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Spectrum Management and Telecommunications

Decision on the Technical, Policy and Licensing Framework for Wireless Microphones

Contents

1. Intent	1
2. Legislative mandate	1
3. Policy objectives	1
4. Background and context	2
5. Spectrum access for wireless microphones	3
5.1 Operation of wireless microphones in the guard band (614-617 MHz) and duplex gap (652-663 MHz)	4
5.2 Additional spectrum for wireless microphones	5
6. Eligibility and approach for licensing of wireless microphone operations	7
6.1 Licensing eligibility criteria	8
6.2 Licensing approach for wireless microphones in the TV broadcasting bands (54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz), the guard band (614-617 MHz) and the duplex gap (652-663 MHz).....	10
6.3 Licensing approach for wireless microphones in the frequency bands 941.5-952 MHz, 953-960 MHz, 6930-6955 MHz and 7100-7125 MHz	13
6.4 Licensing moratorium	14
7. Other comments	15
8. Next steps	16
9. Obtaining copies	16
Annex A: Frequency bands for wireless microphones	17

1. Intent

1. Through the release of this paper, Innovation, Science and Economic Development Canada (ISED), on behalf of the Minister, hereby announces the decisions resulting from the consultation process in SMSE-019-17, [Consultation on the Technical, Policy and Licensing Framework for Wireless Microphones](#) (referred to hereinafter as the Consultation).
2. The decisions announced in Canada Gazette notice SMSE-003-19, address spectrum access and associated licensing mechanisms for wireless microphones operating in the 54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz, 614-617 MHz, 652-663 MHz, 941.5-952 MHz, 953-960 MHz, 6930-6955 MHz, and 7100-7125 MHz frequency bands.
3. While this decision paper makes reference to the use of white space devices in the 600 MHz band, decisions relating to white space devices are addressed in a separate decision SMSE-003-19, [Decision on the Technical and Policy Framework for White Space Devices](#).

2. Legislative mandate

4. The Minister of Innovation, Science and Economic Development, 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 resource use and for ensuring effective management of the radio frequency spectrum resource.
5. Under the [Radiocommunication Act](#), the Minister also has the power to establish standards, rules, policies and procedures with regards to radiocommunication. 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](#).

3. Policy objectives

6. In developing policies and licensing frameworks to make additional spectrum available, ISED is guided by the [Spectrum Policy Framework for Canada](#) (SPFC), which seeks to maximize the economic and social benefits that Canadians derive from the use of the radio frequency spectrum resource.
7. The SPFC's enabling guideline states that spectrum management practices should be responsive 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 and harmonizing spectrum use with international allocations and standards, except where Canadian interests warrant a different determination.

4. Background and context

8. Wireless microphones are used in a wide variety of indoor and outdoor venues such as broadcast studios, on-location news, concerts, live theatre, convention and conference centres, houses of worship, film studios and television production studios. In large sporting events or entertainment productions, hundreds of wireless microphones may be used concurrently.

9. For the purpose of this decision paper, the term “wireless microphones” is used generically and is meant to include other uses and low-power apparatus also permitted under the current regulatory framework, such as systems for cue and control communications and synchronization of video camera signals. Specific descriptions of different types of wireless microphone equipment are included in relevant Radio Standards Specifications (RSS) as listed in table A1 of annex A of this decision paper.

10. Wireless microphones have historically been able to operate in various frequency bands, including the 614-698 MHz frequency band (referred to as the 600 MHz band). Table A1 of annex A provides a list of frequency bands where wireless microphones have been permitted.

11. In 2014, ISED released a consultation to repurpose the 600 MHz band through Canada Gazette notice SLPB-005-14, *Consultation on Repurposing the 600 MHz Band*.

12. In 2015, ISED issued the SLPB-004-15, *Decision on Repurposing of the 600 MHz Band* () (2015 Decision) in which the bands 617-652 MHz and 663-698 MHz were repurposed from broadcast to commercial mobile use. Subsequently, a mobile service band plan was adopted. The band plan also identified the band 614-617 MHz as “the guard band” to ensure coexistence with TV broadcasting below 614 MHz. In addition, the band 652-663 MHz was identified as “the duplex gap” between the mobile uplink and downlink portions in the 600 MHz band. The 2015 Decision also indicated ISED’s intention to conduct a future consultation on issues related to non-mobile services in the 600 MHz band, including wireless microphones.

13. In 2017, ISED issued the Consultation to seek comments on the spectrum available for use by wireless microphones and the associated licensing framework.

14. In conjunction with the release of the Consultation, ISED issued spectrum advisory bulletin SAB-003-17, *Low-power Radio Apparatus, Including Wireless Microphones, in the Band 614-698 MHz*, which established the timeline for the transition of wireless microphones currently operating in the portions of the 600 MHz spectrum that were repurposed for commercial mobile.

15. [Comments](#) and/or [reply comments](#) received on the Consultation are available on ISED’s website and were received from:

- 6Harmonics
- Bell Mobility (Bell)
- Canadian Association of Broadcasters (CAB)

- CBC/Radio-Canada (CBC)
- Department of National Defence
- Dynamic Spectrum Alliance Limited (DSA)
- Lectrosonics
- NAV Canada
- Radio Advisory Board of Canada (RABC)
- Rogers Communications Canada Inc. (Rogers)
- Saskatchewan Telecommunications (SaskTel)
- Sennheiser Canada
- Shaw Communications Inc. (Shaw)
- Shure Inc. (Shure)
- Transport Canada
- Wayne A. Stacey

5. Spectrum access for wireless microphones

16. Wireless microphones in Canada have historically had access to a number of frequency bands as summarized in table A1 of annex A.

17. In TV broadcasting bands, including the 600 MHz band, wireless microphones have had access to those frequencies that are not in use by TV broadcasting users. The specific frequencies and overall amount available to wireless microphones varied by geographic location depending, for example, on the numbers and locations of nearby over-the-air television broadcast transmitters.

18. Wireless microphones and commercial mobile systems will cause interference with each other if they operate in the same frequency range. Thus, with the repurposing of the 600 MHz frequency band from broadcast to commercial mobile, wireless microphones are being transitioned out of the 617-652 MHz and 663-698 MHz frequency bands where commercial mobile systems will operate. This transition will reduce the amount of ultra high frequency (UHF) spectrum available to wireless microphones by 70 MHz. A total of 152 MHz UHF spectrum remains available for use by TV stations and wireless microphones. In addition, with the repacking of TV stations into the remaining TV broadcasting bands there may be very little UHF spectrum left available for use by wireless microphones in locations with a high density of TV stations.

19. The Consultation sought comments on allowing access to additional spectrum to facilitate ongoing deployment of wireless microphone applications. The Consultation requested comments on the operation of wireless microphones in the 600 MHz guard band and duplex gap and in new frequency bands: 941.5-952 MHz, 953-960 MHz, 6930-6955 MHz and 7100-7125 MHz.

5.1 Operation of wireless microphones in the guard band (614-617 MHz) and duplex gap (652-663 MHz)

20. Given the changes to 600 MHz spectrum availability for wireless microphones in Canada, in the Consultation ISED proposed to allow wireless microphones to continue to have access to 614-617 MHz (the guard band) and 652-663 MHz (the duplex gap). This access would be subject to technical rules to prevent harmful interference to mobile service operations in adjacent bands.

21. In the U.S., following its 600 MHz repurposing, wireless microphones are permitted to operate in portions of the guard band and duplex gap. Specifically, the guard band and upper 6 MHz of the duplex gap (657-663 MHz) are available for shared use by unlicensed (licence-exempt) wireless microphones and white space devices. An additional 4 MHz of the duplex gap (653-657 MHz) is available for licensed wireless microphones only. The U.S. reserved 1 MHz of spectrum (616-617 MHz and 652-653 MHz) to protect the adjacent mobile service downlink band.

22. ISED asked if the technical rules in the guard band and duplex gap should be harmonized with those of the U.S. These technical rules would include mandating a maximum equivalent isotropically radiated power (e.i.r.p.) of 20 mW and implementing a 1 MHz frequency separation (616-617 MHz and 652-653 MHz) to protect adjacent mobile service operations in 617-652 MHz band.

5.1.1 Summary of comments

23. The majority of respondents supported ISED's proposal to allow wireless microphones to continue to access the guard band and the duplex gap subject to the devices complying with technical specifications that mitigate interference to mobile services operating in adjacent bands.

24. Comments were divided on the question of harmonization with U.S. technical rules. Rogers, SaskTel, 6Harmonics, and Shure generally favoured the approach to harmonize with U.S. rules. However, Shaw and Rogers suggested that these technical rules may not be sufficiently stringent enough to ensure that future 5G mobile service users would be properly protected from wireless microphone operation. CBC/Radio-Canada and Sennheiser Canada expressed concerns that the transmit power limits used in the U.S. were too low and would unnecessarily limit the reliable operating range of wireless microphones.

5.1.2 Discussion

25. A key consideration for the continued access of wireless microphones in the guard band and duplex gap spectrum is that many devices currently operating throughout the 600 MHz band can be adjusted to operate in the guard band and duplex gap.

26. Harmonizing spectrum access with the U.S. will enable Canada to take advantage of a joint North American equipment ecosystem, benefit from economies of scale and ease operations for crews that cross the border frequently on live production tours. Therefore, ISED recognizes

that wireless microphones should continue to have access to the guard band and duplex gap frequency ranges.

27. With respect to the technical requirements for wireless microphones, responses to the Consultation were split with some respondents indicating that the FCC rules would be overly stringent and others indicating that they would not be stringent enough. ISED agrees that the technical rules applicable to the guard band and duplex gap should facilitate reliable wireless microphone operation without creating harmful interference to adjacent mobile service operations while not being overly stringent.

28. Recognizing that there are a variety of wireless microphone users with varying needs, respondents were divided on harmonization with the U.S. because some differences in Canadian rules may be warranted to support the full range of users while protecting mobile services in adjacent bands. ISED will further consult with stakeholders, including the RABC, to establish appropriate technical rules. The relevant RSSs for wireless microphone operation in the guard band and the duplex gap will be updated including the possible need to impose a guard band from 616-617 MHz and 652-653 MHz.

D1

- Wireless microphones are permitted to operate in the guard band (614-617 MHz) and duplex gap (652-663 MHz) subject to final technical rules to be established. These technical rules could include the possible requirement of a guard band within the bands 614-617 MHz and 652-663 MHz and other technical provisions in order to protect adjacent mobile service bands.

5.2 Additional spectrum for wireless microphones

29. As stated in the Consultation, ISED recognizes that the frequency bands 941.5-952 MHz, 953-960 MHz, 6930-6955 MHz and 7100-7125 MHz bands are well suited for wireless microphones. Potential wireless microphone users are expected to include incumbent users that already make use of the frequencies for studio-to-transmitter links and television auxiliary services.

30. In addition, there is an established international ecosystem for wireless microphones in the 941.5-952 MHz, 953-960 MHz, 6930-6955 MHz and 7100-7125 MHz frequency ranges. In the U.S., portions of the frequency band 941-960 MHz, and 7 GHz are permitted for use by wireless microphones. In Europe, 7-8.5 GHz is among the frequency ranges recommended for use by terrestrial audio and video applications by the Electronic Communication Committee (ECC) of the European Conference of Postal and Telecommunication Administrations (CEPT), and is currently in use by several European countries.

31. Recognizing the importance of providing additional spectrum to accommodate wireless microphone use, ISED sought comments on its proposal to permit their operation in the frequency bands 941.5-952 MHz, 953-960 MHz, 6930-6955 MHz and 7100-7125 MHz.

5.2.1 Summary of comments

32. Overall there was broad support for ISED's proposal to introduce the use of wireless microphones into the frequency bands 941.5-952 MHz, 953-960 MHz, 6930-6955 MHz and 7100-7125 MHz subject to appropriate conditions including a requirement to license wireless microphone use in order to protect incumbent users.

33. DSA, however, favoured reserving the 7 GHz range (6930-6955 MHz and 7100-7125 MHz) for possible future use for remote local area network (RLAN) type devices. DSA noted that ISED should consider the FCC's Notice of Inquiry (NoI), [Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz](#) and parallel activities in Europe on the possible introduction of licence-exempt RLANs in the 7 GHz range. The FCC has since issued a Notice of Proposed Rulemaking (NPRM), [Unlicensed Use of the 6 GHz Band](#), proposing rules for unlicensed indoor devices in the frequency band 6875-7125 MHz.

34. Sennheiser Canada commented that even if RLANs were allowed into the 7 GHz range in the future, the burden on RLANs of protecting wireless microphones in 7 GHz would add little to the far more challenging burden of protecting other incumbents operating in that frequency range.

5.2.2 Discussion

35. The frequency band 941.5-944 MHz is currently used by utilities and municipalities for fixed point-to-point, very low capacity systems. No comments were received specifically on the introduction of wireless microphones in this band. Similarly, no specific comments were received with respect to the band 944-952 MHz. ISED is of the view that given the nature of the existing use in these bands, with an appropriate licensing framework, such as a requirement for wireless microphones to operate on a licensed basis (to be addressed in section 6), wireless microphones would be able to coexist with incumbent users.

36. Broadcasting to studio transmitter links represent approximately 90% of the usage within 953-960 MHz. Likewise, the frequency bands 6930-6955 MHz and 7100-7125 MHz are mainly used by broadcasting entities for fixed service one-way line-of-sight radio systems to provide television auxiliary services. These broadcasting entities are regular users of wireless microphones and have experience in the deployment of wireless microphones that will facilitate band sharing with other incumbent licensees.

37. With regard to the comments from DSA, ISED considered the potential use of licence-exempt RLAN devices in the 5925-7125 MHz band in the [Spectrum Outlook 2018 to 2022](#), and noted the uncertainty regarding international developments and potential future availability of RLAN equipment for this frequency range. However, this uncertainty does not necessarily preclude the use of wireless microphones in the frequency bands 6930-6955 MHz and 7100-7125 MHz, as successful band sharing among RLAN devices and wireless microphones has previously been shown in other frequency bands such as the 2.4 GHz band.

38. ISED will allow use of the 941.5-952 MHz, 953-960 MHz, 6930-6955 MHz and 7100-7125 MHz frequency bands by wireless microphones because of the broad support and compatibility with these bands and the ability to share with incumbent users. Appropriate technical rules to ensure compatibility with incumbent services will be addressed in the context of a planned update of the applicable RSS.

D2

- Wireless microphones are permitted in the frequency bands 941.5-952 MHz, 953-960 MHz, 6930-6955 MHz and 7100-7125 MHz and will be subject to technical rules that will be published in applicable RSS updates.

6. Eligibility and approach for licensing of wireless microphone operations

39. To support the variety of use cases (including among others, indoor, outdoor, professional and amateur) wireless microphones can be operated on a licensed, licence-exempt or voluntarily licensed basis in various bands. The licensing models vary depending on frequency band and are shown in table A1 of annex A.

40. Following the decision released in [October 2012](#) to support the introduction of white space devices into the TV broadcasting bands below 698 MHz (54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz, 614-698 MHz) a number of stakeholders requested that ISED provide wireless microphone users the option to voluntarily license their systems to be protected from white space devices. As a result, a voluntary licensing approach was developed and published in February 2015, which is captured in CPC-2-1-28, [Voluntary Licensing of Licence-Exempt Low-Power Radio Apparatus in the TV Bands](#). The majority of wireless microphone users in the TV broadcasting bands continue to operate on a licence-exempt basis with a relatively small number (75 licensees holding approximately 450 licences) operating on a voluntarily licensed basis.

41. The U.S. has implemented a licensed approach including eligibility criteria in the 653-657 MHz, 900 MHz and 7 GHz bands. Licences are limited to eligible broadcasters and motion picture and television program production entities as well as large venue owners or operators and professional sound companies.

42. ISED sought comments with respect to the licensing approach and, where applicable, licensing eligibility criteria for wireless microphones. Specifically, comments were sought on a combination of licence-exempt and voluntarily licensed (for eligible applicants) approaches for wireless microphones in the TV broadcasting bands (54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz), guard band (614-617 MHz) and duplex gap (652-663 MHz).

43. In addition, a licensed approach (for eligible applicants) was proposed for the 900 MHz (941.5-952 MHz, 953-960 MHz) and 7 GHz (6930-6955 MHz and 7100-7125 MHz) bands. It should be noted that even if licensed, wireless microphones operating in these bands cannot claim protection from nor cause interference to other users.

6.1 Licensing eligibility criteria

44. ISED proposed that eligible applicants be defined as: “Broadcasters and other program producers, as well as large venue operators/owners and professional sound companies employing a significant number of wireless microphones as part of their productions/events.”

45. Applicant eligibility criteria were proposed for the voluntary-licensed use in the TV broadcast and 600 MHz spectrum shared with white space devices, and for the proposed licensed use of the spectrum 941.5-952, 953-960, 6930-6955, and 7100-7125 MHz by wireless microphones.

6.1.1 Summary of comments

46. Responses to the proposed eligibility criteria were varied. CBC/Radio-Canada, SaskTel, RABC, DSA, and Lectrosonics supported ISED’s proposal to introduce eligibility criteria that restrict those who may apply for licences to professional users only. Furthermore, the RABC highlighted that restricting licence eligibility to professional users would facilitate accurate interference calculations, thus preventing interference to applications such as studio-transmitter link/transmitter-studio link (STL/TSL) systems in use by broadcasters in the same bands.

47. Sennheiser Canada, SaskTel, and Shure suggested that more flexibility is required in the definition of eligibility to account for users that demonstrate a need for high-quality audio and whose audiences expect professional quality audio. Sennheiser Canada contended that ISED should follow the FCC approach and not limit licences to entities that employ a significant number of wireless microphones because that approach may be unnecessarily restrictive.

48. Wayne A. Stacey commented that some houses of worship maintain operations that are even more sophisticated than other entities that would be eligible and recommended that ISED be flexible in applying its eligibility criteria.

49. Rogers suggested that the operators of large events, sports complexes, professional theatre operators and professional touring companies should also be considered.

6.1.2 Discussion

50. As stated previously, wireless microphones are permitted either on a licence-exempt or licensed basis, depending on the frequency band. ISED is of the view that in order to ensure the continued use and future access by incumbent users, a licensed approach with limited eligibility for licensing in certain frequency bands is necessary. This approach would enable ISED to ensure that those frequency bands are not overly encumbered by the proliferation of wireless microphones, and at the same time, ensure that any interference issues can be addressed.

51. In defining the eligibility for licensing, ISED recognizes that entities including broadcasters, venue operators and owners (e.g. theatre and concert productions, sporting events), professional sound companies, the entertainment industry, as well as the audio equipment rental

industry could benefit from having access to the spectrum on a licensed basis. However, as was highlighted in the comments, these specific user categories may not adequately capture all users that need reliable communications or that deploy high-quality wireless microphones.

52. Given the comments received, ISED recognizes the benefits of expanding the eligibility criteria to include other operators and users that demonstrate the need for professional high-quality audio while being mindful of the need to share spectrum with other users including white space devices. ISED further recognizes that even small system configurations may require high-quality deployments and will therefore remove the requirement for a “significant number of devices” from the definition.

53. Therefore, ISED is defining eligible applicants as: “Broadcasters and other program producers, large venue operators and owners, professional sound companies, and theatre, music, sporting venues, and other similar event organizations that require high -quality audio wireless microphones as part of their productions or events.” While the applicant eligibility criteria have been clarified, there remains some flexibility for their practical application.

54. Applicants for licences will be asked to demonstrate how they meet the eligibility criteria. Meeting the eligibility criteria will be an ongoing obligation. In addition, to the specific user eligibility criteria defined in this decision, all *Radiocommunication Act* licensees must meet the eligibility criteria set out in section 9 of the *Radiocommunication Regulations*.

55. Some respondents noted that certain existing licence holders might not qualify under the proposed new eligibility criteria, but currently use high-quality microphones as part of their regular operations or have established activities relying on protection from white space devices. Given the relatively small number of voluntary licences that would fall into this category, there would be minimal impact on the spectrum available to white space devices if continued licensing of these existing devices was to be supported. Thus, those licence holders that do not meet the new eligibility criteria will be allowed to keep their existing licence(s) if they are licensed for spectrum that is unaffected by the transition plan (see [SAB-003-17](#)), or may apply for a new licence within the bands shared with white space devices if they are affected by the transition.

D3

- In the frequency bands where wireless microphones share with white space devices and in the frequency bands 941.5-952 MHz, 953-960 MHz, 6930-6955 MHz, and 7100-7125 MHz, eligible applicants for licensing are defined as: “Broadcasters and other program producers, large venue operators and owners, professional sound companies, and theatre, music, sporting venues, and other similar event organizations that require high-quality audio wireless microphones as part of their productions or events.”

D4

- Current voluntary licensees as of the date of release of this decision, whether they meet the new eligibility criteria or not, will be considered eligible for the purposes of replacing or renewing their current voluntary licence(s). The replacement or renewed licence(s) must be within spectrum shared with white space devices that can be voluntarily licensed.

Licensing approach for wireless microphones in the TV broadcasting bands (54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz), the guard band (614-617 MHz) and the duplex gap (652-663 MHz)

ISED sought comments on its proposal to continue the approach of allowing voluntarily licensed microphones in all bands shared with white space devices (54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz, 657-663 MHz) and allowing licence-exempt wireless microphones in the TV broadcasting bands (54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz), guard band (614-617 MHz) and duplex gap (652-663 MHz).

6.2.1 Summary of comments

56. The RABC, Bell, CAB, SaskTel, Rogers, CBC/Radio-Canada, Shure, and Sennheiser Canada supported continuing the current approach of allowing voluntarily licensed and licence-exempt wireless microphones in all spectrum where white space devices operate. Sennheiser Canada commented that this licensing approach has worked well in other countries.

57. There were differing licensing proposals from respondents for the guard band (614-617 MHz) and duplex gap (652-663 MHz) based on whether or not ISED's decision for those frequency bands would be shared with white space devices.

58. Stakeholders, including the CBC/Radio-Canada, Rogers, Bell, CAB, and participants representing broadcasters and the mobile service industry in the RABC, favoured the use of the guard band and duplex gap by wireless microphones only and suggested a licence-exempt approach. These stakeholders commented that the licence-exempt approach would provide broadcasters with the flexibility and speed to cover news events without the burden of having to register wireless microphone locations in a white space database. In addition, broadcasters advised that operating on a licence-exempt basis would reduce operating costs for users.

59. Other stakeholders including SaskTel and Shure supported limiting the guard band and duplex gap to wireless microphones only, but preferred both a licence-exempt and licensed approach to alleviate coordination challenges and congestion.

60. Another set of stakeholders, including CanWisp and the Canadian Electronics and Communications Association (CECA) as part of their input to the RABC submission, as well as DSA and 6Harmonics disagreed. These respondents recommended that Canada harmonize with the U.S. approach that permits sharing of the guard band and duplex gap between wireless

microphones and white space devices. They suggested using the U.S. approach of permitting shared use of the upper 6 MHz portion of the duplex gap (657-663 MHz) by wireless microphones and white space devices. This approach highlights Canada's high-level spectrum policy objective to "harmonize spectrum use with international allocations and standards except where Canadian interests warrant a different determination." Permitting the use of white space devices in the upper portion of the duplex gap would provide an additional North America wide spectrum option for white space devices. Furthermore, these stakeholders requested that wireless microphones be permitted to operate on a licence-exempt basis only.

61. Additionally, DSA commented that even though they agree with the U.S. rules for wireless microphone use in the duplex gap and guard band, they do not see a need for adopting the U.S. requirement for licence-exempt wireless microphone users to register with a white space database to determine available channels in the upper 6 MHz segment of the duplex gap. Sennheiser Canada agreed with DSA on this matter.

62. Respondent Wayne A. Stacey proposed that any licence-exempt wireless microphone user previously operating in the TV bands below 617 MHz should be permitted to acquire a (voluntary) licence. In addition, he suggested that if licensing is to be restricted to eligible applicants only, then this restriction should only be applicable in the duplex gap and the higher bands proposed in the Consultation.

6.2.2 Discussion

63. Licence-exempt wireless microphone users noted that the devices provide an important function for many industries because of their flexibility and rapid deployment capability for special events, news gathering, and in-studio uses. Licence-exempt operation means a low regulatory burden facilitating ease of access to and increased usage of spectrum. Licence-exempt wireless microphone users are not required to pay annual licence fees and may operate anywhere in Canada provided that applicable regulatory and technical standards are met.

64. The extensive use of licence-exempt wireless microphones, respondent comments, and the reduced spectrum availability in the TV broadcast bands are all factors supporting the continued operation of wireless microphones on a licence-exempt basis across all TV broadcasting bands and within the 600 MHz duplex gap and guard band. Although the U.S. has established a 4 MHz block of the 600 MHz duplex gap restricted to licensed wireless microphones, ISED sees a benefit to maintaining a uniform approach of licence-exempt use across the TV broadcast bands, guard band and duplex gap.

65. Wireless microphone users also indicated a need in some instances for interference protection from dynamically configurable white space devices, especially if white space devices experience significant growth in deployment in the coming years. ISED notes that this interference protection is a consideration only in bands where wireless microphones and white space devices share spectrum, as there is no protection between licensed and licence-exempt wireless microphones that both operate on a no-interference, no-protection basis with respect to each other.

66. ISED continues to support shared use of spectrum between wireless microphones and white space devices. To ensure spectrum sharing between these applications, only eligible applicants as defined by ISED in section 6.1.2 will be permitted to voluntarily apply for licensing of their wireless microphones in the frequency bands shared with white space devices.

67. Responses from consultation SMSE-018-017, [Consultation on the Technical and Policy Framework for White Space Devices](#) indicated strong support for the use of white space devices in the duplex gap, resulting in a [decision](#) to allow white space devices to use the upper 6 MHz portion of the duplex gap (657-663 MHz). Given the white space decision and the existing framework for spectrum sharing between wireless microphones and white space devices, only eligible applicants will be permitted to apply for voluntary licences for their wireless microphones using the upper 6 MHz portion of duplex gap.

Voluntarily licensed wireless microphones will only be protected from white space devices provided their geographic coordinates, operating parameters, and intended period(s) of operation are registered in an ISED-designated [white space database](#). As specified in annex C, item 5 of the *CPC-4-1-01, Application Procedures for White Space Database Administrators (WSDBAs)*, the WSDBA is not permitted to charge fees for the registration of licensed stations. In the current regulatory framework, licence-exempt wireless microphones may not register with a white space database.

D5

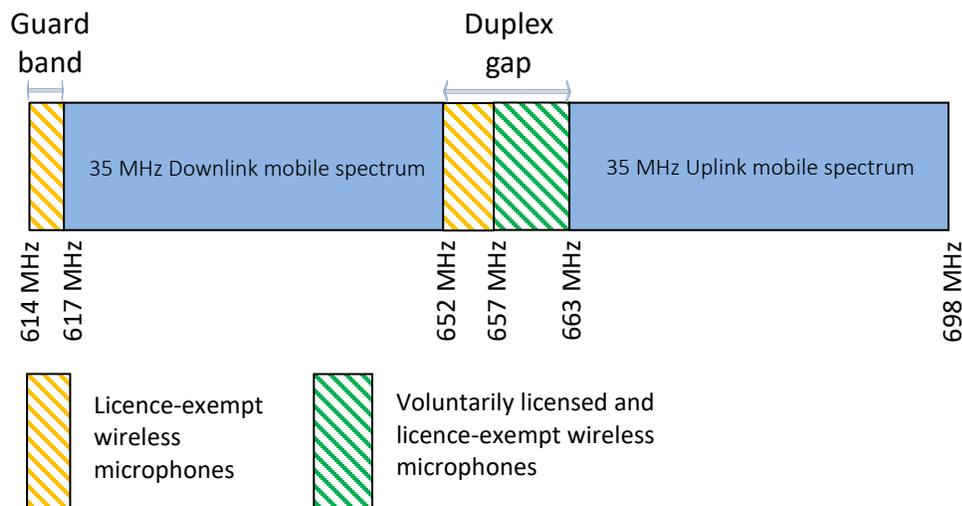
- Wireless microphones can continue to operate on a licence-exempt, no-protection, no-interference basis across the TV broadcasting bands (54-72 MHz, 76-88 MHz, 174-216 MHz and 470-608 MHz).
- Wireless microphones are permitted to operate on a licence-exempt, no-protection, no-interference basis within the 600 MHz guard band (614-617 MHz) and duplex gap (652-663 MHz) subject to new technical rules that will be published in applicable RSS updates.

D6

- Wireless microphones can continue to operate on a voluntarily licensed basis across the TV broadcasting bands (54-72 MHz, 76-88 MHz, 174-216 MHz and 470-608 MHz).
- Wireless microphones are permitted to operate on a voluntarily licensed basis within the upper portion of the duplex gap (657-663 MHz) subject to new technical rules that will be published in applicable RSS updates.
- Only eligible applicants (as defined in section 6.1.2) may apply for a voluntary licence.
- Voluntarily licensed wireless microphone operators must continue to register their operation with a white space database in order to be protected from harmful interference from white space devices.

68. Figure 1 shows the operation and licensing of wireless microphones between 614-698 MHz subsequent to this decision.

Figure 1: Wireless microphones operating in the frequency band 614-698 MHz



6.3 Licensing approach for wireless microphones in the frequency bands 941.5-952 MHz, 953-960 MHz, 6930-6955 MHz and 7100-7125 MHz

69. ISED sought comments on its proposal to license the operations of wireless microphones to eligible users on a no-interference, no-protection basis in the frequency bands 941.5-952 MHz and 953-960 MHz, 6930-6955 MHz and 7100-7125 MHz.

6.3.1 Summary of comments

70. Stakeholders including the RABC, Bell, Lectrosonics, SaskTel, Rogers, Shaw, CBC/Radio-Canada, CAB, and Shure supported ISED’s proposal to require wireless microphones to operate on a licensed basis in the frequency bands 941.5-952 MHz, 953-960 MHz, 6930-6955 MHz and 7100-7125 MHz. The RABC suggested that a licensed approach balances the need for additional spectrum with the need to protect incumbent fixed services within these bands.

71. Although DSA argued against introducing wireless microphones in the 6930-6955 MHz and 7100-7125 MHz bands, DSA added that if wireless microphones are allowed to operate in these frequency bands, they should be authorized on a licence-exempt basis only, in case ISED decides to authorize licence-exempt RLANs in the same spectrum in the future.

6.3.2 Discussion

72. The bands 941.5-952 MHz and 953-960 MHz, 6930-6955 MHz and 7100-7125 MHz are used by incumbent services for multipoint communication systems, fixed point-to-point systems,

studio-to-transmitter links, and line-of-sight radio systems used to provide auxiliary television services.

73. A licensing requirement for wireless microphones allows for the imposition of licence conditions to prevent interference to incumbent services, while also mitigating the risk of a proliferation of wireless microphones. Moreover, licensing wireless microphones on a no-interference, no-protection basis will further ensure the interference-free operation of incumbent services and systems.

74. Given the nature of the incumbent applications (typically outdoor fixed service systems) with respect to the low power levels and corresponding small coverage area of wireless microphones, there is a strong likelihood that these systems can coexist through a licensing approach.

D7

- The operation of wireless microphones in the frequency bands 941.5-952 MHz, 953-960 MHz, 6930-6955 MHz, and 7100-7125 MHz is on a licensed, no-interference, no-protection basis. A radio license is required for the use of wireless microphones in these bands.
- Only eligible users (as defined in section 6.1.2) will be allowed to apply for licences for the operation of wireless microphones in these bands.

76. An updated list of frequency bands for wireless microphones and associated licensing mechanisms can be found in table A2 of annex A.

6.4 Licensing moratorium

75. In 2014, ISED placed a moratorium on new applications for licensing of wireless microphones in the TV broadcasting bands, given the potential for changes and reorganization of services stemming from the repurposing of the bands. The moratorium was to remain in place until the revised TV allotment and transition plans for 600 MHz, spectrum utilization policies and technical and regulatory rules for wireless microphones in the TV broadcasting bands were put in place.

76. All of the factors relevant to lifting the moratorium in the TV broadcasting bands have been addressed, and the moratorium can be lifted in 54-72 MHz, 76-88 MHz, 174-216 MHz, and 470-608 MHz. As new technical rules are required for wireless microphone operation in the upper portion of the duplex gap the licensing moratorium will remain in effect for 657-663 MHz. ISED intends to lift the moratorium on the licensing of wireless microphones in the band 657-663 MHz once new technical rules are established.

D8

- With this decision, ISED is lifting the moratorium on applications for voluntary licences by eligible wireless microphone users within the TV broadcasting bands (54-72 MHz, 76-88 MHz, 174-216 MHz, and 470-608 MHz).
- A moratorium on issuance of voluntary licences for wireless microphones will remain in place for the upper portion of the duplex gap (657-663 MHz) shared with white space devices until final technical rules are established. ISED intends to lift the moratorium on the licensing of wireless microphones in the band 657-663 MHz, once new technical rules are established.

7. Other comments

77. Although ISED did not seek comments on the transition plan (see SAB-003-17) for wireless microphones in the Consultation, the Canadian Broadcasting Corporation (CBC)/Radio-Canada, broadcasters within the RABC, CAB and Sennheiser Canada suggested changes to the transition measures. They all recommended extending the transition period for wireless microphones, so that they may continue to operate and use their existing equipment longer. In particular, CAB argued that currently there is no risk of interference from wireless microphones to mobile services, since mobile services will not be deployed until after the completion of the digital television transition (DTT) schedule. Furthermore, it was suggested that licence-exempt wireless microphones should be permitted to continue operation until the DTT schedule is complete.

78. Sennheiser Canada also requested that existing licence-exempt wireless microphones in the 600 MHz frequency range be allowed to continue operating until mobile services are deployed. Furthermore, they suggested allowing the lease and importation of wireless microphones, so touring companies could continue to operate in Canada, further noting that manufacturers need at least three years to develop and launch a product.

79. In response to the above comments, as indicated in the SLPB-005-17, [Consultation on a Technical, Policy and Licensing Framework for Spectrum in the 600 MHz Band](#), ISED notes that low-power apparatus including wireless microphones are not able to operate in the 600 MHz band without interference with mobile services. Mobile services may deploy soon after the auction is complete once licences have been awarded. Given that the locations of licence-exempt wireless microphones are unknown, it is not possible to coordinate the rapid deployment of mobile services with users of wireless microphones. Therefore, ISED will maintain the previously communicated transition plan for wireless microphones operating within the 600 MHz band. For details, please refer to the spectrum advisory bulletin SAB-003-17, [Low-power Radio Apparatus, Including Wireless Microphones, in the Band 614-698 MHz](#).

80. ISED's approach of not permitting wireless microphones in the 960-1164 MHz frequency band was supported by all respondents, except Sennheiser Canada. Sennheiser Canada urged ISED to consider the required protection mechanisms to make this band available for wireless

microphone devices. The CEPT has recently started studying this frequency band for use by low-power audio wireless microphones.

81. The Department of National Defence, NAV Canada and Transport Canada highlighted that the 960-1164 MHz band is currently allocated to and in use by services that support safety-critical air traffic control services including navigation and surveillance systems. Furthermore, Transport Canada highlighted the risk for potential disruption of air navigation facilities and aircraft operations that could result from the use of wireless microphones in this band.

82. Given the amount of existing licensed and licence-exempt spectrum for the operation of wireless microphones in Canada, the additional frequency bands for wireless microphones being made available through this decision, and the challenges associated with sharing with aeronautical services in the band, ISED does not see an immediate need for making the 960-1164 MHz frequency band available for the operations of wireless microphones at this time. ISED will continue to monitor international trends and developments regarding wireless microphone operations in this and other frequency bands.

8. Next steps

83. ISED will update the appropriate technical rules as a result of the policy decisions made in this document.

9. Obtaining copies

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

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

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Annex A: Frequency bands for wireless microphones

Table A1			
Frequency bands where wireless microphone use was permitted prior to the release of this decision paper			
Frequency band (MHz)	Licensing mechanism	Radio standards specification (RSS)	Licensing procedure, where applicable
26.10-26.48 (HF), 88-107.5 (FM), 150-174 (VHF), 450-451, 455-456 (UHF)	Licensed	RSS-123	CPC-2-1-11
72-73, 74.6-74.8, 75.2-76	Licence-exempt	RSS-210 annex C	n/a
88-108 (FM), 902-928, 2400-2483.5, 5725-5850	Licence-exempt	RSS-210 annex B	n/a
54-72, 76-88, 174-216 (VHF) 470-608, 614-698* (UHF)	Licence-exempt	RSS-210 annex G	n/a
54-72, 76-88, 174-216 (VHF) 470-608, 614-698* (UHF)	Voluntarily licensed	RSS-210 annex G	CPC-2-1-28
902-928, 2400-2483.5, 5725-5850	Licence-exempt for digital modulation	RSS-247	n/a

* As a result of SAB-003-17, on May 25, 2018, ISED no longer accepted applications for the certification of new low-power apparatus that operate in the bands 617-652 MHz and 663-698 MHz. As of November 15, 2018, no low-power apparatus in the bands 617-652 MHz and 663-698 MHz may be sold, offered for sale, manufactured, imported, distributed or leased on the Canadian market.

Table A2			
Frequency bands where wireless microphone use is permitted as of the release of this decision paper			
Frequency band (MHz)	Licensing mechanism	Radio standards specification (RSS)	Licensing procedure, where applicable
26.10-26.48 (HF), 88-107.5 (FM), 150-174 (VHF), 450-451, 455-456 (UHF)	Licensed	RSS-123	CPC-2-1-11
941.5-952, 953-960, 6930-6955, 7100-7125	Licensed (if eligible)	TBD	TBD
72-73, 74.6-74.8, 75.2-76	Licence-exempt	RSS-210 Annex C	n/a
88-108 (FM), 902-928, 2400- 2483.5, 5725-5850	Licence-exempt	RSS-210 Annex B	n/a
54-72, 76-88, 174-216 (VHF), 470-608, 657-663 (UHF), 614-617, 652-657 (UHF)	Licence-exempt	RSS-210 Annex G*	n/a
54-72, 76-88, 174-216 (VHF), 470-608, 657-663 (UHF)	Voluntarily-licensed (if eligible)	RSS-210 Annex G*	CPC-2-1-28*
902-928, 2400-2483.5, 5725-5850	Licence-exempt for digital modulation	RSS-247	n/a

* To be updated to reflect decision including eligibility.