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INNOVATION, SCIENCE AND ECONOMIC
DEVELOPMENT CANADA

Notice No. SMSE-018-17

Consultation on the Technical and
Policy Framework for White Space Devices

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Comments of Microsoft Corporation

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I. Introduction and Summary

1. In this consultation, Innovation, Science and Economic Development Canada (ISED) has determined that it should reassess the regulatory framework for white space devices in light of the new 600 MHz band licensed mobile service and recent changes to U.S. white space device rules.¹ Microsoft agrees.

2. Reallocation of TV band spectrum has resulted in uncertainty over technical rules and spectrum availability for white space devices, slowing investment and hampering commercialization of white spaces technology. Now that Canada has issued its decision on repurposing the 600 MHz band and finalized its band plan for mobile service, however, it has the opportunity to provide the regulatory certainty that will enable manufacturers to bring innovative and affordable white space devices to market.

3. As ISED observes, initial applications for white spaces technologies are likely to involve “the provision of wireless broadband Internet service in rural and remote areas that are difficult to reach with other solutions.”² Microsoft agrees that white spaces will be an effective tool to expand broadband in rural communities, and also agrees with ISED that white spaces technology can provide substantial benefits to Canadians even beyond broadband connectivity, including next generation consumer networks, machine-to-machine communications, and “other innovations that haven’t yet been conceived.”³

4. But access to enough white spaces spectrum is critical to enabling the investment needed to achieve these goals. Thus, Microsoft supports the Consultation’s proposals to make additional TV band channels available for use by white space devices, and to make rules that are consistent with the U.S. regulatory framework to support economies of scale. As part of these efforts, Canada’s white space device rules should ensure that at least three usable six-megahertz channels in the UHF frequency band are available in each market nationwide in order to attract investments by chipmakers, drive economies of scale, and reduce prices sufficiently to allow widespread rural deployments.

5. Most importantly, because spectrum above 608 MHz—including channel 37 and the duplex gap separating 600 MHz uplink and downlink—contains two of these channels, ISED should not adopt its tentative conclusion to prohibit Canadians from operating white space devices on those frequencies. Instead, ISED should permit Canadian consumers and innovators access to both of these channels, as is the case for U.S. consumers and innovators.

¹ See generally SMSE-018-17, *Consultation on the Technical and Policy Framework for White Space Devices*, Canada Gazette, Part 1, Vol. 141, No. 47 (Nov. 25, 2017) (Consultation).

² Consultation ¶ 9.

³ Consultation ¶ 9.

II. ISED Should Adopt its Proposals to Make Additional TV Band Channels Available to White Space Devices.

6. Microsoft supports ISED's proposals to adopt rules harmonizing white space operations with the U.S. framework for operations on channels 3-4 and 14-20.⁴ Harmonizing spectrum use by white space devices can lead to substantial benefits for Canada.

7. As ISED explained in its *Decision on Repurposing the 600 MHz Band*, "harmonizing . . . spectrum use with the United States will facilitate Canadian access to the latest wireless devices and network technologies . . . , ensuring lower costs and wider availability of equipment."⁵ This is true because "[w]ireless equipment . . . is highly complex and is manufactured in mass quantities," and new devices accordingly "require long development cycles and significant research and development investments."⁶ Therefore, "to sustain a rapid pace of development and to leverage limited development resources, wireless technologies and products are targeted for global or regional markets."⁷ These same considerations apply to white space devices.

8. Importantly, however, ISED's sound reasoning also applies to harmonization not only for operation on frequencies in the remaining TV bands, but also for spectrum in the 600 MHz band and channel 37, which will provide essential certainty regarding spectrum availability for white space devices in every market. Thus, as discussed below, ISED should reconsider its tentative conclusions prohibiting Canadians from operating white space devices in spectrum above 608 MHz.

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).

9. ISED should adopt its proposal to permit operation of fixed white space devices in channels 3 and 4, consistent with the U.S. rules.⁸ ISED initially prohibited white space device operations on these channels in order to address potential concerns about interference risk to consumer devices, such as VCRs, that output signals on channels 3-4 as a means of connecting to television sets.⁹ As ISED observes, however, modern televisions and consumer devices no longer rely on this connection method.¹⁰ For example, Microsoft's Xbox One consoles use high-

⁴ See Consultation at Questions 1-2, ¶¶ 22-31.

⁵ SLPB-004-15, *Decision on Repurposing the 600 MHz Band* ¶ 40, Canada Gazette, Part 1, Vol. 141, No. 34 (Aug. 22, 2015) (*Decision on Repurposing the 600 MHz Band*).

⁶ *Id.* ¶ 39.

⁷ *Id.*

⁸ See 47 C.F.R. § 15.707(b).

⁹ Consultation ¶ 19.

¹⁰ *Id.*

definition multimedia interface (HDMI) cables to establish a digital connection to the user's television.¹¹ Microsoft agrees that use of channels 3-4 by white space devices is highly unlikely to result in harmful interference to modern televisions and consumer electronic devices.

10. ISED should also permit fixed white space device operation on channels 3-4 because this spectrum, used in areas where channel 2 is also vacant, will create a channel "triplet" where fixed devices can operate at their maximum permitted power level.¹² Under the existing rules, this limit is 4 W E.I.R.P. (30 dBm conducted power with up to 6 dBi of direction gain).¹³ However, as part of its review of white space device technical operating parameters that will occur at the completion of this consultation,¹⁴ ISED should enable greater transmit power for fixed devices in less congested areas, consistent with U.S. rules.¹⁵

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).

11. ISED should adopt its proposal to permit operation of personal/portable white space devices on channels 14-20.¹⁶ ISED issued the existing rules prohibiting personal/portable devices on these channels to harmonize with U.S. rules at the time, which were intended to provide an additional source of protection for land mobile operations.¹⁷

12. As ISED observes, the U.S. rules now permit personal/portable white space device operations because those devices can protect incumbent land mobile services using a white spaces database, just as fixed white space devices can.¹⁸ Moreover, there are no land mobile services in Canada operating on the frequencies that correspond to channels 14-20. Indeed,

¹¹ See Xbox, *Set up Your Xbox One Console* (explaining that each Xbox One game system typically includes an HDMI cable), <https://support.xbox.com/en-US/xbox-one/console/set-up-new-system-solution> (select Xbox One console model; follow to "Continue with Physical Setup") (last visited Jan. 31, 2017).

¹² Under U.S. rules, fixed white space devices can operate in first-adjacent channels as long as they limit power levels to 40 mW. See 47 C.F.R. § 15.712(a)(2)(ii). ISED should adopt a similar provision for first-adjacent operations in Canada as part of its review of white space device technical operating parameters that will follow this consultation. See Consultation ¶ 38.

¹³ See SMSE-007-15, RSS-222—*White Space Devices (WSDs)* § 6.2.1.2, Canada Gazette, Part 1, Vol. 149, No. 7 (Feb. 14, 2015) (RSS-222).

¹⁴ See Consultation ¶ 38.

¹⁵ See Federal Communications Commission, *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, et al.*, Report and Order, FCC 15-99, 30 FCC Rcd. 9551, 9572-73 ¶ 51 (2015) (Part 15 Report and Order).

¹⁶ See 47 C.F.R. § 15.707(a)(1) (including spectrum between 470-512 MHz in the list of permissible channels for all white space devices subject to the applicable protection criteria for incumbent operations).

¹⁷ Consultation ¶ 22.

¹⁸ See *id.* ¶ 23.

the Canadian table of frequency allocations does not even include an allocation for any service other than broadcasting in this band.¹⁹ Making this spectrum available for personal/portable white space device use will help to maximize utilization of the white spaces below channel 21.

13. In short, Microsoft agrees that harmonization of these rules will increase the likelihood that industry will be able to develop a successful equipment ecosystem in Canada.²⁰

III. Creating a White Space Ecosystem that Supports Investment in Canada Requires Access to Spectrum Above 608 MHz, Including the 600 MHz Duplex Gap and Channel 37.

14. Although Microsoft supports ISSED's proposals to enable opportunistic fixed access to channels 3-4 and personal/portable access to channels 14-20, these actions alone will be insufficient to support the investment needed for white spaces to become an effective tool for the Canadian market. This is because, in order for the development of lower-cost, mass-produced white space devices, innovators need reliable access to 18 megahertz of UHF spectrum throughout the country. If there is not enough spectrum available, white space devices will be higher-cost, specialized systems and out of reach for many Canadians, including those in rural areas.

15. As Microsoft and several other industry participants have detailed in the U.S. white spaces proceeding, three six-megahertz-wide channels must be available in each market to facilitate the mass-market adoption necessary to attract significant investment from chipmakers, drive economies of scale, and reduce prices sufficiently to allow widespread rural deployment.²¹ Similarly, the U.S. Federal Communications Commission (FCC) concluded in its 600 MHz Band *Incentive Auction Report and Order* that designating sufficient spectrum for licence-exempt use in the repurposed 600 MHz band and Channel 37 will "help to create

¹⁹ See Industry Canada Spectrum Management and Telecommunications, *Canadian Table of Frequency Allocations 2014 Edition* (rev. Jan. 2015), available at <http://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf10759.html>.

²⁰ See Consultation ¶ 24.

²¹ See, e.g., Comments of Microsoft Corporation at 3, MB Docket No. 15-146 (filed Sept. 30, 2015); Reply Comments of IEEE 802 at 4, ET Docket No. 12-268 (filed Mar. 12, 2013); Letter from Paul Margie, Counsel for Google Inc., to Marlene H. Dortch, Secretary, FCC, ET Docket No. 14-165 and GN Docket No. 12-268 (filed June 2, 2015); Reply Comments of Microsoft Corporation at 3, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 25, 2015); Comments of Google Inc. at 51, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 4, 2015); Comments of Microsoft Corporation at 2, ET Docket No. 14-165 and GN Docket No. 12-268 (filed Feb. 4, 2015); Letter from Paul Margie, Counsel for Broadcom Corporation, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed Sept. 25, 2014); Letter from Paul Margie, Counsel for Google Inc. and Microsoft Corporation, to Marlene H. Dortch, Secretary, FCC, GN Docket No. 12-268 (filed Sept. 19, 2014); Letter from S. Roberts Carter, Counsel for Broadcom Corporation, to Marlene H. Dortch, Secretary, FCC, at 1, GN Docket No. 12-268 (filed Apr. 23, 2014). These filings are available through the FCC's Electronic Comment Filing System, <https://www.fcc.gov/ecfs/>.

certainty for the unlicensed industry, thereby promoting greater innovation in new devices and services, including increased access for broadband services across the country.”²²

16. These same considerations apply with even greater force in Canada, where the overwhelming majority of the population resides in urban areas where reliable access to three six-megahertz channels in the remaining TV band spectrum alone is not guaranteed. ISED should therefore not adopt its tentative conclusion to confine the use of white space devices to spectrum below 608 MHz, and instead create rules permitting operation in these frequencies.

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

17. ISED has concluded that it is important to harmonize wireless device rules with U.S. requirements to drive investment and economies of scale. For this same reason, ISED should enable white space devices to operate in spectrum above 608 MHz, including in the upper six megahertz of the duplex gap (652-663 MHz) separating the uplink and downlink bands for the 600 MHz service.²³ The U.S. rules enable white space operations in this six megahertz-portion of the duplex gap, and also permit opportunistic use of other 600 MHz band spectrum in areas where 600 MHz licensees have yet to commence operations.²⁴

18. As ISED recognizes, existing white spaces technology would enable Canada to implement a similar technical framework for operations in these bands.²⁵ However, ISED tentatively concludes that it should limit white space devices to spectrum below 608 MHz because the spectral environment for opportunistic white space spectrum use is more stable in the remaining TV band, and because significant spectrum will be available for white space operations in remote areas.²⁶

19. While Microsoft agrees with ISED that television station relocation and deployment of mobile services will result in some substantial changes to 600 MHz band availability for licence-exempt use, this should not serve as an impediment to white space operations above 608 MHz. Indeed, the 600 MHz band contains the *most stable* frequency potentially available for personal/portable white space devices: the six-megahertz channel between 657-663 MHz in the duplex gap. Canada has adopted the 600 MHz band plan nationwide. Thus, if ISED harmonizes its rules with the U.S. to enable duplex gap operations, chip makers, equipment

²² Federal Communications Commission, *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Report and Order, FCC 14-50, 29 FCC Rcd. 6567, 6683 ¶ 264 (2014) (Incentive Auction Report and Order).

²³ As discussed in greater detail in response to Question 4, ISED should also enable access to channel 37, which is located above 608 MHz.

²⁴ 47 C.F.R. § 15.707(a)(4)-(5).

²⁵ Consultation ¶ 28.

²⁶ *Id.* ¶ 29.

manufacturers, and network operators will have certainty that one of the three channels necessary to enable widespread white space use will be available in every market.

20. Nor is it the case that a less stable spectrum environment should preclude opportunistic use of other portions of the 600 MHz band by white space devices during the multi-year transition from television to licenced mobile operations,²⁷ or potential opportunistic use in less densely populated portions of the 600 MHz Tier 2 licensee's coverage area until such time as the licensee commences operations in that area. The FCC conducted a consultation to define 'commence operations.'²⁸ ISED can take up this question in its future proceeding to review TVWS device and white spaces database rules.²⁹ Generally speaking, as ISED recognizes, "the development of an appropriate protection area around mobile service deployments could be established through technical rules in the white space database," just as it has in the U.S.³⁰ Because the Radio Standards Specifications (RSS) for white space devices for fixed and mode II personal/portable white space devices contemplate that these devices will contact a white space database at least once a day,³¹ the existing framework for white space device operations can easily accommodate white space operations during the years of transition and beyond, enabling Canadians to put to productive use spectrum that would otherwise lie fallow.

21. Finally, while ISED is correct that a significant amount of spectrum will be available for white space devices in remote areas, the success of white spaces in Canada depends on reliable access to at least a minimal amount of spectrum in urban areas in order to create a market for white space devices. As set forth above, chipmakers and device manufacturers simply won't be able to leverage economies of scale to create affordable white space devices for a jurisdiction if there is not enough spectrum to support device operations in more densely populated areas.³² This is especially true in Canada, where an overwhelming percentage of the population—81 percent as of the 2011 Census—lives in urban rather than rural areas.³³

22. Moreover, as ISED has recognised elsewhere, "the majority of the Canadian population resides close to the Canada-US international border."³⁴ This is likely to have a significant impact on white space spectrum availability in the remaining TV band at the conclusion of the

²⁷ *See id.*

²⁸ Federal Communications Commission, *Expanding the Economic and Innovation Opportunities of Spectrum Through Incentive Auctions*, Report and Order, FCC 15-140, 30 FCC Rcd. 12025 (2015) (Commencing Operations).

²⁹ *See* Consultation ¶ 38.

³⁰ *See id.*

³¹ *See* RSS-222 §§ 8.1.3, 8.2.5.

³² *See supra* note 22 and accompanying text.

³³ Government of Canada, *Population, Urban and Rural, by Province and Territory (Canada)*, <http://www.statcan.gc.ca/tables-tableaux/sum-som/I01/cst01/demo62a-eng.htm> (last modified Feb. 4, 2011).

³⁴ Decision on Repurposing the 600 MHz Band ¶ 41.

television repack, since the Canadian White Space Database Specifications include protection criteria for U.S. broadcast stations and receive sites.³⁵

23. Microsoft is keenly focused on factors that lower the cost of white spaces technologies since the obstacle to serving rural areas has generally been the high cost involved in deploying broadband networks in these areas. Because affordability is key to the success of white spaces technologies in connecting rural areas, it is essential that sufficient spectrum be available nationwide for use on a licence-exempt basis. Without access to spectrum above 608 MHz, including access to spectrum in the 600 MHz duplex gap, there is simply no way to provide a viable market that will encourage deployment of widespread, affordable white space devices in Canada.

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

24. In addition to authorizing white space operations above 608 MHz in the duplex gap and on an opportunistic basis, ISED should enable white space devices to operate on channel 37, subject to reasonable rules to protect incumbent radio astronomy and licence-exempt wireless medical telemetry systems (WMTS) deployed in healthcare facilities. Doing so will provide access to an additional important, stable channel for white space device operations in the spectrum-constrained environments where many Canadians live.

25. As the Consultation recognizes, “Canada and the U.S. have similar [incumbent] users that operate on channel 37.”³⁶ Consideration of the analysis of channel 37 in the U.S. is therefore appropriate. In the U.S., the FCC determined that the public interest supported authorizing channel 37 for white space operations because (1) repurposing TV band spectrum for other uses would “reduce the number of channels available for [white space device] use”; (2) “authorizing the use of channel 37 for unlicensed operations will make additional spectrum available for unlicensed devices on a nationwide basis, thereby advancing [the] goal of promoting innovation in new unlicensed devices”; and (3) white spaces databases will provide reliable protection for WMTS incumbents at fixed locations, just as they do for other fixed operations.³⁷ These same considerations apply in Canada.

26. With respect to radio astronomy, ISED notes that these operations occur in the U.S. at “specific and known sites, which the [white space database] protects through minimum separation distances” from transmitting white space devices.³⁸ ISED can adopt the same

³⁵ See SMSE-007-15, *DBS-01—White Space Database Specifications* § 17.2, Canada Gazette, Part 1, Vol. 149, No. 7 (Feb. 14, 2015).

³⁶ Consultation ¶ 35.

³⁷ Incentive Auction Report and Order ¶¶ 276-77.

³⁸ Consultation ¶ 35.

approach to protect the Dominion Radio Astrophysical Observatory in Penticton, British Columbia, which is the only radio astronomy facility in Canada that uses channel 37.

27. With respect to WMTS, the Consultation suggests that enabling white space device operations on channel 37 would impose additional regulatory burdens on Canadian WMTS facilities relative to those in the U.S. because the U.S., unlike Canada, already requires WMTS users to register with a frequency coordinator.³⁹ However, the U.S. white spaces rules do not contemplate querying the frequency coordination database to protect WMTS facilities.

28. As the FCC has explained, the existing frequency coordination database does not reliably include “the geographic location for each facility where a WMTS network is installed, nor does it have the coordinates that define the perimeter of each facility.”⁴⁰ Indeed, the U.S. white spaces rules specifically designate WMTS facilities as “[f]acilities that are not recorded in Commission databases,” and therefore must be registered with a white space database to receive protection from harmful interference.⁴¹ This registration is not burdensome or complicated, requiring only the submission of basic information, including contact information and the latitude/longitude of the coordinates that define the facility’s perimeter.⁴²

29. Canada is experiencing skyrocketing demand for both licensed and licence-exempt spectrum.⁴³ In this environment, it is more than reasonable to expect a WMTS entity to spend a few minutes submitting readily ascertainable information in order to receive an extraordinarily valuable spectrum right—protection from harmful interference—even though they did not obtain their licence through an auction.

30. Finally, ISED is concerned that “protect[ing] adjacent channel mobile operations would present further technical challenges” associated with channel 37 use by white space devices.⁴⁴ As ISED recognizes, however, a three-megahertz guard band from 614–617 MHz now separates channel 37 from 600 MHz mobile downlink spectrum, just as it does under the U.S. band plan.⁴⁵ This three-megahertz guard band exists to protect incumbent operations on channel 37 from interference by mobile downlink transmissions.⁴⁶ Significantly, however, the FCC determined

³⁹ See *id.*

⁴⁰ Part 15 Report and Order ¶ 248.

⁴¹ See 47 C.F.R. § 15.713(b)(2)(iv).

⁴² See 47 C.F.R. § 15.713(j)(11).

⁴³ See, e.g., SLPB-006-17, *Consultation on the Spectrum Outlook 2018 to 2022* ¶ 36, Canada Gazette, Part 1, Vol. 151, No. 42 (Oct. 21, 2017) (“Canada will experience a substantial increase in demand for commercial mobile data in the coming years”); *id.* ¶ 56 (predicting “growing demand for spectrum in the licence-exempt bands, largely due to the growth of Wi-Fi devices seeking higher speeds and performance, and the potential volume of IoT devices”).

⁴⁴ See Consultation ¶ 35.

⁴⁵ See *id.*

⁴⁶ See Part 15 Report and Order ¶ 106.

that this same guard band “also would protect wireless downlink services from harmful interference from white space devices operating on channel 37.”⁴⁷ ISED can similarly enable white space device operations on channel 37 while ensuring protection for mobile downlink transmissions by excluding 614-617 MHz from the permissible channels for white space operations, consistent with white space rules in the U.S.⁴⁸

IV. Conclusion

31. If ISED adopts rules that provide Canadian consumers and innovators with sufficient spectrum, white space devices will serve as a powerful tool to expand broadband access and next-generation services in rural and urban communities. For the reason stated above, Microsoft therefore respectfully requests that ISED adopt its proposals to permit white space operations on channels 3-4 and 14-20 consistent with U.S. rules, and also permit white space devices to access spectrum above 608 MHz, including channel 37 and the 600 MHz duplex gap.

Respectfully submitted,



Michael Daum
Director of Technology Policy,
Privacy and Regulatory Affairs,
Corporate, External, and Legal Affairs
Microsoft Corporation

⁴⁷ *Id.*

⁴⁸ See 47 C.F.R. § 15.707(a)(6).