10900-B Stonelake Boulevard, Suite 126 · Austin, Texas 78759 U.S.A.
Phone: +1-512-498-9434 (WIFI) · Fax: +1-512-498-9435
www.wi-fi.org

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

VIA ELECTRONIC FILING
e-mail: ic.spectrumengineering-genieduspectre.ic@canada.ca

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Dear Colleagues,

Wi-Fi Alliance commends the Innovation, Science and Economic Development Canada ("ISED") on its ongoing work in the area of spectrum management and harmonization. In particular, Wi-Fi Alliance applauds the ISED proposal to allow the introduction of license-exempt operations in the 5925-7125 MHz frequency band ("6 GHz band").[1]

Wi-Fi Alliance is a global, non-profit industry association of over 850 leading companies from dozens of countries devoted to seamless interoperability. 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. Devices using Wi-Fi standards have become increasingly important in connecting people and devices. Millions of Canadians rely on Wi-Fi to connect billions of devices every day, and studies show this is increasing rapidly.[2/] Devices using spectrum that supports Wi-Fi are now the primary means by which Canadians connects to the Internet.[3/] This central role will only increase in the future, since Wi-Fi technology will be an essential complement to Fifth Generation wireless ("5G") networks, as

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[1] *See* Consultation on the Technical and Policy Framework for Licence-Exempt Use in the 6 GHz Band ("Consultation") at https://www.ic.gc.ca/eic/site/smt-gst.nsf/vwapj/SMSE-014-20-2020-11EN.pdf/$file/SMSE-014-20-2020-11EN.pdf

[2/] *See Wi-Fi Celebrates 20 Years with More Than 20 Billion Anticipated Device Shipments over the Next Six Years*, ABI Research (Jun. 13, 2019) available at: https://www.abiresearch.com/press/wi-fi-celebrates-20-years-more-20-billion-anticipated-device-shipments-over-next-six-years/

[3/] CISCO, *VNI Complete Forecast Highlights Tool*, Asia Pacific, Wired Wi-Fi and Mobile Growth (2016), http://www.cisco.com/c/m/en_us/solutions/service-provider/vni-forecast-highlights.html (select "North America" select "Canada" ("CISCO VNI")

highlighted by the recently released Cisco VNI Mobile Report showing that traffic offloaded to Wi-Fi increase with each successive technology generation.[4/] All of this traffic over Wi-Fi-enabled devices requires spectrum. Wi-Fi Alliance's previously released *Spectrum Needs Study*[5/] demonstrated that significantly more spectrum access is required to meet immediate connectivity needs in Canada. It is also important to recognize that connectivity provided by Wi-Fi through low-cost devices, delivers billions of dollars in economic value to Canada.[6/]

Responses to 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***

Answer to Q1(a): Wi-Fi Alliance introduced new Wi-Fi 6E terminology to distinguish forthcoming Wi-Fi 6 devices that are capable of 6 GHz operation.[7] Wi-Fi 6E brings a common industry name for Wi-Fi users to identify devices that will offer the features and capabilities of **Wi-Fi 6** – including higher performance, lower latency, and faster data rates – extended into the 6 GHz band. Wi-Fi 6E devices are expected to become available quickly following 6 GHz regulatory approvals, utilizing this additional spectrum capacity to deliver continuous Wi-Fi innovation and valuable contributions to consumers, businesses and economies. As the 6 GHz regulatory landscape evolves, Wi-Fi Alliance member companies are moving forward aggressively with Wi-Fi 6E enabled products. Analysts predict the first Wi-Fi devices to use the band will include Wi-Fi 6E consumer access points and smartphones, followed by enterprise-grade access points. Industrial environments are also expected to see strong adoption from Wi-Fi 6E to deliver applications including machine analytics, remote maintenance, or virtual employee training. Wi-Fi 6E will utilize 6 GHz to deliver much anticipated augmented reality and virtual reality (AR/VR) use cases for consumer, enterprise, and industrial environments. Already, the list of Wi-Fi 6E certified products is growing.[8] In 2021, over 300 million Wi-Fi 6E devices are expected to enter the market.[9] Also, it is important to note that the U.S. Federal Communication Commission (FCC)initiated regulatory certification of the 6 GHz devices.[10]

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

Answer to Q1(b): The next generation of Wi-Fi networks, Wi-Fi 6, are already being deployed in the 5 GHz band. Standard power Wi-Fi 6E operations and constraints (e.g., eirp limits) are similar to the license-exempt equipment already authorized to operate in portions of the 5 GHz band. In fact, Wi-Fi 6/6E standard offers flexibility by permitting operation using a variety of bandwidths in the 5 GHz and 6 GHz bands. The proximity of the 6 GHz band to the 5 GHz band means that existing devices can be readily redesigned. The standard power Wi-Fi 6E equipment ecosystem, therefore, is available for deployment pending authorization of the AFC system needed to manage Wi-Fi 6E standard power frequency access.

[4/] Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2017–2022, White Paper at page 18, available at https://www.cisco.com/c/en/us/solutions/collateral/service-provider/visual-networking-index-vni/white-paper-c11-738429.pdf

[5/] Wi-Fi Alliance, *Spectrum Needs Study* at p. 23, Feb. 2017, available at https://www.wi-fi.org/downloads-registered-guest/Wi-Fi%2BSpectrum%2BNeeds%2BStudy_0.pdf/33364

[6/] *Economic Value of Wi-Fi available at* http://valueofwifi.com

[7] *See* "Wi-Fi Alliance® brings Wi-Fi 6 into 6 GH" *https://www.wi-fi.org/news-events/newsroom/wi-fi-alliance-brings-wi-fi-6-into-6-ghz*

[8] *See* List of Wi-Fi 6E Certified Devices at https://www.wi-fi.org/product-finder-results?sort_by=default&sort_order=desc&certifications=1275 ; *also see*: https://www.youtube.com/watch?v=oOZLhkaehzU&feature=youtu.be

[9] *See* IDC Market Presentation at https://www.idc.com/getdoc.jsp?containerId=US46220720

[10] *See* FCC OET KDB at: 987594 D01 U-NII 6GHz General Requirements v01r01

c. AFC

Answer to Q1(c): Wi-Fi Alliance and other industry organizations are actively developing technical specifications to enable AFC implementation. In the near future, Wi-Fi Alliance plans to publish technical specification that defines the architecture, protocols, and functionality for AFC System to AFC Device Interface. Multiple entities have already demonstrated AFC system prototypes.[11] It is expected that by mid-2021, FCC will initiate the AFC operator approval and AFC system certification processes targeting the end of the year for completion.

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

Answer to Q2: Wi-Fi Alliance applauds ISED's proposal, which is premised on two incontrovertible facts. First, unlicensed spectrum and the services it supports – Wi-Fi in particular – are essential drivers of Canada's economy and a key component of its communications infrastructure. And second, there is simply insufficient spectrum capacity to support the growing demand for Wi-Fi. ISED's proposal also recognizes that the 5925-7125 MHz band is uniquely suited to accommodate the urgent need for additional Wi-Fi spectrum access for the following reasons:

- Wi-Fi access to this spectrum will make more Wi-Fi channels available, increase capacity, lower latency and reduce congestion in existing Wi-Fi frequency.
- The contiguous spectrum would allow for wider, non-overlapping Wi-Fi channels with harmonized technical conditions.
- Wi-Fi access to this spectrum will enable new technologies, innovation and improvements in wireless connectivity.
- Existing Wi-Fi equipment designed for the 5 GHz band can be rapidly adapted and deployed in the 5925-7125 MHz band offering significant economies of scale and other benefits.

Q3 ISED is seeking comments on the proposed footnote Cxx and the changes to the CTFA as shown in table 2. "ADD Cxx: Licence-exempt RLAN applications in the 5925-7125 MHz band must operate in accordance with the established spectrum policy and technical framework; and must not cause harmful interference to, or claim protection from, licensed systems operating in the band."

Answer to Q3: The proposed regulatory constraint (i.e., footnote) ensures that introduction of new RLAN applications will not disrupt or constrain important incumbent operations in the 5925-7125 MHz frequency band. That is exactly why licence-exempt RLAN applications, such as Wi-Fi, operating on a non-interference basis with an obligation to fully protect incumbents from harmful interference, are well-suited for this spectrum. The ISED proposed regulatory framework will maximize utilization and benefit of the 5925-7125 MHz frequency band by allowing Wi-Fi to operate without causing interference to incumbent operations or requiring their relocation to other frequency bands.

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

a. indoor and outdoor operation would be permitted

Answer to Q4(a): Wi-Fi Alliance strongly supports ISED's proposal to permit standard-power RLANs in the 5925-6425 MHz, 6425-6525 MHz and the 6525-6875 MHz sub-bands, subject to AFC use.[12] The AFC system approach, as proposed by ISED, will ensure protection of incumbents in these bands, while allowing this valuable spectrum to be used by licence-exempt devices to extend broadband coverage. Wi-Fi Alliance particularly appreciates ISED's objective to make sufficient and appropriate spectrum resources available to

[11] *See* for example: https://ecfsapi.fcc.gov/file/100302586574/2019-10-01%20OET%20AFC%20Demo%20Ex%20Parte.pdf

[12/] *Consultation* at ¶ 55.

ensure that Canadians continue to benefit from advancements in wireless technology.[13] In light of this objective, Wi-Fi Alliance questions the proposal not to permit the operation of standard-power RLANs in the 6875-7125 MHz sub-band so as to protect nonexistent TV pick-up services in the 6875-6930 MHz frequency range.[14] Precluding the AFC controlled standard-power RLANs from utilizing this valuable spectrum resource, only to reserve spectrum access for broadcasting auxiliary service "if needed in the future" is not efficient or necessary. The 6 GHz incumbent service deployments are not static, and the AFC systems will be designed to accommodate periodic updates to the ISED's Spectrum management System (SMS). If future transportable TV pick-up operations require access to the 6875-7125 MHz sub-band then the AFC system can be updated to disallow standard-power RLAN transmissions on these frequencies. Recognizing the important role that standard-power RLANs can play in closing the digital divide by providing ubiquitous connectivity in underserved areas, Wi-Fi Alliance urges ISED to allow access to the 6875-7125 MHz sub-band subject to the same regulatory provisions as in other 6 GHz sub-bands.

b. RLAN access points would only be permitted to operate under the control of an AFC system in the 5925-6875 MHz frequency range

Answer to Q4(b): Wi-Fi Alliance agrees with ISED proposal that standard-power RLAN access points only be permitted access to spectrum under the control of an AFC system, which will avoid transmissions at designated locations on frequencies that may be used by fixed-microwave systems, the Dominion Radio Astrophysical Observatory (DRAO) and other 6 GHz incumbent services. As explained above (see Answer to Q4(a)), the AFC system will protect all ongoing licensed deployments (e.g., current and planned) and, therefore, there is no need to preclude standard-power RLAN operations in the 6875-7125 MHz sub-band.

c. maximum permitted e.i.r.p. would be 36 dBm

Answer to Q4(c): Wi-Fi Alliance generally agrees with ISED proposal to limit standard power RLAN e.i.r.p. at 36 dBm.[15] This proposal comports with previous ISED decision concerning RLAN outdoor operations in the 5150-5250 MHz frequency band.[16] ISED, however, should consider allowing standard-power access points used in fixed point-to-point RLANs to operate at power levels greater than 36 dBm e.i.r.p. This allowance would provide wireless internet service providers additional flexibility needed to relieve congestion in the 5 GHz band and extend the RLAN connectivity success to the 6 GHz band. To ensure that higher e.i.r.p. levels are used primarily for point-to-point operations, ISED may specify a limit on the maximum conducted transmitter power (e.g., 30 dBm) and allow standard power point-to-point RLANs to employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter conducted power, thereby encouraging the use of higher gain, highly directional antennas.

d. maximum permitted power spectral density would be limited to 23 dBm/MHz

Answer to Q4(d): Wi-Fi Alliance generally agrees with ISED's proposal to limit standard power RLAN power spectral density to 23 dBm/MHz.[17]

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

Answer to Q4(e): Wi-Fi Alliance is of the view that the proposed antenna pointing limitations for the protection of Fixed Satellite Service (Earth-to-space) operation are unnecessary. The standard power RLAN transmissions pose no risk of harmful interference the Fixed Satellite Service (Earth-to-space) operation because the proposed limits on standard power RLAN radiated power will prevent interference to space station receivers. The significant separation distances between ground-based, power-constrained RLAN

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13 *Consultation* at ¶ 49

14 *Consultation* at ¶ 53

15 *Consultation* at ¶ 55

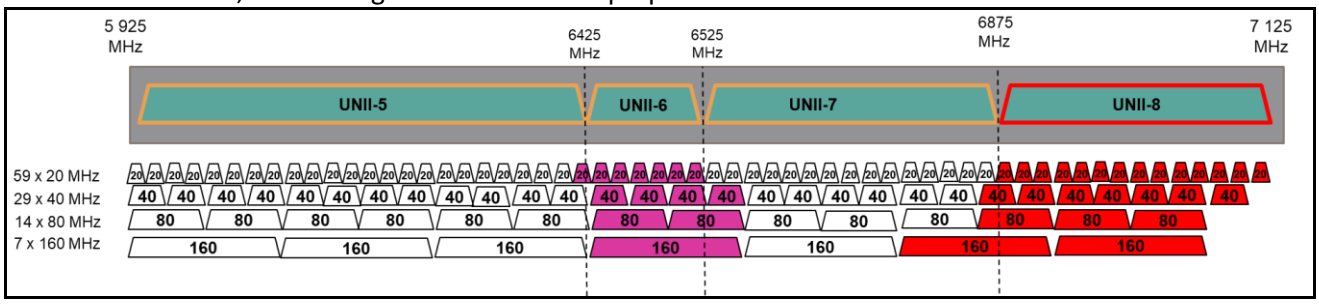
16 *See* SMSE-013-17, ISED Decision on the Technical and Policy Framework for Radio Local Area Network Devices Operating in the 5150-5250 MHz Frequency Band, May 2017

17 *Consultation* at ¶ 55

transmitters and space-based satellite receivers (i.e., 35,800 kilometers above the equator) provide ample isolation to mitigate against harmful interference. ISED notes that similar limits already apply to the 6 GHz fixed service transmitters,[18] but it is important to recognize that these transmitters operate at significantly higher (e.g., orders of magnitude) e.i.r.p. levels than RLANs. Wi-Fi Alliance asks ISED to consider that this limitation would create additional burdens and impediments to the introduction of much needed standard power RLAN in Canada.

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.

Answer to Q5: Wi-Fi Alliance strongly supports ISED proposal to allow standard power RLAN operations in the 6425-6525 MHz. Bandwidth and spectrum contiguity are important for implementation of wider (e.g., 80 MHz, 160 MHz and 320 MHz) channels which are required to support high-data throughput and lower latency connectivity. Self-coordinated multi-channel RLAN systems (e.g., Wi-Fi) relying on dynamic random spectrum access and contention-based protocols require access to multiple channels to maintain acceptable performance. The current Wi-Fi standard (IEEE 802.11ax, Wi-Fi 6/6E) specifies channel bandwidths of up to 160 MHz, while the next amendment under consideration (IEEE 802.11be Extremely High Throughput) will specify channel bandwidths of up to 320 MHz. Importantly, access to multiple channels would further reduce potential for interference with the incumbent services that operate in different portions of the 6 GHz band. As shown on the figure below, access to 6425-6525 MHz and 6875-7125 MHz enables availability of multiple additional channels, maximizing benefits of ISED's proposal.



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.

Answer to Q6: ISED judicious approach to align with the U.S. 6 GHz RLANs regulations will facilitate harmonization of Wi-Fi ecosystem leveraging compatibility, economies of scale and other benefits.

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

Answer to Q7(a): Wi-Fi Alliance support ISED's proposal to allow the use of low-power indoor only RLANs ("LPI devices") in 5925-7125 MHz frequency band. LPI devices can coexist with the 6 GHz incumbent service because their transmissions will be attenuated by building entry losses, clutter loss, polarization mismatch and other signal losses, all of which will reduce the LPI device's signal power to below harmful interference threshold.

b. the use of a contention-based protocol (e.g. listen-before-talk) would be required

Answer to Q7(b): Contention-based protocols such as Wi-Fi's carrier sense multiple access with collision avoidance already enable co-existence of multiple unlicensed device types. The same contention-based

[18] *Consultation* at ¶ 58

protocols used by unlicensed devices to ensure that they do not interfere with one another will reduce interference potential to the 6 GHz incumbent licensed operations. The IEEE specification for Wi-Fi, for example, requires energy detection at -62 dBm/20 MHz. Wi-Fi Alliance members report that their implementation can sense at an even lower threshold to ensure compliance with the IEEE specification. So, in real world implementations, the contention-based protocol is even more effective in protecting incumbent operations. Wi-Fi Alliance supports requiring such protocols for LPI device implementations in the 6 GHz band.

c. maximum permitted e.i.r.p. would be 30 dBm

d. maximum permitted power spectral density would be limited to 5 dBm/MHz

Answer to Q7(c and d): In considering appropriate e.i.r.p. and power spectral density (PSD) limits for LPI devices, it is necessary to consider evolution of the Wi-Fi ecosystem. In particular, ISED should take into account that the current standard (IEEE 802.11ax, Wi-Fi 6/6E) specifies channel bandwidths of up to 160 MHz, while the next amendment under consideration (IEEE 802.11be Extremely High Throughput) will specify channel bandwidths of up to 320 MHz. If the maximum allowable power limit values are set, as proposed, at 5 dBm/MHz and 30 dBm, then for devices operating with bandwidths other than 320 megahertz, the maximum allowable total power must be scaled down accordingly (e.g., 27 dBm with a bandwidth of 160 megahertz, 24 dBm with a bandwidth of 80 megahertz, 21 dBm with a bandwidth of 40 megahertz, and 18 dBm with a bandwidth of 20 megahertz). Lower power levels will reduce Wi--Fi 6E performance in coverage area and throughput. To ensure that Canadian consumers realize full benefits of Wi-Fi 6E, Wi-Fi Alliance recommends increasing the PSD from 5 dBm/MHz to 8 dBm/MHz with a maximum permissible e.i.r.p. of 30 dBm for devices with channel bandwidths of up to 160 megahertz and e.i.r.p. of 33 dBm for devices with channel bandwidths of up to 320 megahertz. Operations at these power levels can effectively provide multi-gigabit Wi-Fi throughout homes and businesses while protecting 6 GHz incumbents.

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

Answer to Q8(a): Wi-Fi Alliance strongly supports this proposal. Permitting very-low power RLANs ("VLP devices") indoors and outdoors across the frequency range 5925-7125 MHz band would enable numerous innovative use cases. According to a recent Deloitte study, Wi-Fi 6 is a transformative, "force multiplier for other innovative technologies – including IoT, cloud, and edge computing."[19/] some of these important use-cases include healthcare, location, advanced connectivity, automotive, wireless casting, and augmented- and virtual-reality ("AR/VR"), with many applications still to be defined. In healthcare, for example, VLP devices are already widely deployed for traditional networking throughout the industry and are even more heavily used now to meet COVID-related applications. Wi-Fi is well-suited to these dynamic environments because it is one of the most trusted and ubiquitous wireless technologies, offering high performance connectivity, government-grade WPA3™ security, and support for legacy devices. Beyond hospitals and clinical settings, Wi-Fi also offers a solution to the growing personal health and fitness market. Wi-Fi also helps healthcare information technology managers meet the growing connectivity demands presented by both healthcare staff and patients and their families. Wi-Fi 6E VLP devices offer healthcare facilities a significant increase in coverage, capacity, and efficiency without sacrificing core competencies like interoperability, security and ease of use. And Wi-Fi 6E VLP devices can be particularly effective in handling dense environments with hundreds or thousands of devices requiring connectivity simultaneously.

b. the use of a contention-based protocol (e.g. listen-before-talk) would be required

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19/ ENTERPRISES BUILDING THEY FUTURE WITH 5G AND WI-FI 6, DELOITTE INSIGHTS (2020) https://www2.deloitte.com/content/dam/insights/us/articles/6664_Next-gen-wireless/DI_Enterprises-building-their-future.pdf ("Deloitte Report").

Answer to Q8(b): Wi-Fi Alliance supports requiring contention-based protocols for VLP devices. See answer to Question 7B for additional details.

c. maximum permitted e.i.r.p. would be 14 dBm

d. maximum permitted power spectral density would be limited to -8 dBm/MHz

Answer to Q9(c and d): In considering appropriate transmit power level limits for VLP device, ISED should consider that:

(1) Majority of VLP devices will operate indoors while at *even lower power* than LPI devices and, thereby, will be even less interfering. Moreover, VLP devices are largely personal area network devices that will experience more localized clutter and body loss than typical LPI access points. The use of VLP devices *outdoors,* similarly, presents minimal risk of interference to incumbent operations. First, according to estimates, Canadians only spend 6% of their time outdoors.[20/] And, obviously, most Canadians will not continuously use their VLP devices while they are outdoors. Further, the main use of VLP devices outdoors will be during the time periods when fixed service devices enjoy maximum link margins.[21/] In general, the VLP device interference requires a long list of unlikely, worst-case conditions to occur simultaneously, and even if such rare alignment did occur, the interference would be momentary due to the low-duty cycle and transitory use of outdoor VLP devices.

(2) Affordable and ubiquitous VLP device ecosystems necessary to support market scale and commercial viability depends on globally harmonized regulatory framework. In this regard, it is important to note that, while the 6 GHz VLP rues are still under consideration by the FCC, European countries, after extensive study effort, already decided to permit the use of VLP devices that operate with PSD of at least 1 dBm/MHz and 14 dBm e.i.r.p.[22/] Constraining VLP operations to an unnecessarily restrictive power limits would stifle rapidly evolving 6 GHz VLP ecosystem and preclude implementation of innovative use cases (e.g., wearables). Moreover, fragmented regulatory framework challenge implementation of highly-portable VLP devices requiring two formats – one for Europe (and the rest of the world) and the other only for Canada. Disjoined regulations for the VLP devices would diminish economies of scale, cross-border portability, harmonization and other benefits.

To align with Europe and other markets, ISED should permit VLP devices to operate at 14 dBm EIRP and 1 dBm/MHz – levels that would both protect existing services and allow effective use of the band for VLP operations. To further mitigate interference potential, ISED may require the 6 GHz VLP devices to implement the transmit power control ("TPC"). TPC is a well-established interference mitigation factor. Indeed, in the proceeding authorizing unlicensed devices in the 5 GHz band, the FCC observed:

> "TPC is a feature intended to adjust the transmitter's output power based on the signal level at the receiver. TPC will allow the transmitter to operate at less than the maximum power for most of the time. As the signal level at the receiver rises or falls, the transmit power will be decreased or increased as needed. Because TPC equipped devices adjust their transmit power

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[20/] Not Enough Time, Nature Brain, "*Overall Canadians spent 94% of their total time indoors*." (April, 2020) available at: http://www.naturebrain.com/2020/04/not-enough-time/#:~:text=Overall%20Canadians%20spent%2094%25%20of,5%2C000%20Canadians%20found%20similar%20results;

[21/] FCC published Report and Order (FCC-20-51) ¶ 143 ("Temporal separation between when multipath fading is most likely to occur and when Wi-Fi devices are heavily used means there is low probability that Wi-Fi transmissions will overlap with multipath fading events.").

[22/] CEPT Electronic Communications Committee Decision ECC/DEC/(20)01 (Nov. 20, 2020) available at: https://docdb.cept.org/download/50365191-a99d/ECC%20Decision%20(20)01.pdf; *Also see* UK Ofcom, *Improving Spectrum Access for Wi-Fi*, Statement (July 24, 2020), https://www.ofcom.org.uk/__data/assets/pdf_file/0036/198927/6ghz-statement.pdf (discussing spectrum use in the 5 and 6 GHz bands in the United Kingdom).

to the minimum necessary to achieve the desired performance, the average interference power from a large number of devices is reduced, the power consumption is minimized and network capacity is increased."[23]

Similarly, the International Telecommunications Union ("ITU") Radio Regulations for implementation of Radio Local Area Networks, Resolution 229 states that in the 5 GHz bands, systems in the mobile service (including Wi-Fi devices) should employ TPC to provide, on average, at least 3 dB mitigation on the maximum average output power.[24/]

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

Answer to Q9: To ensure a robust and competitive AFC ecosystem, ISED should allow the marketplace to decide on the viability of the AFC business models. AFC implementations should be permitted to vary depending on technology and use cases, while still protecting incumbent operations. AFC administrators should be permitted to charge market-based fees. Fee structures for AFCs should be determined between AFC administrators and users based on market conditions, not on-predetermined or regulated structures.

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.

Answer to Q10: Wi-Fi Alliance agrees with this proposal. ISED should not restrict AFC administrator eligibility to a specific entity and instead promote diverse AFC implementations. Industry groups, like Wi-Fi Alliance, will play an active role in promoting the Wi-Fi ecosystem in the 6 GHz bands, but there is no need for regulatory oversight of this role beyond the certification of the AFCs. Any entity, including RLAN equipment vendors or manufacturers, should be allowed to offer AFC capabilities. Diversity among the AFC systems will promote a full range of innovations in product and service offerings. The ISED, therefore, should adopt regulations that would foster a market-driven, technology-neutral environment for the provision of the AFC systems.

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

Answer to Q11: In the FCC's 6 GHz proceeding, Wi-Fi Alliance supported the proposal to designate an AFC system administrator for a five-year term that can be renewed at the administrator's request, based on the administrator's performance during the term. Wi-Fi Alliance, however, emphasized that it is impractical to require an AFC administrator to transfer registration information at the end of the term and that an AFC administrator should have the flexibility to discontinue operations at its discretion. ISED designation of an entity as an AFC administrator should *permit* AFC operations, but not *obligate* the entity to perform those functions. An AFC administrator should have the flexibility to discontinue provision of the AFC function at its discretion. In the event an AFC system ceases operations, all AP devices that employed that AFC would be automatically adjusted within the mandatory AFC re-check period[25]. At that time, standard-power APs would

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[23/] *In The Matter of Revision of Parts 2 And 15 of the Commission's Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5 GHz Band*, Notice of Proposed Rulemaking, 18 FCC Rcd 14582, ¶ 24 (2003).

[24/] ITU Radio Regulations, Resolution 229 (Rev. WRC-12), *Resolve 7* (finding that "in the bands 5.250-5.350 MHz and 5.470-5.725 MHz, systems in the mobile service shall either employ transmitter power control to provide, on average, a mitigation factor of at least 3 dB on the maximum average output power of the systems, or, if transmitter power control is not in use, then the maximum mean e.i.r.p. shall be reduced by 3 dB.").

[25] FCC published Report and Order (FCC-20-51) ¶ 46

be required to either migrate to a new AFC system, cease operation in the 6 GHz band, or switch to LPI operations (if permitted, based on operational characteristics) when no recheck can be performed with the defunct AFC.

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.

Answer to Q12: Wi-Fi Alliance agrees with ISED that close regulatory alignment between Canada and U.S. will facilitate development and deployment of the AFC systems by leveraging the ecosystem built for the broader U.S. market. ISED, however, should preserve flexibility to foster a vibrant AFC ecosystem and enable continued innovation that will lead to increased competition and lower costs for consumers.

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

a. information required from licensed users

Answer to Q13(a): Wi-Fi Alliance supports ISED determination that AFCs should rely on the ISED's Spectrum Management System (SMS) database for a comprehensive set of technical parameters for site-based licenses.– *i.e*. there should be no mandatory requirement to use third-party databases.[26] As ISED notes, SMS contains extensive technical data for site-based licenses, including transmitter and receiver locations, frequencies, bandwidths, polarizations, transmitter EIRP, antenna height, and the make and model of the antenna and equipment used. ISED should encourage the 6 GHz licensees to verify the accuracy of data in SMS to ensure that they are protected from interference. If a licensee fails to affirm current operations, a notation should be added in SMS indicating that the operation of the non-responsive licensee need not be taken in to account by unlicensed services.

b. interference protection criteria for computation of exclusion zones

Answer to Q13(b): Wi-Fi Alliance is of the view that an I/N ratio is the appropriate metric for the AFC interference protection criteria. Importantly, after extensive consideration, FCC determined that /N of -6 dB is the appropriate interference protection criterion for the AFC exclusion zone calculations.[27] Applying the same criteria for implementation of AFC systems in Canada would ensure protection to the important fixed microwave services and maintain close alignment with AFC systems implemented in the U.S.

c. information required from standard-power APs

Answer to Q13(c): Wi-Fi Alliance plans to publish the technical specification that defines the architecture, protocols, and functionality for AFC System to AFC Device Interface. From the regulatory perspective, ISED should consider the following provisions:

- The standard-power APs should be required to provide AFC with their location along with the level of location accuracy uncertainty. This would permit devices with precisely known locations (such as permanent deployments performed by professional installers) to take advantage of the greatest number of channels while protecting incumbent operations from potential location calculation errors.
- AFC should be permitted to account for the AP's transmit power level, which may be lower than the maximum-allowed power level, thereby reducing the areas where the use of some frequencies may be restricted. Requiring the AFC to determine permissible frequencies only at the *maximum* allowed power level would be unnecessarily restrictive and reduce spectrum access.
- Taking into account that real-world AP device antenna patterns would likely result in less gain toward the horizon, AFC systems should be permitted to account for AP antenna's orientation and

[26] *Consultation* at ¶ 68

[27] FCC published Report and Order (FCC-20-51) ¶ 70 and 47 CFR. § 15.407 (l)(2)

directivity. For example, In many cases, a standard-power access point antenna will be affixed to a ceiling or wall, which will limit its gain contours. Accounting for standard-power AP antenna orientation and directivity, however, should be an optional feature of AFC systems, not a requirement. If the AP's antenna orientation and directivity is not available, then the AFC system should base its computation on the worst case (*e.g.* omnidirectional) antenna pattern.

d. frequency of AFC update of licensee information

Answer to Q13(d):

Data used in AFCs should be updated as frequently as ISED's SMS database is updated, so systems remain current with SMS data. But, the standard power RLAN devices should not be required to constantly re-check with an AFC system before they operate. Licensed microwave links – even on a temporary basis – take months to construct and deploy. It therefore should be sufficient for the standard-power AP to verify available channel assignments with the AFC every 30 days. If an AP is unable to check with an AFC at the end of the 30-day period, a 48-hour grace period should be permitted; if the re-check cannot be performed by the end of the grace period, then the standard-power AP should be precluded from operating on the 6 GHz frequencies.

e. security and privacy requirements

Answer to Q13(e): ISED should consider imposing non-burdensome security obligations on AFC administrators similar to non-prescriptive security requirements for ISED's White Space Databases Specifications.[28] With regards to standard-power RLAN security, the device should prevent software modification by unauthorized parties to ensure that devices remain in compliance once they are in customers' hands; but ISED should not mandate the form of that security, allowing manufacturers to innovate.

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.

Answer to Q14: In considering regulators for the AFC system, it is important to recognize that AFC is a novel and innovative spectrum management technique. To ensure success of the AFC system, ISED should provide AFC administrators and the marketplace with the discretion to balance cost, complexity and other factors in the development of their systems. There is no reason to constrain viable AFC implementations by unnecessary regulations.

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**

Answer to Q15: Wi-Fi Alliance agrees with ISED that the AFC system approach, will ensure protection for fixed microwave, fixed point-to-point television auxiliary and radio astronomy stations in the 5925-7125 MHz frequency band.

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

Answer to Q16: At this time, Wi-Fi Alliance is not in a position to comment on the sample agreement.

[28] ISED DBS-01, Issue 2 – White Space Database Specifications, Section 17. Security (January, 2020)

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

Answer to Q17: Wi-Fi Alliance agrees with ISED assessment that allowing AFC system incremental implementation either on limited geographic areas and/or limited portions of the potentially available spectrum would reduce barriers to entry and facilitate introduction of competitive AFC marketplace in Canada.

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.

Answer to Q18: To the extent practicable, Wi-Fi Alliance supports ISED's proposal to align the technical and administrative requirements and procedures between those for White Space Database Systems (WSDB) and 6 GHz AFC.

Conclusion

The future of the Internet is more: more wireless data, more devices, more uses. Devices that use Wi-Fi protocols will be at the center of this growth. Wi-Fi has been recognized as a **foundational technology for the Internet of Things**, a necessary complement to **delivering 5G**, an important tool bringing communication networks to **underserved areas**, and a strong **contributor to national economies**. Expanding Wi-Fi access to the 6 GHz spectrum will make broadband connectivity available to all, especially those in rural and underserved areas. In pursuit of that goal, ISED should proceed expeditiously with its proposal to allow Wi-Fi access to the 5.925-7.125 GHz band while ensuring that the existing services operating in the spectrum continue to thrive.

Respectfully submitted,

/s/ Alex Roytblat

WI-FI ALLIANCE
Alex Roytblat
Vice President of Regulatory Affairs

aroytblat@wi-fi.org