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October 26, 2020

Innovation, Science and Economic Development Canada
c/o Director, Spectrum Regulatory Best Practices
235 Queen Street (6th Floor, East Tower)
Ottawa ON K1A OH5

Re: Consultation on the Technical and Policy Framework for the 3650-4200 MHz Band and Changes to the Frequency Allocation of the 3500-3650 MHz Band; August 2020; Gazette Notice No. SLPB-002-20

The Dynamic Spectrum Alliance (the Alliance) is a global, cross-industry, not for profit organization advocating for laws, regulations, and economic best practices that will lead to more efficient utilization of spectrum, fostering innovation and affordable connectivity for all. Our membership spans multinationals, small-and medium-sized enterprises, as well as academic, research and other organizations from around the world all working to create innovative solutions that will benefit consumers and businesses alike by making spectrum abundant through dynamic spectrum sharing.[1]

The Alliance's goals are to make spectrum abundant for broadband to connect the next four billion people, stimulate wireless innovation for next generation broadband, and accelerate an inclusive digital economy. The Alliance appreciates the opportunity to respond to the invitation of Innovation, Science and Economic Development Canada (ISED) to comment on its "Consultation on the Technical and Policy Framework for the 3650-4200 MHz Band and Changes to the Frequency Allocation of the 3500-3650 MHz Band" (the Consultation).[2]

As ISED considers options for the introduction of wireless broadband services (WBS) in the 3650-4200 MHz band (3.8 GHz Band), the Alliance encourages ISED to implement Dynamic Spectrum Access (DSA) database solutions to manage sharing among new wireless broadband services

[1] A full list of Dynamic Spectrum Alliance members is available on the Dynamic Spectrum Alliance's website at www.dynamicspectrumalliance.org/members.

[2] "Consultation on the Technical and Policy Framework for the 3650-4200 MHz Band and Changes to the Frequency Allocation of the 3500-3650 MHz Band"; ISED; https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11627.html

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(WBS), as ISED has proposed in the Consultation. Adopting a spectrum sharing model for WBS in the 3.8 GHz band will enable more users to access scarce and valuable spectrum resources, leading to lower-costs, lower barriers to entry, the most effective allocation for smaller innovative businesses, farmers for agricultural connectivity, and IoT. This, in turn, enables and encourages competition and innovation by existing service providers as well as new entrants, including enterprises and verticals looking to deploy private networks.

In addition to adopting a sharing approach for WBS services in the 3.8 GHz band, we also recommend that ISED implement DSA database solutions to facilitate sharing between incumbent Fixed Satellite Service (FSS), fixed point-to-point (PTP), and WBS services. Such sharing would maximize the overall public benefit by making more efficient use of this spectrum,[3] accelerating access by new entrants, and minimizing manual coordination burdens on ISED and industry. Automated DSA solutions would also enable ISED to adopt "use-it-or-share-it" rules for new WBS services across the entire 3.8 GHz band, providing additional opportunistic access opportunities and ensuring even more efficient use of spectrum.

As ISED noted, there is increased interest in the 3.8 GHz band internationally for 5G services, particularly given the large bandwidths potentially available in this range. We encourage ISED to leverage commercially proven DSA solutions to maximize the use of this critical mid-band spectrum. There are numerous benefits that DSA technology can provide to facilitate access to this spectrum by new users and minimize the administrative burdens on both ISED and industry, including:

- Enabling incumbent FSS services to continue to use the band and/or to transition to new sub-bands, while minimizing the use of separation distances and exclusion zones
- Accelerating access to spectrum by new users during transitions
- Streamlining coordination amongst co-channel and adjacent channel users
- Minimizing the need for guardbands
- Automating industry TDD synchronization preferences
- Facilitating cross-border coordination
- Providing opportunistic access through "use-it-or-share-it" requirements.

[3] Maximizing the use of spectrum and fostering innovation for the benefit of all Canadians are key priorities for ISED as stated in the "Spectrum Outlook 2018 to 2022"; https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11403.html#s2.

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The Alliance and its member companies have extensive experience in enabling sharing of both fixed and mobile broadband services with FSS and PTP incumbents and are ready to assist ISED in its efforts to introduce WBS in this band while maintaining access for existing users. Regulators in several countries have already authorized automated, and sometimes dynamic, frequency coordination databases to manage real-time assignments in shared bands and to protect incumbent operations (including military and public safety systems) from harmful interference. These database technologies are widely available, sufficiently mature, scalable, and secure.[4]

The Alliance applauds ISED for its policy objectives of fostering investment and innovation, supporting competition, and encouraging ubiquitous broadband access. We look forward to working with ISED to implement DSA database solutions in this critical mid-band spectrum.

The remainder of our response will address the questions posed by ISED in the Consultation. Please do not hesitate to contact me for further discussions or clarifications on the subject matter.

Best regards,

Martha SUAREZ
President
Dynamic Spectrum Alliance

[4] http://dynamicspectrumalliance.org/wp-content/uploads/2019/03/DSA_DB-Report_Final_03122019.pdf

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Question 1: Timelines for the development of an equipment ecosystem using 5G technologies in the 3800 MHz band.

As ISED notes in the Consultation, the 3.8 GHz band is covered by several different 3GPP Band Classes for both 4G LTE and 5G equipment. The Band Classes for which LTE equipment is widely available from multiple vendors include:

- B42 (3400-3600 MHz)
- B43 (3600-3800 MHz)
- B48 (3550-3770 MHz)

The 5G New Radio Band Classes for which equipment is still under development include:

- n77 (3300-4200 MHz).
- n78 (3300-3800 MHz)
- n48 (3550-3700 GHz)

Many European countries have already auctioned or are soon to auction licenses in 3400-3600 MHz and 3600-3800 MHz bands, with equipment for those sub-bands recently becoming available. Europe has not yet developed a licensing approach for the 3.8-4.2 GHz band. In the U.S., the Federal Communications Commission (FCC) is preparing to start the auction of the 3700-3980 MHz band (the U.S. C-Band) in December 2020. The auction is expected to continue into the first quarter of 2021 with winning bidders announced sometime in the spring. Based on this schedule, 5G equipment for the U.S. C-Band is likely to become available from the largest vendors starting in the late 2021 to early 2022 timeframe.

4G (and soon 5G) equipment is available today on a widespread basis for Band 48, the U.S. CBRS band. In fact, there are approximately 40 different vendors currently supplying equipment for the CBRS band, making it the largest LTE ecosystem.[5] The migration from LTE to 5G in CBRS will take place starting in 2021 and will likely continue through 2022 as 5G use cases develop and mature.

[5] https://www.cbrsalliance.org/certification/

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Question 3: Difference in technical rules between the U.S. and EU could impact Canada's ability to leverage the economies of scale from the global 3800 MHz ecosystem

While there are differences between the technical rules for the 3 GHz bands in the U.S. and the European Union, each market will be sufficiently large on its own to develop an equipment ecosystem on which Canada can rely to ensure that 5G networks and services are deployed in the 3.8 GHz Band in a timely manner. That being said, there are other considerations that might impact ISED's choice of technical rules. For example, cross-border coordination will be an important and ongoing challenge for both Canadian and U.S. licensees in the 3 GHz bands. The use of automated DSA solutions, such as a Spectrum Access System (SAS) or a simplified version thereof, can be leveraged not only to facilitate sharing between incumbent FSS, fixed PTP, and WBS services, but also to coordinate cross-border operations between Canadian and U.S. 3 GHz band operators. Having technical rules that are as harmonized as closely as possible between Canada and the U.S. will also facilitate cross-border coordination and improve economies of scale for both markets.

Question 5: Developing a flexible use licensing model for fixed and mobile services in the 3650-4000 MHz band

The Alliance fully supports ISED's efforts to make additional critical mid-band spectrum available for WBS services and the adoption of licensing policies that make efficient use of the spectrum, deliver more spectrum for connectivity and broadband access, and accelerate commercialization of services. We recommend that ISED consider the benefits of shared access licensing approaches for the 3.8 GHz band, such as those adopted for the U.S. CBRS band, which includes both licensed and lightly-licensed access options within the same band, subject to the same technical requirements. Evidence of the advantages and efficacy of this licensing approach includes:

- Proceeds for FCC's Auction 105 for CBRS priority access licenses (PALs) exceeded $4.5 billion;
- An unprecedented 271 entities participated in the PAL auction; and
- An equally impressive 228 entities acquired PAL licenses, representing breadth and diversity of wireless sectors.

In addition to offering both licensed and lightly-licensed access in 3.8 GHz, as ISED has proposed, the Alliance urges ISED to implement "use-it-or-share-it" rules for the licensed portions of the band. These rules will ensure that efficient use of this critical spectrum is maximized and enable

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WISPs or smaller innovative providers to access the additional spectrum resources necessary to ensure that rural and remote Canadians do not miss out on the benefits of opening this important 5G band. Together with a streamlined secondary market leasing process, the "use-it-or-share-it" rules also provide incentives for licensees to make sure all of their spectrum resources are put to use as quickly and as widely as possible.

Question 8: Maintaining a primary allocation to FSS in the entire 3700-4200 MHz band and the proposal that existing FSS earth stations in satellite-dependent areas remain licensed in the entire 3700-4200 MHz band

As ISED looks to balance the spectrum needs of both incumbent FSS systems and new WBS operators, we recommend that ISED leverage DSA database solutions to facilitate sharing and manage the transition of FSS from one part of the band to another. Relying on DSA solutions would make more efficient use of this spectrum and minimize the administrative burdens on both ISED and industry.

In the U.S. CBRS band, sharing between new mobile and fixed broadband services and FSS earth stations has been managed for over a year using the SAS, which enables incumbent FSS services to continue to operate without interference, while minimizing the use of separation distances and exclusion zones. It will also accelerate access to spectrum by new users during any transition period for FSS systems that are moving to other bands.

In addition to protecting incumbents and maximizing efficient use of all available spectrum, the use of DSA solutions minimizes the administrative burdens of manual coordination on all stakeholders. By relying on a SAS-like automated sharing solution, interference calculations should be straightforward, especially for fixed systems where the directional nature of fixed point-to-multipoint radios permits the coordination of sectors even where earth stations are in the same geographic area, but located outside the beam of the base station and the client device return path. Any changes in the status of FSS operations can be accommodated by a requirement that WBS operations periodically contact the database to renew their grant to transmit.

Question 13: Establishing unpaired blocks of 10 MHz

The Alliance agrees with ISED that licensing the 3.8 GHz band using 10 MHz blocks is a reasonable approach that will meet the needs of both nationwide service providers looking to aggregate larger blocks and as well as smaller operators looking for smaller, less expensive license options.

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Question 14: Displacing the existing WBS licensees and designate 80 MHz of spectrum available for the development of a new shared licensing process in the 3900-3980 MHz band as described in Option 2

While the Alliance fully supports ISED's efforts to make more mid-band spectrum available to support 5G systems and to increase the amount of spectrum for lightly licensed WBS services from 50 to 80 MHz, we have concerns with the proposal to relocate the existing WBS licensees from the 3650-3700 MHz band to 3900-3980 MHz. As noted above in response to Question 1, LTE equipment is readily available from multiple sources for Band 48 and could be used now by those WBS licensees to upgrade their current systems and significantly improve connectivity for rural and remote areas across Canada. By requiring them to relocate to the 3900 MHz band, the current 3650-3700 MHz WBS licensees will be put at a significant disadvantage. Given that vendors of 5G equipment will be focused on the winners of the U.S. C-Band auction for the foreseeable future, it is unlikely that they will have the time and capacity to work with smaller licensees, such as WBS operators relocated to 3900 MHz. This will result in those WBS operators missing opportunities that exist today to improve and extend broadband services throughout Canada.

Furthermore, it is unclear whether the equipment ecosystem for the U.S. C-Band, which includes 3900-3980 MHz, will ever develop to the extent that the one for the U.S. CBRS band already has. It is more likely that the U.S. C-Band ecosystem will be developed and dominated by a handful of large vendors that typically work with the national mobile network operators. On the other hand, the ecosystem for the U.S. CBRS band already has over 40 equipment vendors that are actively working with a wide range of users in the CBRS General Authorized Access (GAA) lightly-licensed tier and can be ready to extend their support to Canada's lightly-licensed WBS operators.

Question 19: ISED is seeking preliminary comments on the future spectrum licensing process for 3900-3980 MHz

The Alliance supports ISED's efforts to introduce a lightly-licensed, shared approach for the 3900-3980 MHz band. Adopting an automated spectrum sharing model for WBS in the 3.8 GHz band will enable more users to access scarce spectrum resources, leading to lower-costs and lower barriers to entry. This, in turn, enables and encourages competition and innovation by existing service providers as well as new entrants, including enterprises and verticals looking to deploy private networks, which are then able to invest more significantly in network deployment instead

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of spectrum acquisition. The Alliance recommends that ISED consider rules similar to those adopted by the FCC for the CBRS GAA tier to manage new WBS users, minimize coordination requirements by licensees, and maximize efficient use of spectrum for as many users as possible.

Question 43: ISED is seeking comments on the proposal to rely on technical limits and coordination procedures rather than mandate specific technology solutions (e.g. TDD synchronization between systems) to address interference issues between TDD flexible use systems in the 3650-3980 MHz band.

In addition to its ability to facilitate the introduction of new services into bands occupied by other services, DSA technology is also capable of addressing the challenges associated with a lack of TDD synchronization in unpaired frequency allocations. As ISED notes, a lack of synchronization of TDD systems could lead to harmful interference and/or inefficient use of spectrum, particularly if guard bands or large separation distances are imposed. While ISED might consider mandating a particular synchronization frame to ensure compatibility among different systems, the Alliance recommends that DSA technology be used to coordinate spectrum usage amongst licensees and eliminate the need for technology mandates.

For example, the U.S. CBRS industry (through the CBRS Alliance) developed networking and coexistence specifications regarding a number of critical issues to manage sharing within the CBRS band. These specifications include cell phase synchronization, TDD configurations, GAA channelization, and SAS-CBRS device protocol extensions. By agreeing in advance to a set of preferred TDD configurations and a process for determining which configuration should be implemented, the CBRS industry greatly reduced the expense and complexity associated with peer-to-peer manual coordination and avoided the inefficiencies associated with mandatory guard bands and separation distances. In order to minimize the number of possible TDD configurations to select from, the CBRS Alliance specified two preferred configurations that represent the majority of anticipated traffic scenarios.

This industry-led approach, implemented through the use of DSA technology, has greatly simplified coordination and avoided the hazards associated with a lack of synchronization of TDD systems. The Alliance recommends that ISED consider implementing a similar approach to manage the 3.8 GHz band.

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Question 44: ISED is seeking comments on whether any additional measures should be taken to limit potential interference issues between flexible use systems in the 3650-3980 MHz band.

As mentioned above, the CBRS industry developed networking and coexistence specifications regarding a number of critical issues to manage sharing within the CBRS band – both amongst PAL licensees as well as GAA users. Similar approaches can be implemented in the 3.8 GHz band in Canada in order to minimize interference between flexible use systems. The critical component to enable such industry-led solutions, however, is the use of an automated sharing solution that is aware of the operating characteristics of the new WBS systems and uses that knowledge to automate the coexistence of different systems and users.

Question 45: ISED is seeking comments on whether specific technical measures should be adopted to address potential interference issues between flexible use systems and WBS systems until the displacement deadline.

As described in response to Question 44, the use of a DSA solution will greatly simplify coordination and facilitate coexistence between different users in the 3.8 GHz band, including between licensed and lightly-licensed WBS operators. Once protection criteria are established for licensed users and industry agrees on coexistence specifications, a DSA solution can easily manage spectrum usage, protect against interference, and minimize coordination burdens.

Question 46: Until the transition deadline, in all areas for flexible use in the 3650-3700 MHz band: ISED is seeking comments on the proposal that until the transition deadline, those flexible use licensees deploying stations in 3650-3700 MHz within 25 km of a licensed FSS earth station (not including interim FSS authorization) in the 3700-4200 MHz band will be required to coordinate with the operators in these earth stations.

As mentioned previously, the use of an DSA solution can be used to protect FSS earth stations from WBS operations without the need for set separation distances or manual coordination requirements. The U.S. CBRS rules include aggregate interference protection requirements for incumbent FSS systems from new PAL and GAA users. A similar approach can be applied to 3650-3700 MHz WBS operations in Canada, which will greatly increase the availability of spectrum for WBS operations, guarantee protections for FSS, and minimize burdens on industry.