

January 19, 2021

Innovation, Science and Economic Development Canada
c/o Senior Director, Spectrum Planning and Engineering
Engineering, Planning and Standards Branch
235 Queen Street (6th Floor, East Tower)
Ottawa ON K1A 0H5
Canada

**Re: Consultation on the Technical and Policy Framework for Licence-Exempt Use in the 6 GHz Band
November 2020 Gazette Notice No. SMSE-014-20**

Dear Senior Director, Spectrum Planning and Engineering:

Federated Wireless, Inc. (“Federated Wireless”) provides these comments in response to the Innovation, Science and Economic Development (“ISED”) “Consultation on the Technical and Policy Framework for Licence-Exempt Use in the 6 GHz Band” (“the Consultation”). Federated Wireless commends ISED for its efforts to make this critical mid-band spectrum available on a shared basis for license-exempt devices, while establishing rules and policies that will protect incumbent services. We appreciate the opportunity to share our experience in implementing automated dynamic spectrum sharing solutions in the United States in the 3 and 6 GHz bands and offer our perspectives on how this same technology can be readily deployed to meet ISED’s goals for the 6 GHz Band in Canada, including maximizing efficient use of spectrum, encouraging innovation, and supporting the rapid and widespread deployment of next generation wireless networks.

I. Background on Federated Wireless and Automated Dynamic Spectrum Sharing

Federated Wireless is a U.S.-based wireless technology company that has been certified by the U.S. Government to manage dynamic sharing of the 3550-3700 MHz band, known as the Citizens Broadband Radio Service (“CBRS”), between incumbent military and commercial uses, as well as between different tiers of commercial uses on both a licensed and unlicensed basis. Commercial services launched in September of 2019 and today there are more than 100,000 CBRS devices operating across the United States providing wireless broadband services via fixed wireless providers (“WISPs”), enterprise IT, hospitality, retail, real estate, industrial IoT, and transportation, education, among numerous other sectors.

Federated Wireless is also a prospective Automated Frequency Control (“AFC”) system administrator for the 6 GHz band in the United States. The U.S. Federal Communications Commission (“FCC”) adopted new rules last year that will permit the introduction of unlicensed devices (WiFi, 5G NR-U, etc.) to operate on a shared basis in the 5.925-7.125 GHz band.

Standard power and outdoor unlicensed devices will be required to connect to an AFC system to determine what frequencies are available for unlicensed operations. Federated Wireless has adapted our dynamic shared spectrum technology to function as an AFC for the 6 GHz band. The Federated Wireless AFC determines what frequencies are available after downloading information about incumbent services from the FCC's Universal Licensing System ("ULS"), analyzing the potential impact of unlicensed devices to incumbent operations, and determining what frequencies can be used while implementing FCC-defined protection of those incumbents. This simplified type of automated dynamic sharing can also be adapted readily to other frequency bands, other types of incumbents, and other new services, in addition to other countries including Canada.

II. Responses to ISED's Consultation Questions

Q1: ISED is seeking comments on the timelines for the availability of:

- a. low-power equipment ecosystems, both Wi-Fi 6E and 5G NR-U**
- b. standard-power equipment ecosystems, both Wi-Fi 6E and 5G NR-U, under the control of an AFC**
- c. AFC**

As mentioned above, Federated Wireless has already adapted our dynamic shared spectrum technology, which has been operating commercially for over a year in the U.S. CBRS band, to function as an AFC system in the 6 GHz band. This AFC was developed with input from the unlicensed industry, incumbents, as well as the FCC, and it has been demonstrated in multiple public fora. At this time, the availability of the Federated Wireless AFC on a commercial basis is dependent on the FCC's release of public notices relating to AFC and AFC-connected RLAN device certification. As soon as these public notices are released, Federated Wireless intends to submit a proposal describing how our system complies with the FCC's AFC rules and to work with unlicensed device manufacturers to demonstrate how their devices connect to and interact with the Federated Wireless AFC.

Q2: ISED is seeking comments on its proposals to allow licence-exempt RLAN use in the 5925-7125 MHz band.

Federated Wireless supports ISED's proposals to allow unlicensed RLAN use of the 6 GHz Band. Federated Wireless commends ISED for its efforts to make available much-needed spectrum to meet the surging demand for broadband and next-generation wireless services. In light of the ever-growing demand for broadband connectivity, it is crucial to provide additional unlicensed capacity in the 6 GHz band. Federated Wireless urges the ISED to act expeditiously to make the 6 GHz Band available for unlicensed use as broadly as possible and leverage the lessons learned in implementing other sharing regimes to ensure that the 6 GHz AFC system meets both the present and future needs of incumbent licensed and newly authorized unlicensed users.

Q3: ISED is seeking comments on the proposed footnote Cxx and the changes to the CTFA as shown in table 2.

Federated Wireless supports ISED's proposed footnote to allow unlicensed devices to access the 6 GHz Band and use of an AFC to protect incumbent services.

Q4: ISED is seeking comments on the proposed rules for standard-power RLANs:

- a. indoor and outdoor operation would be permitted**
- b. RLAN access points would only be permitted to operate under the control of an AFC system in the 5925-6875 MHz frequency range**
- c. maximum permitted e.i.r.p. would be 36 dBm**
- d. maximum permitted power spectral density would be limited to 23 dBm/MHz**
- e. use of a vertical elevation mask, with a maximum e.i.r.p. of 125 mW at elevation angles above 30 degrees over the horizon, would be required**

Federated Wireless supports ISED's proposed rules for standard power RLANs, including the requirement that standard power and outdoor devices connect to an AFC to ensure protection of incumbent services.

While Federated Wireless supports ISED's proposed rules, we also encourage ISED to consider certain changes to the rules that can be implemented by leveraging the AFC's capabilities to further increase spectrum access for new unlicensed operations namely. These recommended changes include permitting:

- 1) Higher power operations by RLANs that operate under the control of an AFC. Federated Wireless notes that the AFC is capable of offering the same level of protection to incumbents whether the RLAN is operating at the standard power levels proposed by ISED or at higher power. Unlicensed device transmit power does not need to be limited as a backstop to ensure protection of incumbents. By design, the AFC computes and resolves interference potential of unlicensed devices using information provided to it, including transmit power. Should interference occur to an incumbent, the closed loop nature of the AFC permits resolution via adjustment of operating parameters and interference protection requirements.
- 2) Consideration of RLAN antenna directivity by the AFC in computing protections for incumbents. Federated Wireless notes that the AFC can readily account for antenna directivity in its calculations. The use of directional antennas, however, may necessitate the use of professional installation in order to ensure that the information provided to the AFC is accurate.
- 3) Operation of standard power RLANs in connection with an AFC system throughout the 5925-6930 MHz band. Given that transportable TV pick-up services do not currently operate in 6875-6930 MHz, standard-power RLANs should be able to access this spectrum to provide essential broadband services. If in the future these frequencies are needed for transportable TV pick-up services, the AFC can provide RLAN devices with new instructions to avoid these channels. There is no need to limit access to spectrum that is not currently being utilized when a dynamic sharing tool, such the AFC, is capable of implementing regulatory adjustments, including protection criteria, access to specific sub-bands, etc., in near real-time.

We encourage ISED to take full advantage of the capabilities of the AFC to ensure that efficient use of the 6 GHz Band is maximized. Furthermore, Federated Wireless believes there are ways in which dynamic shared access technology can be leveraged to enforce protection of mobile users, such as transportable TV pick-up services, to open even more spectrum for new services. We would be happy to discuss such solutions with ISED at the appropriate time.

Q5: ISED is seeking comments on allowing access to the additional 100 MHz of spectrum in the 6425-6525 MHz sub-band for standard-power operation.

Federated Wireless supports ISED's proposal to permit standard-power RLAN devices connected to an AFC to access the 6425-6525 MHz band. The AFC is not limited to specific frequency bands and it can be adapted to compute protections for a wide variety of incumbents, as they exist today and as they evolve in the future. As mentioned above, Federated Wireless recommends that ISED also consider permitting RLAN devices to operate in the 6875-6930 MHz band. Should these frequencies be needed in the future for other services, the AFC can direct RLAN devices to cease operating in this part of the 6 GHz Band.

Q6: ISED is seeking comments on the equipment availability of standard-power RLANs in the 6425-6525 MHz band and the impact on the development of AFC systems for Canada due to a potential lack of international harmonization for that sub-band.

As mentioned above, use of the AFC to compute interference protection is not limited to particular frequency bands or particular incumbents. The AFC that Federated Wireless has developed can readily be adapted to include the additional 100 MHz that ISED proposes to allow standard power 6 GHz Band RLAN devices to access. Furthermore, our understanding is that standard-power RLAN devices are being designed to be capable of operating across the entire 6 GHz Band.

Q7: ISED is seeking comments on the proposed rules for low-power indoor-only RLANs:

- a. operation would be permitted indoor only across the 5925-7125 MHz band**
- b. the use of a contention-based protocol (e.g. listen-before-talk) would be required**
- c. maximum permitted e.i.r.p. would be 30 dBm**
- d. maximum permitted power spectral density would be limited to 5 dBm/MHz**

Federated Wireless notes that, while interference from low-power indoor RLAN devices is unexpected, should interference be experienced by incumbents, registration of such RLANs with an AFC could facilitate interference mitigation and resolution. Even if these devices are not required to check with an AFC for a list of available channels, having the ability to communicate with them and make adjustments to their operations in the face of interference complaints would be a prudent approach and would not be cost-prohibitively.

Q8: ISED is seeking comments on the proposed rules to allow very low-power RLAN devices:

- a. operation would be permitted indoors and outdoors across the frequency range 5925-7125 MHz band**

- b. the use of a contention-based protocol (e.g. listen-before-talk) would be required**
- c. maximum permitted e.i.r.p. would be 14 dBm**
- d. maximum permitted power spectral density would be limited to -8 dBm/MHz**

Federated Wireless has no comments on ISED's proposed rules for very low-power RLAN devices.

Q9: ISED is seeking comments on potential business models for AFC administrators to operate their AFC systems in Canada.

Federated Wireless believes that there will be several different business models that AFC administrators pursue, based on market demands, use cases, etc. These models could include one-time fees embedded in the price of the RLAN device, recurring monthly or annual per-device fees charged to an end-user or to a network operator, or AFC-related fees combined with other spectrum planning and consultation services. Providing prospective AFC administrators with flexibility on their business models should ensure that competitive approaches develop.

Q10: ISED is seeking comments on its proposal to permit the approval of multiple, third party AFC systems, taking into account the potential for the development of a sustainable market for AFC systems in Canada.

Federated Wireless supports ISED's proposal to approve multiple, third-party AFC systems. So long as all AFC systems meet the requirements for protecting incumbents, different AFC implementations should be allowed. Some AFC implementations may be designed to be very low-cost by being conservative about what spectrum channels might be available in a given location. Other implementations may seek to maximize spectrum availability by employing more sophisticated techniques that require more computational capabilities and are likely therefore to cost more to manage. So long as the ability exists for new AFC implementations to be authorized, competition amongst AFC administrators should provide the necessary motivation and opportunity for innovation and increased consumer choice.

Q11: ISED is seeking comments on potential exit strategies if the AFC administrator decides to cease operation in Canada.

Federated Wireless believes that approved AFC administrators that wish to exit the market should be required to transfer their customer data to another approved AFC system administrator to ensure that no 6 GHz RLAN devices are stranded. The FCC's rules for the transfer of data from one AFC to another may be instructive.

Q12: ISED is seeking comments on adopting an AFC system model that is harmonized to the maximum extent possible with the AFC system model being implemented in the U.S. and other international markets.

Federated Wireless agrees that harmonization with the U.S. rules for AFC operations will provide significant advantages for the Canadian market, including minimizing AFC development time and increasing speed-to-market. The use of common AFC systems may also facilitate international border coordination.

Q13: ISED is seeking comments on the implementation considerations for the operation of an AFC system, specifically:

- a. information required from licensed users**
- b. interference protection criteria for computation of exclusion zones**
- c. information required from standard-power APs**
- d. frequency of AFC update of licensee information**
- e. security and privacy requirements**

In keeping with efforts to harmonize AFC system operations in Canada with those in the United States, Federated Wireless recommends that ISED adopt rules similar to those adopted by the FCC, including those in FCC Rule Part 15.407 that include the protection criteria for incumbent services, the information RLAN devices must provide AFC systems and the frequency of such notifications, as well as security/privacy requirements.

Q14: ISED is seeking comments on any additional considerations, limits or general concerns that should be taken into account in setting detailed standards and procedures for AFC operation.

As ISED considers what detailed standards and procedures will apply to AFC operations in Canada, Federated Wireless notes that the FCC established technical rules regarding the key aspects of AFC functionality, which should be sufficient to move forward with certification without additional input from any standards organizations. Given that it did not mandate AFC-peering, there are no critical matters for interoperability for a standards body or multi-stakeholder group to address. Standards bodies, including the WinnForum and the WiFi Alliance, are currently engaged in developing AFC-device interoperability requirements. Such requirements are important, but not necessary, for AFC systems to be certified. We recommend that ISED make note of these standards development activities, but that AFC certification should not be delayed until these activities are complete.

Q15: ISED is seeking comments on its proposal to require AFC systems to protect the following types of licensed stations from standard-power APs:

- a. fixed microwave stations**
- b. fixed point-to-point television auxiliary stations**
- c. radio astronomy stations**

Federated Wireless agrees with ISED's proposal to require AFC systems to protect fixed microwave stations, fixed point-to-point television auxiliary stations, and radio astronomy stations.

Q16: ISED is seeking comments on the sample agreement related to the designation and operation of an AFC system in Canada.

Federated Wireless does not have any comments on the sample agreement.

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Q17: ISED is seeking comments on the proposed approach to incremental implementation of an AFC system in Canada.

Federated Wireless supports ISED's proposal to allow AFC administrators to offer services for certain geographic locations or frequencies. However, in order to effectively protect incumbent services, it may be necessary for AFC systems to compute calculations for incumbent services on a nationwide basis. For example, one end of a fixed link might be within or close to the geographic area the AFC system intends to serve, while the other end of the link might be located well outside of the AFC system's service area. Ensuring that all incumbent systems are adequately protected will be critical for successful sharing of the 6 GHz Band.

Q18: ISED is seeking comments on the objective to maximize the potential for synergies, where possible, in defining the technical and administrative requirements for the respective databases addressing different bands under different technical regimes.

Federated Wireless agrees that there may synergies that can be achieved by replicating the TV White Spaces administrative requirements for AFC systems. We do not believe that the technical requirements for TV White Spaces should be applied to AFC systems, however.

Respectfully submitted,
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