To: Martin Proulx
Director General
Engineering, Planning and Standards Branch
Innovation, Science, and Economic Development Canada
235 Queen Street
Ottawa, Ontario
Canada, K1A 0H5

Re: Comments of the Dynamic Spectrum Alliance on White Space Devices (WSDs) RSS-222, Issue 2 Draft 1 External, June 13, 2019

Date: August 23, 2019

COMMENTS OF THE DYNAMIC SPECTRUM ALLIANCE

Dynamic Spectrum Alliance ("DSA")[1] submits these comments to the Department of Innovation, Science and Economic Development Canada ("ISED") regarding Radio Standards Specification RSS-222, Issue 2 that sets out the certification requirements for license-exempt radio equipment operating in the TV White Spaces, known as White Space Devices ("WSDs").[2]

The Dynamic Spectrum Alliance ("DSA") welcomes the ISED's efforts to update RSS-222, Issue 2 and believes that it makes several important changes to the rules for both fixed and personal/portable WSDs, updates and streamlines the certification process, specifies the

[1] The Dynamic Spectrum Alliance (DSA) 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. Membership spans multinational companies, small- and medium-sized enterprises, academic, research, and other organizations from around the world. A full list of DSA members is available on the DSA's website at www.dynamicspectrumalliance.org/members/.

[2] *See White Space Devices (WSDs)*, Radio Standards Specification RSS-222, Issue 2, Department of Innovation, Science and Economic Development Canada (rel. June 13, 2019) ("RSS-222, Issue 2"), https://www.rabc-cccr.ca/open-consultations/rss-222-2-and-dbs-01-2/.

transition period for RSS-222, Issue 1 to take effect, and makes editorial improvements. Many of the changes harmonize Canadian and U.S. WSD rules. DSA also appreciates that some of these proposed changes can also be found in DSA's "Model Rules and Regulations for the Use of Television White Spaces."[3]

For years, DSA has engaged with regulators on multiple continents who are considering WSD authorizations. Based on our observations and experiences, we believe that RSS-222, Issue 2 also leaves certain rules in place, which if left unchanged, will limit the commercial potential of fixed WSDs for providing broadband access to unserved and underserved populations. We therefore outline several additional changes ISED should consider for RSS-222, Issue 2.

Finally, subsequent to the release of RSS-222, Issue 1 in early 2015, there have been developments in WSD technology and use cases that ISED may want to consider as it updates its rules for both WSD and the White Spaces Data Base ("WSDB"). Specifically, the DSA would like ISED to consider a new class of narrowband WSD that are intended for Internet of Things ("IoT") applications.

RSS-222-2 Rule Changes That Advance the Deployment of WSDs

The following proposed changes for fixed WSDs will improve the ability of Wireless Internet Service Providers ("WISPs") and other service providers using WSD equipment to reach unserved and underserved populations in less densely populated areas of the country. These changes include:

[3] *See* Dynamic Spectrum Alliance, Model Rules and Regulations for the Use of Television White Spaces Version 2.0 (2017), http://dynamicspectrumalliance.org/wp-content/uploads/2018/01/Model-Rules-and-Regulations-for-the-use-of-TVWS.pdf.

- Defining "less congested areas" where fixed WSDs are permitted to operate at higher radiated power levels and/or greater height above ground level.
- Authorizing bonding of contiguous and non-contiguous channels that conceptually will allow fixed WSDs to provide both broadband coverage and capacity to residents in the less densely populated parts of Canada.
- Under RSS-222, Issue 1, ISED determined the required separation distance between WSDs and licensed incumbents, assuming the WSD was always operating at its EIRP limit and height above ground level limit. The updated rules provide intermediate EIRP levels and associated conducted power limits, power spectral densities, and conducted adjacent channel emission limits for a fixed WSD operating below its conducted power, allowing for a more accurate determination of separation distance.

The proposed changes that will most impact the deployment of personal/portable WSDs are associated with geo-location—in particular, indoor geo-location. The rules changes of note are:

- Fixed and Mode II personal/portable devices must report their geo-location and geo-location uncertainty with a 95 percent confidence level when they query the WSDB for a list of available channels at their locations. While most fixed WSDs are expected to operate outdoors where the GPS geo-location method will have access to a relatively strong signal from multiple satellites, personal/portable devices are expected to operate primarily indoors, where the GPS signal doesn't penetrate far beyond a window. The rule changes make it practical to establish appropriate geographic protection zones between indoor personal/portable devices and protected incumbents.

- Given the challenges of determining the indoor location of portable devices in all three dimensions (latitude, longitude, and height) with the requisite accuracy for applications, including Enhanced 911 ("E-911"), using GPS, alternative methods for geo-location and height detection methods are being developed. If such a method were to be developed and applied to WSDs, the rule changes requires that the description of the alternate geo-location determination capability (other than GPS) be included in the test report.

ISED Should Consider Further Rule Changes in RSS-222-2

Allow professional installers to provide the height of a fixed WSD

Under Section 9.1.1—Fixed WSD Initialization, a fixed WSD shall access a white space database to determine the available channels and the corresponding maximum permitted power for each available channel, and shall be capable of providing several pieces of information to the WSDB, including its geographic coordinates and antenna height above ground level. DSA reads the draft provision to require the fixed WSDs to provide the information to the WSDB automatically.

The current generation of commercial GPS has a measurement-to-measurement variation of plus or minus 15 meters. While such variation horizontal coordinates is not critical for fixed WSDs, as the exclusion zone may slightly shift from day-to-day, it can be disastrous with respect to antenna height above ground level, if such measurement-to-measurement variations cause the WSD height above ground level to be reported as above the fixed WSD height limit.[4] For

[4] *See White Space Database Specifications*, Database Specification DBS-01, Issue 2, § 11.3.1.(i), Department of Innovation, Science and Economic Development Canada (rel. June 13, 2019) ("DBS-01, Issue 2").

systems operating close to the height-above-ground-level limit, on most days there will be a list of available channels—but on some days there may not be any available channels—simply because of GPS variation.

The U.S. Federal Communication Commission ("FCC") recognized this issue with the current generation of commercial GPS. In its March 2019 TVWS rules update, it allows for the professional installer to manually input the height above ground level for a fixed WSD.[5] DSA urges ISED to consider taking a similar approach until widely deployed commercial GPS systems become more accurate.

Find an alternative approach to the field strength limits on channel 36

In its *Decision on the Technical and Policy Framework for White Space Devices*, ISED maintained the prohibition on WSD operations on channel 37.[6] DSA believes the prohibition is due to the fact that, unlike in the U.S., Wireless Medical Telemetry Service ("WMTS") operators in Canada do not have to register the location of their facilities with a WMTS database provider, who then makes the information available to regulators and the public at large. Clearly, it is difficult for the regulator to protect WMTS receivers if it has no idea where they are located.

Short of requiring registration by WMTS operators, it is worth considering how to protect WMTS without effectively making channel 36 a taboo channel. DSA believes that a special

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5 *See Amendment of Part 15 of the Commission's Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands and Duplex Gap, and Channel 37*, Report and Order and Order on Reconsideration, 34 FCC Rcd. 1827, ¶ 9-13 (2019).

6 *See Decision on the Technical and Policy Framework for White Space Devices*, Spectrum Management and Telecommunications SMSE-003-19, Department of Innovation, Science and Economic Development Canada, Decision D.3, at 8 (2019), https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11486.html.

emissions mask for channel 36 is not likely to be a viable approach because that no WSD manufacturer will purchase a technically challenging (and likely expensive) filter to enable WDS operations on only one channel. The FCC has replaced field strength emission limits with modest separation distances between the WSD operating on channel 36 and the perimeter of the WMTS facility.[7] However, this approach would be very difficult in Canada, because ISED does not know the location of facilities with WMTS systems.

DSA's understanding is that most WMTS facilities operate in the more densely populated parts of the country. Fixed WSD operations are well-suited for less densely populated and less congested areas. Unlike personal/portable WSDs, fixed devices must register with a WSDB administrator. In lieu of the field strength emission limits, ISED might consider a manual coordination process for channel 36 for fixed devices. Service areas for rural WISPs tend to be local, and providers know the communities they service. Where channel 36 would otherwise be an available channel, ISED could require WISPs to identify any potential WMTS locations during their network design phase. WISPs can use the FCC separation distances for first adjacent channels as the guide for the manual coordination. These values are provided below. Note that the separation distances from the fixed WSD and the WMTS facility are all less than 100 meters.

EIRP Level (dBm)	**Separation Distance (meters)**
16	8
20	13
24	20
28	32
32	50
36	71

[7] *See Amendment of Part 15 of the Commission's Rules for Unlicensed Operations in the Television Bands, Repurposed 600 MHz Band, 600 MHz Guard Bands and Duplex Gap, and Channel 37*, Report and Order, 30 FCC Rcd. 9551, 9574–76, ¶ 212-214 (2015).

ISED Should Consider a New Section of Rules for Emerging Narrowband WSDs

ISED's white space rules, including the proposed changes, were developed to protect licensees from broadband fixed and personal/portable WSD operations. Narrowband or narrow-channel WSDs have, thus far, not been considered as a category of WSDs. Similar to other WSDs, narrowband WSDs can take advantage of the greater range, better penetration though common building materials, and non-line-of sight operation afforded in the UHF and VHF frequency bands. These benefits can be applied to outdoor IoT use cases in agriculture and environmental sensing.

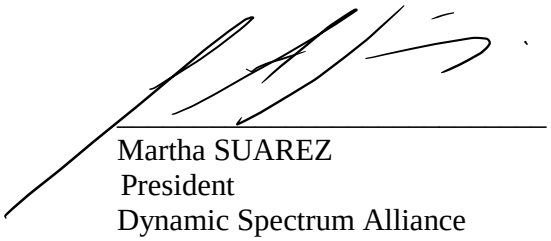
However, there are some specific technical rules that limit the commercial attractiveness of IoT operations in the TV white spaces: conducted power spectral density limits and the conducted adjacent channel limits. In RSS-222-2, Table 1, for a 6 MHz channel operating at a channel conducted power limit of 30 dBm, the channel conducted power spectral density limit is 12.6 dBm/100 kHz. But if, for example, someone wanted to operate a hypothetical narrowband IoT device at 12.6 dBm conducted power in a 100 kHz channel within the 6 MHz channel, the rules do not allow it. The 12.6 dBm conducted power signal would have to be spread out over 6 MHz. Interpolating the values in the table, the conducted power spectral density limit in 100 kHz is -4.6 dBm, which is well below a milliwatt and of limited use.

Earlier this year, Microsoft Corporation filed a Petition for Rulemaking at the U.S. FCC that included a proposal for a new section of rules to create a new narrowband class of WSDs.[8] DSA filed comments in support Microsoft's petition and supports rules that enable narrowband

[8] *See* Petition for Rulemaking of Microsoft Corporation at 15-22, ET Docket No. 14-165 (filed May 3, 2019).

IoT while protecting incumbents from harmful interference.[9] No administration has created such rules to date, and DSA invites Canada to be the first country to do so.

Respectfully submitted,



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[9] *See* Comments of Dynamic Spectrum Alliance at 9-11, ET Docket No. 14-165 (filed June 10, 2019).