will be able to maintain current service offerings to a material number of customers, using one third of their current holdings (at least 20 MHz). Further,

under Option 1, an adequate amount of spectrum will be freed up for future licensing across the country, supporting competition and fueling 5G innovation and development in *all markets*. For the reasons discussed above, it is imperative that enough spectrum be freed up for licensing pursuant to pro-competitive policies. Under Option 2, in certain markets, only 50 MHz would be repurposed for subsequent licensing, severely limiting access to this valuable spectrum by new competitors.

54. Furthermore, Option 1 is more equitable than Option 2 as it contemplates a reclamation of a uniform amount in every market. Under Option 2, a licensee holding 50 MHz in a particular licence area would be entitled to keep 100% of its holdings, whereas a licensee holding 175 MHz in a particular licence area would be entitled to keep only 29% of its holdings.
55. Shaw notes, however, that grid cell licences should not be eligible for conversion as described above. These licences were either acquired on a first-come, first-served basis, or were granted when the licensee failed to meet its original deployment conditions for the entire Tier 4 serving area. In most cases, they cover only a small fraction of a Tier 4 service area and permitting conversion of these licences could result in stranded spectrum in the remainder of the Tier 4 area. As such, it would be more appropriate for these licences to expire at the end of a pre-defined protection period (as contemplated in Question 11, below).

Q7 — ISED is seeking comments on a revised band plan using unpaired blocks of 10 MHz in the frequency range of 3450–3650 MHz.

56. Shaw is supportive of a proposed revised band plan using unpaired blocks of 10 MHz in the frequency range of 3450-3650 MHz. This proposal would afford maximum flexibility for the partial conversion of the existing licences and options for pro-competitive licensing that will be determined in a future proceeding. However, we agree that setting a band plan on this basis should not preclude ISED from licensing blocks as aggregated packages of multiple 10 MHz blocks to facilitate large bandwidth channels for 5G technologies. The Department should consider and consult on the appropriate licence tier size in a subsequent licensing proceeding. For reasons we have explained in this submission,

Shaw believes that the licensing framework consultations should propose that licensing be carried out on a Tier 2 or Tier 3 basis.

Q8 — ISED is seeking comments on whether any additional measures should be taken to limit potential interference issues with the proposed TDD band plan.

57. At the present time, Shaw does not have any other proposals, nor do we believe any additional measures are necessary.

Q9 — ISED is seeking comments on the proposal to align the timing of the issuance of flexible use licences to incumbents with the issuance of licences to those who acquire 3500 MHz flexible use licences in a future licensing process.

58. The comments below should be read in conjunction with our Executive Summary and our responses to Questions 5 and 6 above, which discuss Shaw's position on a partial conversion of spectrum for existing holders.

59. We support ISED's objectives of establishing competitive, market-driven 5G services. In order to achieve true, sustainable competition in the 5G environment, all service providers need the same market and regulatory conditions, including with respect to timing for deployment of mobile services under flexible use policies. Considering that incumbent providers already have access to 3500 MHz spectrum, which they can already use for 5G fixed network deployment activities, these players hold a time-to-market advantage. In order to maximize the benefit of the spectrum resource, ISED's policy should seek to provide a counterweight to this advantage by aligning the timing of the issuance of the flexible use licences to incumbents with the realistic timelines for network deployment by new licensees.

60. Accordingly, we recommend that the issuance of converted flexible use licences to existing licensees be six months after the issuance of licences to those who acquire 3500 MHz flexible use licences in a future licensing process. For clarity, if new licences (for new frequencies) are required to facilitate transition, the Department could issue these to existing licensees with a moratorium on mobile use for the six-month period referred to above.

Q10 — ISED is seeking preliminary comments on the importance of price discovery in a licensing process for flexible use licences in the 3500 MHz band.

61. Price discovery has been a central feature of most broadband spectrum auctions worldwide. The experience of the Canadian operators, and indeed most operators worldwide, is almost entirely based on multi-round auctions with increasing prices and some amount of rest-of-market demand information, which promotes price discovery and reduces common value uncertainty.³¹ Even when the products being offered were well known in nearly every aspect – business case, deployment strategy, technology, and costs – price discovery was still important to achieving auction efficiency.
62. As described above, the 3500 MHz band is of critical importance to the development of 5G in Canada. However, given the newness of 5G, there is uncertainty worldwide about the product, interference, and the ideal amount of bandwidth required within 3500 MHz for 5G. As a result, the countries that have already conducted 3500 MHz auctions (UK and Ireland, for example) and the governments that are planning 3500 MHz auctions (Italy, Austria, Switzerland, and Denmark, for instance) have not even entertained the possibility of an auction without price discovery. In summary, the 3500 MHz band is a case study in the importance of price discovery, and ISED would be ill-advised to implement an auction without it.
63. Additionally, Shaw recommends that the Department consider licensing the reclaimed spectrum on a Tier 2 or Tier 3 basis. Since conversion of the existing licences pursuant to the Department's Option 1 proposal, as described above, will free up a uniform amount of spectrum across the band, there is an opportunity for the Department to licence this reclaimed spectrum using a larger tier size. As noted above, flexible use licences issued pursuant to the conversion process would be Tier 4, as originally licensed.
64. As also described above, larger licence areas have traditionally been adopted for mobile, for several reasons. Smaller licence areas, with their proportionally larger border areas,

³¹ Common value uncertainty occurs in an auction when parties are competing for a good with uncertain *ex ante* value that, *ex post*, has roughly equal valuation to some or all bidders. Auction designs with price discovery help to reduce the effect of common value uncertainty by allowing bidders to use bidding dynamics to determine whether their *ex ante* internal estimates of value were reasonable, too aggressive, or too low.

are far more difficult to manage than larger tier sizes. Not only do operators have the challenge of controlling interference from a greater number of adjacent licensees, with users on the move, there is also a far higher risk of service degradation due to hard hand offs at border areas, particularly for new competitors without the extensive network coverage of the incumbents. In light of the flexible use designation for this band, Shaw submits that an appropriate compromise would be to licence the reclaimed spectrum on a Tier 2 or Tier 3 basis.

65. Licensing this spectrum using a larger tier size would also give the Department more auction format options to choose from that would allow for a robust price discovery process, including the possibility of a combinatorial clock auction, which could otherwise be difficult to administer if the licences are divided on a Tier 4 basis.

Q11 — ISED is seeking comments on the proposed protection and notification provisions for incumbent licensees as outlined [in the Consultation Document].

66. In Shaw's view, protection and notification provisions should depend on the size of the existing licensee's deployment, not the population base of the service areas. Network deployments in the band vary across different licence areas, and in some cases, uptake of services is significant, while in other areas, very few users are served.
67. In this regard, Shaw supports ISED's proposal that the transition policy be based on a "where and when necessary" principle. We also recommend that the protection and notification provisions for incumbent licensees apply only in those service areas where there are a sufficient number of end users to justify a need for protection.

Q12 — ISED is seeking comments on alternative transition plans, or variations to the times proposed. Respondents are asked to provide a rationale for any alternative proposals.

68. Refer to Shaw's response to Question 11, above.

Q13 — ISED is seeking comments on whether the fixed and mobile equipment for LTE and 5G technologies will be able to operate with intermittent interference from radars, including cross-border interference, within the 3450–3650 MHz band and in adjacent bands

69. The ability of mobile equipment for LTE and 5G technologies to operate with intermittent interference from radars, including cross-border interference, is a complex issue. Consequently, Shaw recommends further study of the nature of potential interference, the number and distribution of interferers, the characteristics of transmitters of interferers, and other technical details. While some interference can be suppressed by current techniques, additional study is required to quantify the amount of interference that LTE and 5G can suppress in specific scenarios. Shaw is not in a position to provide substantive recommendations in this regard at this time.

THE 3800 MHz BAND (3650-4200 MHz)

Q14 — ISED is seeking preliminary comments on how to optimize the use of the 3650–3700 MHz band, including the potential use of a database access model.

70. There are various options for optimization of the use of the 3650-3700 MHz band. While use of a database access model is one option, the Department should broaden its future consultation to consider other options, including a near-term allocation to mobile service where interference would be limited, such as for indoor and underground operations. Additionally, the Department should consider issuing a moratorium on new licences in this band until a licensing process is finalized.

Q15 — ISED is seeking comments on the importance of the 3700–4200 MHz band to future FSS operations.

Q16 — ISED is seeking comments on whether unlicensed operators in the 3700–4200 MHz band should be required to submit their technical parameters to ISED to assist in frequency management.

Q17 — ISED is seeking comments on which steps Canada should take to optimize the use of the 3700–4200 MHz band in consideration of the current services being provided and the developing technologies that would permit the use of new services in this band (e.g. exclusion zones).

Q18 — ISED is seeking comments on the challenges and considerations related to the coexistence of other services, such as mobile and/or fixed wireless access, in the 3700–4200 MHz band.

71. As Shaw has noted previously, the C-band continues to be important for the operation of Fixed Satellite Service (“FSS”) in Canada.³² For example, Shaw uses this spectrum to deliver standard definition and high definition video services to consumers, particularly in underserved areas. Satellite remains the most efficient method to reach many of these areas, especially northern communities. C-band spectrum is also critical to Shaw for the reception of foreign and American video programming, as the U.S. continues to use C-band FSS for video distribution.
72. However, the Department must consider the C-band for mobile use in light of the well-documented and increasing need for mid-band mobile spectrum to fuel and support 5G development.
73. Shaw is not currently aware of any commercially available technology that will eliminate interference if C-band spectrum is shared with MSS or mobile services, but further exploration is warranted. The development of such technology and other mitigation techniques should be encouraged by policymakers, with a view towards maximizing the efficient use of this valuable spectrum. As an intermediate step towards sharing in the band, the Department should consider allowing indoor and underground mobile operations in the band.
74. Shaw supports the proposal that unlicensed operators in the 3700-4200 MHz band should be required to submit their technical parameters to ISED. To facilitate efficient

³² See comments in ISED, Consultation on the Spectrum Outlook 2018 to 2022, *Canada Gazette*, Part I, October 21, Notice No. SLPB-006-17.

management of this spectrum, it is very important to fully understand and quantify the current use of the spectrum.

75. To this end, the Department should consider taking the following multi-phase approach to optimize the use of the 3700-4200 MHz band:

(a) Phase One: Qualify and quantify current spectrum in use by identifying all unlicensed users of this band.

(i) As ISED indicates, there are unlicensed broadcast receivers that are currently being used to receive TV programming from satellites, which is then distributed over cable infrastructure. Broadcast studios also use unlicensed receivers for programming. While it is difficult to identify unlicensed receivers, Canadian broadcasters can be identified, and based on such information, receiver details determined. Some broadcast receivers are already transitioning to fibre-based technologies, and future transition plans should be identified.

(ii) As part of this phase, ISED could also require FSS earth station operators to register unlicensed earth stations (e.g., subscriber terminal earth stations) with the Department.

(b) Phase Two: Identify areas with no-interference, low interference and exclusion zones. ISED can then consider licensing spectrum in “no-interference areas” and consider transition plans for other areas.

76. Any transition of incumbent C-band users will need to ensure that satellite operations are consolidated in a portion of the band wide enough to support continued use, and all reasonable costs of relocation should be reimbursed. Appropriate protection measures for those users would also need to be developed. Fortunately, the Department should be able to leverage policy developments in other countries, as well as multilateral fora such as the World Radio Conference, to determine suitable mechanisms for coexistence.

END OF DOCUMENT