BEFORE INDUSTRY CANADA

IN THE MATTER OF

CANADA GAZETTE, PART 1, NOTICE NO. SLPB-001-17 CONSULTATION ON RELEASING MILLIMETRE WAVE SPECTRUM TO SUPPORT 5G

COMMENTS OF WI-FI ALLIANCE

AUGUST 4, 2017

1.0 INTRODUCTION AND BACKGROUND

1.1 On June 5, 2017, Innovation, Science and Economic Development Canada ("ISED" or the "Department") issued Notice No. SLPM-001-17 seeking input on the release of millimeter wave (mmWave) spectrum in the 28 GHz, 37-40 GHz, and 64-71 GHz bands to support the deployment of 5th generation (5G) wireless networks and systems.[1/] Wi-Fi Alliance®[2/] applauds ISED's actions to prepare for the deployment of 5G. As ISED notes, other administrations have begun to adopt rules that make this spectrum available. ISED evaluation of these issues now will allow Canada to keep pace with those efforts and ensure that Canadians have the benefits that will be associated with technologies optimized for use in the mmWave bands.

1.2 Wi-Fi Alliance is a global, non-profit industry association of over 700 leading companies from dozens of countries devoted to connecting everyone and everything everywhere. With technology development, market building, and regulatory programs, Wi-Fi Alliance has enabled widespread adoption of Wi-Fi® worldwide, certifying thousands of Wi-Fi products each year. The mission of Wi-Fi Alliance is to provide a highly effective collaboration forum for Wi-Fi matters, grow the Wi-Fi industry, lead industry growth with new technology specifications and programs, support industry-agreed standards, and deliver greater product connectivity through interoperability, testing, and certification. As it has in other spectrum bands, Wi-Fi Alliance expects to be closely involved in the development of connectivity protocols for the

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1/ *Notice No. SLPM-001-17 – Consultation on Releasing Millimetre Wave Spectrum to Support 5G*, Canada Gazette, (June 5, 2017) ("*Consultation*").

2/ Wi-Fi®, the Wi-Fi logo, the Wi-Fi CERTIFIED logo, Wi-Fi Protected Access® (WPA), WiGig®, the Wi-Fi Protected Setup logo, Wi-Fi Direct®, Wi-Fi Alliance®, WMM®, Miracast®, and Wi-Fi CERTIFIED Passpoint® , and Passpoint® are registered trademarks of Wi-Fi Alliance. Wi-Fi CERTIFIED™, Wi-Fi Protected Setup™, Wi-Fi Multimedia™, WPA2™, Wi-Fi CERTIFIED Miracast™, Wi-Fi ZONE™, the Wi-Fi ZONE logo, Wi-Fi Aware™, Wi-Fi CERTIFIED HaLow™, Wi-Fi HaLow™, Wi-Fi CERTIFIED WiGig™, Wi-Fi CERTIFIED Vantage™, Wi-Fi Vantage™, Wi-Fi CERTIFIED TimeSync™, Wi-Fi TimeSync™, Wi-Fi CERTIFIED Location™, Wi-Fi CERTIFIED Home Design™, and the Wi-Fi Alliance logo are trademarks of Wi-Fi Alliance.

mmWave bands. In fact, as outlined further below, Wi-Fi Alliance has already developed "WiGig" protocols for use in those bands.[3/] Accordingly, Wi-Fi Alliance is interested in ISED's potential release of mmWave spectrum in Canada.

1.3 As ISED has noted, wireless connectivity is driving demand for new services, technology, and consequently, spectrum.[4/] 5G technologies that use mmWave spectrum will help meet that demand. ISED correctly observes that forecasted use-cases for 5G include enhanced, ultra-fast mobile broadband, massive machine type communications, and ultra-reliable/low latency communications.[5/] Wi-Fi is already a critical tool for enabling these connections. It facilitates access to the Internet and can be deployed at relatively low costs, supporting carrier off-loading and individual use. Hundreds of millions of people rely on Wi-Fi every day and studies show this is increasing rapidly.[6/]

1.4 The new and emerging applications and industry verticals that ISED notes will be supported by future 5G mmWave networks will similarly rely on Wi-Fi. For example, enhanced, ultra-fast mobile broadband will become the standard in residential and commercial wireless Internet connections, allowing high-definition video streaming. Machine-to-machine communications, the backbone of the Internet of Things ("IoT"), will be carried largely on licence-exempt devices at homes and businesses across Canada. And ultra-reliable/low latency communications will enable groundbreaking applications like virtual reality and augmented reality.

3/ *See, Wi-Fi Alliance, Discover Wi-Fi Certified WiGig*, available at http://www.wi-fi.org/discover-wi-fi/wi-fi-certified-wigig.

4/ *Consultation* at ¶ 7.

5/ *Consultation* at ¶ 8.

6/ *See* Wi-Fi Alliance, *Additional unlicensed spectrum needed to deliver future Wi-Fi® connectivity*, Feb. 27, 2017, available at https://www.wi-fi.org/news-events/newsroom/additional-unlicensed-spectrum-needed-to-deliver-future-wi-fi-connectivity.

1.5 Licence-exempt operations are able to work side-by-side with licenced 5G networks to perform many of these tasks, with existing or forthcoming standards which equal or exceed 5G's performance standards. WiGig, the branding used for Wi-Fi products operating in mmWave bands, will apply much of the same technology used in mobile wireless 5G networks to licence-exempt products. These Wi-Fi products are able to offer reliable access and gigabit throughputs by using 80 megahertz channels and Multiple Input, Multiple Output ("MIMO") technologies, mirroring the high data rates and low latency offered by other 5G technologies. This makes Wi-Fi a key component in new 5G mobile networks operating in any band, including mmWave spectrum. Therefore, as Canada considers how to facilitate the deployment of 5G wireless technologies through the release of mmWave spectrum, it should keep in mind that licence-exempt spectrum on which Wi-Fi operates will be an essential part of the 5G ecosystem just as it is part of today's wireless and wireline networks.

1.6 While the Consultation appropriately focuses on releasing spectrum above 24 GHz for 5G, ISED should recognize that 5G will operate in other bands as well. Propagation characteristics of spectrum bands differ and access to low, high and mid-band spectrum is important to support 5G networks. As noted above, IoT applications already use low band licence-exempt spectrum. While mid-band 5 GHz licence-exempt bands may carry some mid-band 5G traffic, as Wi-Fi Alliance notes below, more spectrum is needed to meet mid-band needs. Therefore, as it considers releasing mmWave spectrum for 5G, ISED should be mindful of opportunities to open up other bands for licence-exempt 5G operations like Wi-Fi.

2.0 QUESTION 4-1: GIVEN THE DISRUPTIVE NATURE OF 5G, WILL NEW BUSINESS MODELS AND NETWORK APPLICATIONS DEVELOP THAT MAY REQUIRE POLICY AND REGULATORY CONSIDERATION FROM ISED? PLEASE DESCRIBE POTENTIAL NEW BUSINESS MODELS AND NETWORK APPLICATIONS AS WELL AS THEIR BENEFITS TO CANADIANS.

2.1 Wi-Fi Alliance agrees that the new business models and network applications that become available as a result of the deployment of 5G networks may require policy and regulatory consideration from ISED. For example, uses for the 57-71 GHz band, including WiGig applications, continue to grow and the FCC's designation of the 64-71 GHz band for unlicensed use[7/] will further spur development in those bands. International standards organizations are also actively developing standards which will allow for new use-cases for the next generation of WiGig devices, including wearables, backup inter-rack connectivity for data centers, and mass video or data distribution to devices in classrooms, exhibition halls, or airplane or train cabins.[8/]

2.2 Similarly, these bands are well suited to new "hotspot" uses, whereby a licence-exempt device provides 5G access to a large number of users operating in a small area without producing the same stress on the mobile networks. Exciting new technologies like augmented reality and virtual reality operations are extremely well-suited to these bands because of their low-latency, high-throughput propagation characteristics.[9/]

7/ *In the Matter of the Use of Spectrum Bands Above 24 GHz for Mobile Radio Services*, Report and Order and Further Notice of Proposed Rulemaking, FCC 16-89 at ¶ 125 (rel. Jul. 14, 2016).

8/ *See* IEEE 802.11 TGay Use Cases (IEEE 802.11-2015/0625r3), at 7-12 (Sept. 2015), available at https://mentor.ieee.org/802.11/dcn/15/11-15-0625-03-00ay-ieee-802-11-tgay-usage-scenarios.pptx.

9/ CTIA, *High Band Spectrum: The Key To Unlocking the Next Generation of Wireless*, Jun. 13, 2016, available at https://www.ctia.org/docs/default-source/default-document-library/5g-high-band-white-paper.pdf (noting that "high-band spectrum's wider channel bandwidth and ultra-low latency hold the promise of enabling and supporting" VR and AR operations).

2.3 Several 802.11ad devices, which are part of the WiGig brand of devices, are already available for this spectrum, and would be able to take advantage of additional frequencies as soon as they are made available.[10/] The 802.11ay standard, which is an evolution of the 802.11ad standard that is expected to be finalized in 2019, will allow for the bonding of up to four 2.16 gigahertz-wide channels, allowing a transmission rate of over 20 Gbits/s,[11/] allowing for a fully wireless experience that may finally eliminate the need for wired Ethernet connections.[12/] WiGig technology will operate seamlessly with the forthcoming 802.11ax standard – which will provide major enhancements to existing Wi-Fi operations in the 2.4 GHz and 5 GHz bands[13/] - enabling devices to operate in multiple bands at once. The combination of these different spectrum bands has the potential to revolutionize many Wi-Fi applications. Wi-Fi Alliance therefore applauds ISED for taking a proactive approach to this regulatory challenge by potentially releasing mmWave spectrum over which these operations will occur.

2.4 In addition, as in the current 4G environment, Wi-Fi plays a crucial role both as a stand-alone network architecture and as a way of off-loading traffic from wireless and wireline networks. It is now the primary means by which traffic connects to the Internet and can be

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10/ *See*, e.g., *NetworkWorld, FAQ: What is 802.11ad wireless technology?* Sept. 27, 2016, available at http://www.networkworld.com/article/3124911/mobile-wireless/faq-what-is-802-11ad-wireless-technology.html.

11/ See, *IEEE P802.11 Task Group ay, Status of Project IEE 802.11ay*, available at http://www.ieee802.org/11/Reports/tgay_update.htm. *See also*, NetworkWorld, *FAQ: What is 802.11ay wireless technology?*, Mar. 28, 2017, available at http://www.networkworld.com/article/3184827/wi-fi/faq-what-is-80211ay-wireless-technology.html.

12/ *See*, Gigabit Wireless, *IEE 802.11ay wireless technology: Next-gen 60 GHz Wi-Fi*, Mar. 31, 2017, available at http://www.gigabit-wireless.com/gigabit-wireless/ieee-802-11ay-wireless-technology-next-gen-60ghz-wifi/.

13/ *See, IEEE P802.11 Task Group ax, Group Information Update*, available at http://www.ieee802.org/11/Reports/tgax_update.htm.

deployed at relatively low cost.[14/] Cisco estimates that 60% of total worldwide mobile data traffic was offloaded onto Wi-Fi in 2016.[15/] Both of these numbers will likely grow as data traffic growth outpaces the growth of wireless network capacity, meaning that Wi-Fi will be even more important as part of the 5G infrastructure than it is of current networks.

3. 0 QUESTION 7-1: ISED IS SEEKING COMMENTS ON THE PROPOSAL TO IMPLEMENT FLEXIBLE USE LICENSING IN THE FREQUENCY BAND 37-40 GHZ, INCLUDING THE CONSEQUENTIAL CHANGES TO CTFA FOOTNOTE C51, WHILE CONTINUING TO ALLOW FOR FIXED-SATELLITE SERVICE (SPACE-TO-EARTH) IN THE BAND.

3.1 ISED appropriately refers to the FCC's work in developing its plan for the use of the 37-37.6 GHz band.[16/] In the U.S., Wi- Fi Alliance has urged the FCC to permit use of the 37-37.6 GHz band on a licence-exempt basis and to not encumber the band with complicated access mechanisms, such as dynamic access systems, but to instead allow device-based contention mechanisms on master devices, as in other bands designated for licence-exempt operations spectrum.[17/] It also urged that licence-exempt devices operating in this spectrum not be required to be operable across all frequencies in the full 37-40 GHz band,[18/] where licensed operations will also be permitted in the U.S.

14/ CISCO, *VNI Complete Forecast Highlights Tool*, North America, United States, Wired Wi-Fi and Mobile Growth (2016), http://www.cisco.com/c/m/en_us/solutions/service-provider/vni-forecast-highlights.html (select "United States" from the "North America" drop-down menu, select "2020 Forecast Highlights" and expand "Wired Wi-Fi and Mobile Growth.").

15/ CISCO, V*isual Networking Index: Global Mobile Data Traffic Forecast Update, 2016-2012 White Paper*, Executive Summary, Mar. 28, 2017, available at http://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/mobile-white-paper-c11-520862.html.

16/ *Consultation* at ¶ 10.

17/ *See, Comments of Wi-Fi Alliance,* GN Docket No. 14-177 (Jan. 27, 2016).

18/ *Id.*

3.2 However, as ISED recognizes,[19/] the U.S. continues to consider the future designation of this band and it is appropriate to harmonize the use of the spectrum between the U.S. and Canada when there is a decision in the future. To the extent that the U.S. makes the 37-37.6 GHz band available for licence-exempt operations, Wi-Fi Alliance urges ISED to make the band available consistent with the above parameters.

4 QUESTION 8-1: ISED IS SEEKING COMMENTS ON ITS PROPOSAL TO DESIGNATE THE BAND 64-71 GHZ FOR LICENCE-EXEMPT OPERATIONS ON A NO-PROTECTION, NO-INTERFERENCE BASIS.

4.1 As ISED notes, there is strong interest in licence-exempt wireless devices for a variety of different uses.[20/] While many are non-communications devices (such as radar), most, like Wi-Fi, enable short-range wireless connections between devices and the Internet, applications which, as noted above, are expected to skyrocket in the coming years. Wi-Fi Alliance therefore strongly supports ISED's proposal to designate the band 64-71 GHz for licence-exempt operations. Nevertheless, the applications that will use the spectrum are much broader than ISED notes, as discussed above.

4.2 As ISED notes, the U.S. has opened the entire 64-71 GHz band for unlicensed operations.[21/] This allows unlicensed operations such as Wi-Fi to operate between 57 GHz and 71 GHz in the United States. India has also considered opening this spectrum up to unlicensed operations,[22/] and Wi-Fi Alliance has encouraged Singapore to do so as well.[23/] The more

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19/ *Consultation* at ¶ 54.

20/ *Consultation* at ¶ 69.

21/ *See, supra,* note 15.

22/ *See Consultation Paper on Proliferation of Broadband Through Wi-Fi Networks*, Consultation Paper No. 14/2016, at 1 (2016), available at http://www.trai.gov.in/Content/ConDis/20782_11.aspx.

23/ *See Comments of Wi-Fi Alliance* in response to Infocomm Media Development Authority of Singapore, 5G Mobile Services and Networks, Consultation Paper (rel. May 23, 2017), available at https://www.imda.gov.sg/~/media/imda/files/inner/pcdg/consultations/consultation%20paper/public%20c

countries which do so, the greater the benefits to consumers in those countries as manufacturers develop more and more products for the spectrum. ISED should therefore take similar action and allow licence-exempt operation in all of these bands, since, as it pointed out in the *Consultation*, there are no existing or authorized operations in the 64-71 GHz band, and the designation of this band for licence-exempt operations will have no impact on any incumbent services.[24/]

4.3 It is important that licence-exempt operations be allowed not only in the 57-64 GHz band, an action ISED has already taken,[25/] but also in the 64-71 GHz band, since oxygen attenuation is less severe in the 64-71 band than in the 57-64 GHz band.[26/] This means that permitting unlicensed operations in the 64-71 GHz band would open the opportunity for new end-user applications operating over longer distances than in the 57-64 GHz band alone.

4.4 ISED should make the spectrum available now, to ensure that Canadians can benefit from the technology already available, and being developed, for the band. ISED has correctly referred to the FCC's rules on licence-exempt devices operating in the 57-71 GHz bands as a model for how its own rules on licence-exempt operations in this spectrum.[27/] This would allow Canadian consumers, like their counterparts in the US, to take advantage of economies of scope and scale which allow manufacturers to design and market products which utilize the entirety of the 57-71 bands.

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onsultation%20on%205g%20mobile%20services%20and%20networks/5g%20mobile%20services%20and%20networks-wi-fi%20alliance.pdf?la=en.

24/ *Consultation* at ¶ 73.

25/ *Consultation* at ¶ 74.

26/ *See Use of Spectrum Bands Above 24 GHz For Mobile Radio Services*, Notice of Proposed Rulemaking, 30 FCC Rcd. 11878 ¶ 310 (Oct. 23, 2015).

27/ *Consultation* at ¶ 74.

5 QUESTION 9-1: ISED IS SEEKING COMMENTS ON: A. WHETHER FLEXIBLE USE ACCESS IN THESE BANDS SHOULD BE EXCLUSIVELY LICENCED OR LICENCE-EXEMPT; B. IF A LICENCING APPROACH IS PROPOSED, WHICH TYPES OF LICENCES (RADIO LICENCES, SPECTRUM LICENCES WITH USER-DEFINED LICENCE AREAS, SPECTRUM LICENCES WITH SERVICE AREAS FOR COMPETITIVE LICENSING, OR OTHERS) ARE EXPECTED TO BEST LEND THEMSELVES TO LICENSING FLEXIBLE USE IN THE 28 GHZ AND 37-40 GHZ FREQUENCY BANDS IN ORDER TO SUPPORT A VARIETY OF 5G TECHNOLOGIES, APPLICATIONS AND BUSINESS CASES? AND C. WHETHER A LICENCE-EXEMPT DYNAMIC ACCESS USING DATA BASE SHOULD BE IMPLEMENTED IN ALL, OR PORTIONS OF THE 28 GHZ, 37-40 GHZ, PARTICULARLY IN THE BAND 37-37.6 GHZ.

5.1 As discussed above, Wi-Fi Alliance supports allowing licence-exempt operation in the 37-37.6 GHz and 64-71 GHz bands. Device-based contention mechanisms are the ideal method of sharing spectrum as they are a proven solution and do not complicate or increase the cost of device design and manufacturing. The global success of Wi-Fi demonstrates that such methods are an effective way of ensuring that congested spectrum operates efficiently, protecting incumbent users while allowing shorter-range and lower-power operations to thrive. Requiring dynamic access systems and databases can increase the cost and complexity of these devices, making them difficult to market for consumer and even most commercial uses. If ISED hopes to make maximum use of licence-exempt spectrum, it should do so using device-based contention mechanisms alone.

6 CONCLUSION

6.1 Wi-Fi Alliance applauds the Department's forward-thinking approach to releasing spectrum in the mmWave bands to support the deployment of 5G networks. Based on the ever-growing importance of Wi-Fi networks to Canadian businesses and consumers, it is important that the Department also ensure the availability of additional spectrum for licence-exempt uses. ISED should be mindful of promoting the licence-exempt technologies that are a part of 5G, alongside licenced mobile use, ensuring that Canadians will be able to make the most of scarce

spectrum resources. Harmonizing its rules with those from the FCC and other international regulators wherever possible will also assist in the creation of global economies of scale and keep Canadians from missing out on exciting new opportunities and technologies that are being developed, or even already available, today.