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Spectrum Management and Telecommunications

# **Consultation on the Technical and Policy Framework for Radio Local Area Network Devices Operating in the 5150-5250 MHz Frequency Band**

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## 1. Intent

1. Through the release of this document, Innovation, Science and Economic Development Canada (referred to hereinafter as the Department) is hereby initiating a consultation on whether to modify the current technical and policy framework for radio local area network (RLAN) devices operating in the 5150-5250 MHz frequency band.

## 2. Legislative mandate

2. The Department, through the [Department of Industry Act](#), the [Radiocommunication Act](#) and the [Radiocommunication Regulations](#), with due regard to the objectives of the [Telecommunications Act](#), is responsible for spectrum management in Canada. As such, the Minister is responsible for developing goals and national policies for spectrum resources use and for ensuring effective management of the radio frequency spectrum resource.

## 3. Legislation

3. The Minister is provided the general powers for spectrum management in Canada pursuant to section 5 of the [Radiocommunication Act](#) and sections 4 and 5 of the [Department of Industry Act](#). Under the [Radiocommunication Act](#), the Minister has the power to establish standards, rules, policies and procedures with regards to radiocommunication, including technical aspects related to broadcasting. The Governor in Council may make regulations with respect to spectrum management pursuant to section 6 of the [Radiocommunication Act](#); these regulations have been prescribed under the [Radiocommunication Regulations](#).

## 4. Policy objectives

4. The Department is guided by the policy objectives of the [Telecommunications Act](#), and the [Spectrum Policy Framework for Canada](#) (SPFC), to maximize the economic and social benefits that Canadians derive from the use of the radio frequency spectrum. The enabling guidelines of the [SPFC](#) state that spectrum management practices, including licensing methods, should respond to changing technology and marketplace demands. In addition, it states that spectrum policy and management should support the efficient functioning of markets by permitting the flexible use of spectrum to the extent possible, by making spectrum available for use in a timely fashion and by ensuring that appropriate interference protection measures are in place.

5. The Department endeavours to harmonize spectrum use with international allocations and standards, except where Canadian interests warrant a different determination. Harmonization leads to larger markets and lower manufacturing costs of equipment due to economies of scale, which results in reduced costs and increased availability for Canadian consumers. As well, spectrum harmonization with international allocations and standards ensures that Canada meets its obligations to comply with the international treaty, the International Telecommunication

Union (ITU) [Radio Regulations](#), as amended by World Radiocommunication Conferences (WRCs) from time to time.

## 5. Background

6. RLAN is a networking technology that uses radio frequency spectrum to allow high-speed data transfer between compatible devices. RLAN devices can provide wireless broadband distribution of information comprised of voice, video, and data. Today, the most commonly known RLAN devices in use are consumer Wi-Fi products, which are based on the Institute of Electrical and Electronics Engineers (IEEE) 802.11 family of standards. These standards continually evolve to improve data rates and capacity. In the future, RLAN devices may be based on other types of technology and standards.

7. RLANs currently operate in different frequency bands, including the 5150-5250 MHz frequency band. Different technical rules (such as power and indoor operation restrictions) apply to RLANs depending on the frequency range in which they operate. These technical rules are derived from the international framework (i.e. the ITU [Radio Regulations](#)) and the domestic spectrum policy framework.

### 5.1 International framework for the 5150-5250 MHz frequency band

8. In the international table of frequency allocations (Article 5 of the ITU [Radio Regulations](#)), the 5150-5250 MHz frequency band is allocated worldwide on a primary basis to the aeronautical radionavigation service, the fixed-satellite service (FSS) (Earth-to-space), limited to feeder links for non-geostationary systems in the mobile-satellite service, and the mobile service, except aeronautical mobile service.

9. A sub-set of this frequency band, 5150-5216 MHz, is also allocated to the radiodetermination satellite service (space-to-Earth), and the fixed-satellite service (space-to-Earth) on a primary basis, limited to feeder links of non-geostationary-satellite systems in the mobile-satellite service.

10. Provisions in the ITU [Radio Regulations](#) stipulate that stations operating in the mobile service, such as RLANs, cannot claim protection from earth stations operating in the fixed-satellite service in the 5150-5250 MHz frequency band. To mitigate harmful interference to stations operating in the other allocated services, RLAN devices are restricted to indoor use with a maximum equivalent isotropically radiated power (e.i.r.p.) of 200 mW in the 5150-5250 MHz frequency band.

11. Article 4.4 of the ITU [Radio Regulations](#) also stipulates that “*Administrations of the Member States shall not assign to a station any frequency in derogation of either the Table of Frequency Allocations in this Chapter or the other provisions of these Regulations, except on the express condition that such a station, when using such a frequency assignment, shall not cause harmful interference to, and shall not claim protection from harmful interference caused by, a*

*station operating in accordance with the provisions of the Constitution, the Convention and these Regulations.”*

## **5.2 Status of the 5150-5250 MHz frequency band in Canada**

12. The [Canadian Table of Frequency Allocations](#) (CTFA) closely aligns with the international framework. The same primary services are allocated in the 5150-5250 MHz frequency band in Canada. This frequency band is not currently used for aeronautical radionavigation or radiodetermination satellite services. However, there are stations in the fixed-satellite service and mobile-satellite service that operate in the 5150-5250 MHz frequency band.

13. Globalstar Canada Satellite Co. operates part of its satellite network in this frequency band. Globalstar’s satellites are connected to the phone network and Internet through a terrestrial network of ground stations called gateways. These gateways use the 5096-5250 MHz frequency band for uplink communication. The gateways are an integral part of Globalstar’s satellite network which provides voice, text, data and tracking services to its customers.

14. The Canadian Space Agency and the Department of National Defence are operating a satellite earth station in the 5150-5216 MHz frequency band to monitor marine traffic over the ocean. Satellites licensed and operated by these Canadian stakeholders collect information from ships, such as identification, position and heading and distribute that information via downlink communication to the earth station, currently located in Ottawa, Ontario.

15. The use of the 5150-5250 MHz frequency band is addressed in Spectrum Utilization Policy SP 5150 MHz, [Spectrum Utilization Policy for Licence-exempt Wireless Local Area Networks in the 5 GHz Range](#), issue 2, April 2005. In addition, the latest version of Radio Standards Specification RSS-247, [Digital Transmission Systems \(DTSS\), Frequency Hopping Systems \(FHSs\) and Licence-Exempt Local Area Network \(LE-LAN\) Devices](#) contains the technical requirements currently in force for the certification of RLAN devices. The rules in [SP 5150 MHz](#) and [RSS-247](#) reflect the current international regulatory framework with RLANs being restricted to indoor use with a maximum e.i.r.p. of 200 mW and operating under a licence-exempt regime.

## **5.3 Status of the 5150-5250 MHz frequency band in the U.S.**

16. In the [United States Table of Frequency Allocations](#), the 5150-5250 MHz frequency band also closely mirrors the international framework. The aeronautical radionavigation service and fixed-satellite service (Earth-to-space) have primary allocations.

17. RLANs can also operate in the 5150-5250 MHz frequency band under [Part 15](#) of the Federal Communications Commission (FCC) rules. Under these rules, operating conditions of the RLAN devices require the operator to accept whatever interference is received and must not cause harmful interference to other radio systems.

18. Prior to 2014, the FCC rules were aligned with the international framework by restricting the operation of the RLAN devices to indoor use with a maximum e.i.r.p. of 200 mW. In the

FCC [Report and Order](#) released on March 31, 2014, the U.S. departed from the international framework for RLAN devices. [Part 15](#) was amended to remove the indoor-only restriction, to increase the permitted power of RLANs devices to a maximum e.i.r.p. of 4 W and to limit RLANs emissions to 125 mW above an elevation angle of 30° to protect domestic satellite (Globalstar) operation, the only U.S. incumbent satellite operator in the 5150-5250 MHz frequency band. In addition, a requirement for RLAN operators to report large-scale deployments (1000 or more) was adopted.

19. In its [Report and Order](#), the FCC stated its view that having a record of large-scale deployments will allow it to take corrective measures if harmful interference does occur to other radio stations at some time in the future. Corrective actions could include reducing power, turning off devices, changing frequency bands, and further reducing power in the vertical direction. It also concluded that the likelihood of harmful interference to domestic satellite operations from RLAN devices would be minimized with the rules it adopted.

## 6. Considerations

20. Since the Department first established the rules governing the use of RLANs in the 5 GHz band, there has been widespread adoption of RLAN devices by consumers, businesses and various industries. The explosion of Wi-Fi-enabled devices such as smartphones, portable computers, tablets, game consoles and smart TVs, is putting pressure on the current capacity of RLAN bands. Moreover, with the increase in commercial broadband traffic, service providers are also deploying Wi-Fi hot spots to off-load some of the traffic from their commercial broadband networks. The proliferation of these devices and the need to off-load broadband traffic are expected to continue in the coming years. According to Cisco,<sup>1</sup> public and home Wi-Fi hotspots in Canada alone will grow from 0.8 million to 10.2 million between 2015 and 2020; representing a 13-fold increase.

21. The Department has received expressions of interest from Canadian stakeholders to review the current RLAN rules with a view of harmonizing with the U.S. by allowing both the current indoor and a new outdoor use of higher power RLAN devices (defined hereinafter as “higher power and outdoor RLAN devices or “HPODs”). It was highlighted that additional spectrum for outdoor use of RLAN devices operating at higher power would alleviate congestion in other RLAN bands (e.g. 2400 MHz and 5800 MHz). Furthermore, an outdoor channel of 160 MHz could be made available for RLAN devices when operating in both the 5150-5250 MHz and 5250-5350 MHz contiguous bands to provide higher throughput.<sup>2</sup> However, it is unclear whether there is widespread Canadian interest and support for authorizing HPOD use in the 5150-5250 MHz frequency band.

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<sup>1</sup> [Global Wi-Fi Market – Global Forecast to 2020 Market](#), TC 2650, 2015

<sup>2</sup> RLAN devices certified under standard IEEE 802.11ac, [IEEE Standard for Information technology--Telecommunications and information exchange between systems--Local and metropolitan area networks--Specific requirements--Part 11: Wireless LAN Medium Access Control \(MAC\) and Physical Layer \(PHY\) Specifications--Amendment 4: Enhancements for Very High Throughput for Operation in Bands below 6 GHz](#) can provide a data link of up to 6.8 Gbps when utilizing a channel bandwidth of 160 MHz.

22. Modifications to the current Canadian framework for the use of RLANs in the 5150-5250 MHz frequency band would represent a deviation from the ITU [Radio Regulations](#). As discussed in paragraph 11, countries adopting rules in derogation of the international framework must ensure that no harmful interference is caused to any stations operating in accordance with the provisions of the [Radio Regulations](#). The Department could consider departing from the international framework under the condition that RLANs will not cause harmful interference to other incumbent services, Canadian or foreign. Concurrently, the Department must also ensure that actions can be taken to remedy harmful interference should it occur.
23. In addition to the Canadian use of the spectrum by satellite systems, several international non-geostationary satellite orbit (NGSO) satellite systems licensed by other countries are currently operating or plan to operate in this frequency band. In absence of detailed technical information, it is unclear how outdoor, higher power deployment of RLAN devices may impact these foreign existing or future NGSO systems.
24. The Department developed technical rules ([RSS-247](#)) and a spectrum utilization policy framework ([SP 5150 MHz](#)) for the operation of RLAN devices in the 5150-5250 MHz frequency band under a licence-exempt (LE) regime. LE devices can operate anywhere in Canada provided the equipment meets the applicable technical rules. They must operate on a “no-interference, no-protection” basis. Currently, LE radio equipment users are not required to provide operational information to the Department, such as the characteristics and the number of devices to be deployed and the locations of the deployment. As discussed in [SP 5150 MHz](#), the LE regime was deemed appropriate given the low risk of harmful interference to incumbent operations resulting from RLANs power limitations, their restriction to indoor use only and their growth potential at the time. The equipment standards in [RSS-247](#) would continue to apply to low-power devices designed for indoor use. The options below address possible approaches to allow the deployment of HPODs in the band.
25. If the Department decided to allow HPODs, a maximum e.i.r.p. of 4 W and an elevation mask towards satellites would likely apply. The Department would also consider requirements such as those adopted by the U.S and additional measures to protect satellite earth stations. The additional measures would include an exclusion zone to protect existing and future satellite earth stations. Because of the small number of earth stations expected to be deployed in the 5150-5250 MHz frequency band, the Department is of the view that an exclusion zone would not have a significant impact on the deployment of HPODs. Based on a study conducted by the Department, an exclusion zone of 25 km could be sufficient to protect the current earth station identified in paragraph 14. Further analysis would be required to determine if 25 km would protect other satellite earth stations deployed in the future. Other requirements may include user registration and rules regarding placement and installation of the devices and obligations to reduce power or take other actions in the case of interference issues. To this end, the Department has explored three approaches which are described below in paragraphs 26-28.
26. One approach would be to develop a detailed LE regime specifically for HPODs. This would entail the development of specific equipment standards and technical requirements that would apply to HPODs in this band. This approach would also involve amendments to the

[Radiocommunication Regulations](#). While a LE approach would minimize the administrative burden on potential users, amendments to the [Radiocommunication Regulations](#) are time consuming and may not support timely deployments of HPODs.

27. A second approach would be to require users to obtain a licence to operate HPODs, and be subject to specific licence conditions. These HPODs would still operate under a strict “no-interference, no-protection” basis. Requirements noted above such as user registration, rules regarding placement and installation of the devices and obligations to reduce power or take other actions in the case of interference issues would be enforced under the relevant provisions of the [Radiocommunication Act](#). This option entails a higher administrative burden for users; however, the process of developing a licensing policy and conditions of licence is often more expeditious than one involving regulatory changes and may allow for more timely deployments of HPODs. The Department could also consider eligibility criteria, such as making licences only available to radiocommunication service providers, in order to minimize both the complexity of licensing and the potential for harmful interference.

28. Alternatively, the Department could defer the review of Canadian HPOD rules until 2020. The international regulatory framework governing the use of HPODs in many parts of the 5 GHz frequency range, including the 5150-5250 MHz frequency band, will be reviewed in late 2019 at the next WRC. This upcoming review may result in changes to the international framework, including additional mitigation techniques to facilitate sharing with incumbent services and the possibility of enabling outdoor operations with associated conditions. Following the outcome of WRC-19, the Department will undertake its usual post-WRC consultation to revise the [CTFA](#), taking into account the results of WRC-19, domestic requirements, and its obligations to comply with the ITU [Radio Regulations](#). As a result, domestic rules relating to the use of HPODs in this frequency band may be further revised after WRC-19. While there is interest within the international community to allow HPODs in the 5150-5250 MHz frequency band, there is no guarantee that the international rules will be changed or align with those adopted by the U.S. Consequently, any deployment of HPODs could be subject to more restrictive technical rules and operational requirements post WRC-19, which in turn could negatively impact business plans and services to consumers.

29. Given the above considerations, the Department is seeking comments on the following points:

- A. the demand for and benefit, if any, of allowing HPODs in the 5150-5250 MHz frequency band before WRC-19.
- "
- B. the potential impacts on domestic and foreign satellite systems in the 5150-5250 MHz frequency band of authorizing HPODs use prior to WRC-19 on the basis of a maximum e.i.r.p. of 4 W. Requirements for an elevation mask towards satellites and an exclusion zone of 25 km around receiving earth stations to protect all satellite systems would likely also apply.
- "
- C. should the Department proceed to authorize HPODs use prior to WRC-19, what regulatory approach would best ensure a balance of timely deployment and the 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 licence depending on the relevant approach.

In providing comments, respondents are requested to include supporting arguments and rationale.

## **7. Next steps**

30. The Department will review the comments received and publish a decision on the questions raised in this consultation paper. Depending on the decision and approach taken, the Department may consult informally with stakeholders, including through the Radio Advisory Board of Canada (RABC), and may develop a further consultation that sets out a more specific proposal.

## **8. Submitting comments**

31. Respondents are requested to provide their comments (in Microsoft Word or Adobe PDF) by [email](#).

32. In addition, respondents are asked to specify question numbers for ease of referencing.

33. All submissions should cite the Canada Gazette, Part I, the publication date, the title and the notice reference number ([SMSE-002-17](#)). Parties should submit their comments no later than 60 days following the date of publication of this document to ensure consideration. Soon after the close of the comment period, all comments received will be posted on the Department's [Spectrum Management and Telecommunications](#) website.

34. The Department will also provide interested parties with the opportunity to reply to comments from other parties. Reply comments will be accepted no later than 15 days following the date of publication of comments.

35. Following the initial comment period, the Department may, at its discretion, request additional information if needed to clarify significant positions or new proposals. In such a case, the reply comment deadline would be extended.

## **9. Obtaining copies**

36. All spectrum-related documents referred to in this paper are available on the [Spectrum Management and Telecommunications](#) website.

37. For further information concerning the process outlined in this document or related matters, contact:

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