

Intel Corporation comments to Canada Gazette part I, volume 151, No. 4 (January 28, 2017), SMSE-002-17, “Consultation on the Technical and Policy Framework for Radio Local Area Network Devices Operating in the 5150-5250 MHz Frequency Band”.

March 29, 2017

Intel Corporation (“Intel”) respectfully submits these comments to the ISED Consultation on Radio Local Area Network Devices in the 5150-5250 MHz Frequency Band.¹ Intel is a leader in designing and building the essential technologies that serve as the foundation for the world's computing and communications devices.

Intel supports expeditious assignment of both licensed and unlicensed (*a.k.a.* license exempt) spectrum in a technology and service neutral manner. Unlicensed devices have enjoyed unprecedented growth—for example, the Wi-Fi Alliance recently announced that Wi-Fi shipments had reached 12 billion units in January 2016, and are expected to reach 15 billion units by the end of 2016.² As ISED noted in the consultation, there has been a significant upsurge of Wi-Fi enabled devices, including the use to offload broadband traffic on commercial networks.³ This has put pressure on the capacity of Radio Local Area Network (RLAN) bands, which motivates the need for expanded authorization to enable additional outdoor spectrum, and at higher power levels, for license-exempt use.

To that end, in 2014 the U.S. Federal Communications Commission (FCC) released a Report and Order⁴ to revise the rules for the 5150-5250 MHz band.⁵ This action expanded the use of *both* indoor and outdoor access points by increasing the conducted power to 1W at up to 6Bi antenna gain, and permits higher antenna gains with a commensurate reduction in conducted power. To protect satellite uplink operations from the possibility of aggregate interference at the satellite receiver rising to unacceptable levels, the *FCC R&O* permits outdoor access points to use these increased power levels only at elevation angles up to 30 degrees. Above the 30 degree elevation angle, EIRP for outdoor access points is restricted to 125 mW maximum.⁶ In

¹ ISED SMSE-002-17 “Consultation on the Technical and Policy Framework for Radio Local Area Network Devices Operating in the 5150-5250 MHz Frequency Band,” (“*ISED Consultation*”)

² See <http://www.wi-fi.org/news-events/newsroom/wi-fi-device-shipments-to-surpass-15-billion-by-end-of-2016>

³ ISED Consultation at ¶¶20-21.

⁴ US Federal Communications Commission (FCC) ET Docket No. 13-49, First Report and Order, “In the Matter of Revision of Part 15 of the Commission’s Rules to Permit Unlicensed National Information Infrastructure (U-NII) Devices in the 5GHz Band,” released April 1, 2014. (“*FCC R&O*”). Available at: <https://ecfsapi.fcc.gov/file/7521096518.pdf> (U-NII-1 band discussion in paragraphs 22-60).

⁵ To view the latest Part 15 rules, navigate to the following link on the FCC website: <https://www.fcc.gov/general/rules-regulations-title-47> then click on “parts 0-19”, then on “15” then on subpart E section 15.407.

⁶ 47 CFR 15.407(a)(1) [Power limits].

addition, deployments with greater than 1000 access points are required to register with the FCC to facilitate corrective action, should harmful interference materialize.⁷

Intel strongly supports ISED's expeditious adoption of the FCC's carefully considered rule changes for indoor and outdoor access points in the 5150-5250 MHz band. Additional answers to the specific questions from the consultation⁸ are provided below.

- A. The demand for, and benefit if any of allowing HPOD's in the 5150 – 5250 MHz frequency band before WRC-19.

Intel concurs with the *ISED Consultation* that there is considerable and increasing demand for Wi-Fi devices and services.⁹ Consequently, there is sufficient benefit to justify Canada's alignment to the established FCC rules for the 5150-5250 MHz band prior to WRC-19. This would result in harmonized rules in North America, thereby improving economies of scale in device production compared to different, non-harmonized rules between Canada and the U.S. which would require different product SKUs. Intel notes that standardized IEEE 802.11ac based products are already certified and available to support the proposed higher power levels in this band, per the revised rules promulgated in the *FCC R&O*.

- B. The possible impact on domestic and foreign satellite systems in the 5150 – 5250 MHz band prior to WRC 19 on the basis of maximum e.i.r.p. of 4W. Requirement for an elevation mask toward satellites and an exclusion zone of 25 km around receiving earth stations to protect all satellite systems would likely also apply.

Both the U.S. and Canada have similar licensed satellite uplink (feeder link) systems in the 5150-5250 MHz band. Separately, a downlink earth station is operated by the Canadian Space Agency and the Department of National Defence in Ottawa, Ontario.

Regarding the uplink systems, the FCC studied the possible impact of aggregate interference to in-orbit satellite receivers during their rulemaking process. This involved inputs from all stakeholders, resulting in the *FCC R&O* establishing rules to increase the power output for indoor¹⁰ and outdoor access points to 1W (conducted) at up to 6 dBi antenna gain (and a 1 dB reduction of power levels for every 1 dB antenna gain beyond 6 dBi). For outdoor access points, an additional limitation of 125 mW EIRP was adopted for cases when the access point is aimed above a 30 degree elevation angle, in order to address aggregate interference concerns at

⁷ 47 CFR 15.407(j) [Operator filing requirements].

⁸ ISED Consultation at ¶129.

⁹ ISED Consultation at ¶120.

¹⁰ "We will permit indoor access points operating in the U-NII-1 band at 1 W of conducted power with a 6 dBi antenna gain and no reduction in vertical antenna gain coupled with a requirement for a 1 dB reduction in conducted power for every 1 dB that the antenna gain exceeds 6 dBi. These types of consumer-oriented devices should not contribute to interference concerns, as the building materials used in indoor environments should sufficiently attenuate energy transmitted from indoor devices to prevent any significant contribution to any noise rise seen by Globalstar's satellite." FCC R&O at ¶144.

satellite receivers. As the *FCC R&O* summarized it, “We reaffirm that Globalstar’s licensed mobile satellite service is protected against harmful interference from unlicensed operations. We note that Globalstar has the capability to monitor increases in noise levels at its satellites, and anticipate that Globalstar will report to us any significant changes in the noise levels and provide specific details as to how it is affecting its operations.”¹¹ Intel believes a similar rationale and monitoring plan could be instated in Canada. As a further protective measure, the *FCC R&O* also put in place rules to control large deployments (>1000 access points by an individual service provider).¹²

Regarding the downlink system that is specific to Canada, the *ISED Consultation* has proposed the use of a 25 km exclusion zone around this earth station facility. Intel believes it would be useful if ISED provided further details on the excluded population as a result of this 25 km exclusion zone (for example, households and businesses within the exclusion zone), as well as the assumptions used in arriving at the 25 km distance. If future downlink earth stations are deployed with equivalent protection rights, Intel would encourage siting considerations to minimize the excluded population,¹³ as well as revisiting the size of the exclusion zone relative to the specific requirements of any future downlink earth station.

Following the FCC rule changes, both indoor and outdoor license-exempt devices have been successfully operating under the revised rules and higher power levels in this band in the U.S., and Intel is not aware of any reported harmful interference events. Intel recommends ISED adopt rules aligned to the well-considered FCC rules which protect uplink systems in orbit over the U.S. and Canada (operating in the 5150-5250 MHz band) from aggregate interference. With the caveats noted above regarding minimization of the exclusion zone size impact, Intel also concurs with ISED’s plan to protect the downlink system in Ottawa and any future licensed downlink systems.

- C. Should the Department proceed to authorize HPOD’s prior to WRC19, what regulatory approach would best ensure a balance of timely deployment and protection of other existing and future services in the 5150 – 5250 MHz frequency band? Also indicate any and all considerations that should be given to equipment standards, technical requirements, eligibility criteria, and/or conditions of license depending on the relevant approach.

Intel believes ISED should proceed to authorize HPODs prior to WRC-19. The benefits to Canadian consumers and businesses from expeditious adoption of rules¹⁴ outweigh the delay in

¹¹ FCC R&O ¶46.

¹² 47 CFR 15.407(j) [Operator filing requirements].

¹³ For example, future downlink earth stations could consider locating in geographic areas with low population density.

¹⁴ Benefits include greater overall capacity and range for the license-exempt band, and ability to expand coverage outdoors.

awaiting the WRC-19 outcome (and the additional delays from a post WRC-19 rulemaking process).

Regarding the balance between timely deployment and protection, adopting the well-considered regulatory approach taken by the U.S. FCC (to the maximum extent possible) would expedite the process and result in harmonized North American rules. This includes allowing both indoor and outdoor access point use at up to 4W EIRP, a limitation of 125 mW EIRP for outdoor access points at elevation angles above 30 degrees, and notification of deployments consisting of over 1000 access points.

This approach is permissible under Article 4.4 of the Radio Regulations¹⁵ and indeed this was the approach taken by the FCC. ISED's adoption of the FCC rules plus the Canada-specific special consideration related to the downlink earth station operated by the Canadian Space Agency and the Department of National Defence meets the requirements of Article 4.4.

ISED is correct in observing that "there is no guarantee that the international rules for HPOD devices in 5150-5250 MHz will be changed or align with those adopted by the U.S." and that "HPODs could be subject to more restrictive technical rules and operational requirements post WRC-19." Any potential need for changes can be assessed after WRC-19. If more restrictive requirements are adopted at WRC-19, the Canada-specific assessment could still conclude that the aforementioned revised requirements continue to comply with Article 4.4, and no further rule changes would be necessary.

¹⁵ Cited in the ISED Consultation at ¶11.