

February 15, 2017

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

Re: *Canada Gazette*, Part I, November 25, 2017; 'Consultation on the Technical and Policy Framework for White Space Devices (SMSE-018-17)

Dear Sir or Madam:

The Dynamic Spectrum Alliance<sup>1</sup> (DSA) is pleased to submit these comments to Innovation, Science, and Economic Development (ISED) Canada's 'Consultation on the Technical and Policy Framework for White Space Devices' ("the Consultation").

The DSA's response to the four questions regarding white space devices channels of operation is provided below. In summary, the DSA:

- supports ISED allowing fixed white space device operations on channels 3 and 4;
- supports ISED allowing personal/portable white space devices to operate on channels 14 through 20;
- disagrees with ISED's proposal to limit white space device operations below 608 MHz, and instead supports the lifting of the moratorium and authorization for licence-exempt white space devices to share the upper 6 MHz segment of the duplex gap with licence-exempt wireless microphones; and
- disagrees with ISED's proposal to prohibit white space device operations on channel 37. Instead, ISED should permit white space devices to operate on channel 37 and protect from harmful interference the country's sole Radio Astronomy Service (RAS) facility and medical facilities operating Wireless Medical Telemetry Service (WMTS) systems through the creation of white space device-free protection zones.

Adoption of the DSA's proposals for white space devices will make for more efficient management of the spectrum and, more importantly, create greater economic opportunities for those living and working in Canada.

Additionally, the DSA would like to highlight that, in December 2017, the organization released v2.0 of 'Model Rules and Regulations for the Use of Television White Spaces'.<sup>2</sup> Version 2.0 benefits from the DSA's experience with the development of regulatory frameworks for white space devices and white space databases put in place

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<sup>1</sup> The Dynamic Spectrum Alliance is a global, cross-industry organization that includes multinational companies, small- and medium-sized enterprises, and academic, research, and other entities from around the world, all working to create innovative solutions that will increase the amount of available spectrum to the benefit of consumers and businesses alike. Further information and a full list of members are available at [www.dynamicspectrumalliance.org](http://www.dynamicspectrumalliance.org).

<sup>2</sup> *Model Rules and Regulations for the Use of Television White Spaces v2.0*, Dynamic Spectrum Alliance, December 2017. <http://dynamicspectrumalliance.org/wp-content/uploads/2018/01/Model-Rules-and-Regulations-for-the-use-of-TVWS.pdf> (visited on February 10, 2018).

by administrations on different continents. At ISED's convenience, the DSA would like the opportunity to discuss some of the ideas contained in our updated model rules and regulations and answer any questions.

***Q1. ISED is seeking comments on its proposal to harmonize with the U.S. framework regarding the operation of fixed white space devices in channels 3 and 4 (60-72 MHz).***

Under the current framework, white space devices are not allowed to access TV channels 3 and 4.<sup>3</sup> These provisions were put in place initially in both Canada and the United States out of an abundance of caution over the potential for (1) direct pickup interference by a TV receiver operating on channel 3 or channel 4, or (2) direct pickup interference to TV interface devices such as VCRs, DVRs, and cable and satellite converter boxes that have signal outputs on channel 3 or channel 4.

As the FCC acknowledged in its 2015 Report and Order<sup>4</sup> that lifted its restriction on fixed white space device operations on channels 3 and 4, much had changed with respect to televisions and television interface devices since the first white space device rules went into effect in 2008. By 2015, most U.S. consumers had replaced their analog over-the-air television receivers with digital television receivers. Digital television receivers allow the connection of external devices without requiring the use of input signal on channel 3 or channel 4. The DSA agrees with ISED's proposal to permit use of channels 3 and 4 by fixed white space devices. Where available, such action will make available up to an additional 12 MHz for use by fixed white space devices, supporting broadband access to rural and remote areas of Canada and longer-distance Internet of Things (IoT) applications.

***Q2. ISED is seeking comments on its proposal to harmonize with the U.S. framework regarding the operation of personal/portable white space devices in channels 14 to 20 (470-512 MHz).***

Today, ISED's rules do not permit use of channels 14 through 20 by personal/portable white space devices.<sup>5</sup> Personal/portable white space device operation is limited to channels 21 through 51, excluding channel 37. However, as ISED recognizes, due to the 84 MHz of spectrum recovered from broadcasters that will be made available for mobile services in the upcoming 600 MHz spectrum auction<sup>6</sup> and the repacking of displaced broadcasters, there will be a reduction in the amount of spectrum available for white spaces overall, with substantially fewer white space channels for personal/portable devices in the remaining UHF band.

To help maintain the critical mass of spectrum in local markets necessary for successful use and deployment of licence-exempt services and products, such as for enhanced Wi-Fi®,<sup>7</sup> the DSA supports ISED's proposal to remove the prohibition on personal/portable device use of channels 14-20.

In the United States, the Federal Communication Commission (FCC), in 2008 and 2010, articulated two principal reasons for limiting low-power operation below channel 21. First, the Commission noted that prohibiting personal / portable devices from operating on these channels would increase the number of channels wholly

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<sup>3</sup> Section 6.1.2, Industry Canada Radio Standards Specification 222 (RSS-22), 'White Space Devices (WSDs)', Issue 1, February 2015.

<sup>4</sup> See "In the Matter of 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", United States Federal Communication Commission, 30 Rcd. at 9584, para. 85.

<sup>5</sup> Section 6.1.2, Industry Canada Radio Standards Specification 222 (RSS-22), 'White Space Devices (WSDs)', Issue 1, February 2015.

<sup>6</sup> See 'Decision on Repurposing the 600 MHz Band', (SLPB-004-15); Industry Canada; Canada Gazette Part I, August 22, 2015, page 2215.

<sup>7</sup> Wi-Fi certification is a registered trademark of the Wi-Fi Alliance.

available for wireless microphone uses.<sup>8</sup> Second, the Commission decided to be “conservative” in protecting the private land mobile radio services (PLMRS), commercial mobile radio services (CMRS), and offshore radiotelephone services that operate in channels 14-20 in a limited number of areas.<sup>9</sup> The FCC made these policy choices against the background of the then-prevailing belief, on the part of manufacturers of personal/portable devices, that channels 21 through 51 “would provide adequate spectrum resources for their products.”<sup>10</sup>

As noted in the Consultation, in 2015, the FCC amended its rules to allow lower-power personal / portable white space devices operations to extend down to channel 14.<sup>11</sup> By then, commercial white space databases had demonstrated the ability to protect licensed operations from harmful interference. Additionally, the Commission identified new spectrum for wireless microphones to use. In parallel to this Consultation, ISED is conducting a Consultation examining additional spectrum bands for licensed- and licence-exempt wireless microphone use.<sup>12</sup>

For these reasons, including cross-border harmonization with the U.S., the DSA agrees that ISED should allow personal / portable white space devices to use channels 14-20.

***Q3. ISED is seeking comments regarding its proposal to limit the use of white space devices to spectrum below 608 MHz at this time.***

The DSA strongly disagrees with ISED’s proposal to prohibit white space device operations at frequencies above 608 MHz. The DSA urges ISED to harmonize its rules with those of the United States and permit fixed and personal / portable white space devices to:

- 1) Share the upper 6 MHz segment of the 600 MHz band duplex gap (657-663 MHz) with licence-exempt wireless microphones at up to 40 mW e.i.r.p.;
- 2) Operate between 616 and 657 MHz and between 663 and 698 MHz until such time as the 600 MHz licensee commences operations and operates in presumably rural areas on frequencies where there are multiple contiguous mobile service uplink and downlink pairs that were not auctioned – all subject to technical rules to ensure no harmful interference to the mobile service; and
- 3) Share 608-614 MHz with RAS and WMTS operations (Q4)

Low Power White Space Device Operation in the Duplex Gap

The DSA urges ISED to allow low-power white space device operations in the duplex gap. It should allow such use because: (1) The FCC determined that a 40 mW e.i.r.p. white space device will not cause harmful

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<sup>8</sup> Unlicensed Operation in the TV Broadcast Bands, ET Docket No. 04-186; Additional Spectrum for Unlicensed Devices Below 900 MHz and in the 3 GHz Band, ET Docket No. 02-380, Second Report and Order and Memorandum Opinion and Order, 23 FCC Rcd 16807, ¶ 151 (2008) (2008 Order); Unlicensed Operation in the TV Broadcast Bands, ET Dkt. 04-186; Additional Spectrum for Unlicensed Devices, Below 900 MHz and in the 3 GHz Band, ET Dkt. 02-380, Second Memorandum Opinion and Order, 25 FCC Rcd 18661, ¶ 126 (2010) (2010 Order).  
<sup>9</sup> 2008 Order at ¶ 152; 2010 Order at ¶ 126.

<sup>10</sup> 2008 Order at ¶ 152. <sup>11</sup> 2008 Order at ¶ 138 (noting that “PLMRS/CMRS operations only use one to three channels in 13 metropolitan areas and other services on those channels, such as the Offshore Radiotelephone Service, similarly operate only in a few areas”), ¶ 142.

<sup>11</sup> See “In the Matter of 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”, United States Federal Communication Commission, 30 Rcd. at 9585, para. 87.

<sup>12</sup> See ‘Consultation on the Technical, Policy and Licensing Framework for Wireless Microphones’, (SMSE-109-17); Innovation, Science and Economic Development Canada; Canada Gazette Part I, November 2017.

interference to the mobile service LTE-downlink if there is a 5 MHz guard band separating the two,<sup>13</sup> (2) It is technically feasible for licence-exempt white space devices to share a 6 MHz channel with licence-exempt wireless microphones, and (3) with the reduced amount of UHF spectrum available in many Canadian metropolitan areas after the 600 MHz auction and repacking of the displaced broadcasters, personal/portable white space devices will require channels that are available everywhere. In the U.S., these two channels are the duplex gap and channel 37. The DSA believes there is a need for ISED to do something similar for Canadian white space device users. For these reasons, the DSA urges ISED to authorize white space devices to share the upper 6 MHz segment of the duplex gap with licence-exempt wireless microphones.

#### Operation in the Reclaimed Spectrum Until the Licensee Commences Operations

The DSA's understanding is that the 600 MHz licences will provide coverage to Tier 2 service areas. While the DSA expects all the 600 MHz paired spectrum blocks will be auctioned within the 16 service areas, the DSA believes that the build-out of 600 MHz networks in the more rural and remote parts of these service areas may take several years. In the interim, there is an opportunity to use this otherwise fallow spectrum for white space device use, subject to technical rules, with spectrum access provided through a white spaces database.

The FCC's *Unlicensed Devices Report and Order* provided a mechanism by which white space devices could operate in the 600 MHz Service Band (recovered 600 MHz spectrum) during the 39-month post incentive auction transition period.<sup>14</sup> The minimum separation distances established between the white space device and the mobile uplink and mobile downlink are very conservative, and justifiably so. Once the licensee commences operations in the area, all white space devices must cease operation. ISED can adopt such an approach for Canada. Admittedly, while there is probably limited payoff to implementing this concept in more densely populated parts of the country, it may provide considerably more licence-exempt spectrum for white space device use in the less densely populated areas and thus provide significant benefits to these Canadians, and may also accelerate decisions by licensees to build out its 600 MHz network to these areas.

#### ***Q4. ISED is seeking comments on its proposal to continue to preclude the use of channel 37 (608-614 MHz) by white space devices.***

For the white spaces ecosystem to take root across Canada and create broad-based economic benefits, there needs to be sufficient UHF frequency spectrum available at every location for personal / portable white space devices to leverage the IEEE 802.11af standard that allows for the bonding and aggregation of channels.

The 600 MHz spectrum auction in Canada and the subsequent repacking of displaced broadcast television stations in the remaining broadcast television bands will reduce the amount of spectrum available for white space devices. The reduction in available white space spectrum will be most acute in metropolitan areas. The DSA considers channel 37 as spectrum that can support personal / portable white space device operations in metropolitan areas rather than providing high-power broadband access in more rural areas. As such, the DSA believes ISED can (and should) make channel 37 available for licence-exempt fixed and personal / portable white space device operations at radiated powers of up to 40 mW e.i.r.p., while protecting the Radio Astronomy Service (RAS) and Wireless Medical Telemetry Services (WMTS).

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<sup>13</sup> See "In the Matter of 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", United States Federal Communication Commission, 30 Rcd. at 9614-9617, para. 150-156.

<sup>14</sup> See "In the Matter of 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", United States Federal Communication Commission, 30 Rcd. at 9619-9628, para. 163-186.

Radio Astronomy Service

The Dominion Radio Astrophysical Observatory (DRAO) near Penticon, British Columbia is currently the only RAS facility in Canada operating on channel 37. RAS operations can be protected from receiving harmful interference by establishing a protection zone around the DRAO facility and having that information incorporated into white space databases. White space devices will not be able to operate on channel 37 if they are located within the protection zone. Protecting incumbent RAS operations at DRAO through registration in the white space database will impose no additional burden or risk on the licensee and will put otherwise fallow spectrum to productive use to the benefit of Canadians.

In the United States, there are twelve RAS telescopes that are operating on channel 37 or plan to operate on channel 37 shortly.<sup>15</sup> Ten of the RAS telescopes are stations in a very long baseline array (VLBA). Two telescopes are single dish (Puerto Rico and Green Bank, West Virginia). For the VLBA stations, assuming a 40 mW e.i.r.p. white space device, the FCC modeling determined that each of these sites receives protection due to terrain shielding that results in the size of the required exclusion zone to vary with direction. Consequently, the FCC derived a minimum and maximum protection distance depending on the bearing as measured from true north relative to the VLBA stations location. The DSA believes that ISED can use the same procedure to establish protection zones for the DRAO facility. The resulting protection zone can be incorporated either in the updated Framework or in DBS-01.

Wireless Medical Telemetry Service

In Canada, WMTS equipment operates on licence-exempt basis in the frequency bands 608-614 MHz, 1395-1400 MHz, and 1427-1429.5 MHz. ISED has no current information regarding how many WMTS systems are operating in each band and the precise location where WMTS devices operate in Canada.<sup>16</sup>

The United States Table of Frequency Allocations for the frequency range 608-614 MHz has co-primary allocation for ‘LAND MOBILE (medical telemetry and medical telecommand)’ and ‘RADIO ASTRONOMY’. Additionally, footnote US246 states that ‘No station shall be authorized to transmit in the following bands: 73-74.6 MHz, 608-614 MHz, except for medical telemetry equipment and white space devices...’.<sup>17</sup> The Canadian Table of Frequency Allocations for the frequency range 608-614 MHz reads:

RADIO ASTRONOMY  
 Mobile-Satellite except aeronautical mobile-satellite  
 (Earth-to-space)

The DSA was unable to locate any footnotes related to WMTS or medical telemetry in either the Canadian Table of Frequency Allocations (2014 edition)<sup>18</sup> or the proposed 2017 update.<sup>19</sup> Consequently, our assumption is that

<sup>15</sup> See “In the Matter of 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”, United States Federal Communication Commission, 30 Rcd. at 9644-9649, para. 222-230.

<sup>16</sup> See ‘the Consultation’ at para. 35.

<sup>17</sup> See ‘FCC Online Table Of Frequency Allocations’, 47 C.F.R. § 2.106, Revised on December 13, 2017, <https://transition.fcc.gov/oet/spectrum/table/fcctable.pdf>, FCC Office of Engineering and Technology Policy and Rules Division, page 29 (table) and page 138 (Footnote US74).

<sup>18</sup> See ‘Canadian Table of Frequency Allocations (2014 edition)’, SMSE-005-17, <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10759.html>, January 2015, page 30.

<sup>19</sup> See ‘Proposed Revisions to the Canadian Table of Frequency Allocations (2017 edition)’, SMSE-005-17, [https://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapi/SMSE-005-17-proposed-revisions-CTFA.pdf/\\$file/SMSE-005-17-proposed-revisions-CTFA.pdf](https://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapi/SMSE-005-17-proposed-revisions-CTFA.pdf/$file/SMSE-005-17-proposed-revisions-CTFA.pdf), August 2017.

Canada is relying on ITU RR 4.4 for authorizing licence-exempt use WMTS in the 608-614 MHz band. Further analysis found that WMTS systems must protect the DRAO RAS facility operating in channel 37 through an 80-km protection zone (or through coordination with DRAO within the protection zone. The DSA also notes that even though WMTS systems operate on a licence-exempt basis, the 'Licence-Exempt Radio Apparatus: Category I Equipment' (RSS-210) states that 'Operation in this [608-614 MHz] band is reserved for medical telemetry devices in hospitals and health care facilities'.<sup>20</sup>

ISED should allow low-power 40 mW white space devices to share channel 37 with WMTS systems located inside facilities. First, it is technically feasible. WMTS in individual facilities and on campuses can be protected through the creation of a protection zone. Through a robust proceeding, the FCC established such zones for U.S. WMTS facilities based on the radiated power and antenna height of white space devices.<sup>21</sup> It will require, though, the WMTS operator to register and provide the GPS coordinates of the footprint of its facility or campus to a white spaces database administrator for input to the white spaces database. As a conservative measure, the protection zone would be marked from the perimeter of the facility or campus. The cost of compliance for any given WMTS provider is minimal.

Fixed and Mode II personal / portable white space devices rely on geolocation and a white spaces database to protect a wide variety of services. The white spaces database will not provide an enabling signal to allow transmission of any white space device attempting to operate within the protection zone established around the WMTS facility. ISED should be assured that the combination of geolocation and a database works. If ISED goes forward with shared use on channel 37, it should update DBS-01<sup>22</sup> to harmonize the database requirements regarding WMTS with those in the U.S. As WMTS would be protected from white space devices, ISED might consider adding a corresponding footnote to the Canadian Table of Allocations for the 608-614 MHz band.

Finally, the DSA wants to clear up some misinformation. In paragraph 35, the Consultation states, '...white space devices operating on channel 37 could also require adjacent channel separation distances from mobile areas of operation.' The FCC spent a considerable amount of time to ensure that white space devices and WMTS systems operating on channel 37 do not cause harmful interference to the LTE-downlink in the A-block and, conversely, considering whether the LTE Downlink in the A-block would cause harmful interference to WMTS systems. The FCC determined that a 40-mW personal/portable device would not cause harmful interference to the LTE-downlink if they are separated in frequency by at least 3 MHz. In the U.S., there were concerns raised by some that, even at a 3 MHz separation, the LTE-downlink will cause interference to WMTS systems. In the U.S., WMTS system are afforded protection. In Canada, they are licence-exempt and receive no protection.

Respectfully submitted,

Kalpak Gude  
President  
Dynamic Spectrum Alliance

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<sup>20</sup> See 'License-Exempt Radio Apparatus: Category I Equipment', (RSS-210), page 17.

<sup>21</sup> See "In the Matter of 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", United States Federal Communication Commission, 30 Rcd. at 9631-9643, para. 193-220.

<sup>22</sup> See "White Space Database Specifications", DBS-01 Issue 1, Industry Canada, February 2015.