

Before the
Innovation, Science and Economic Development Canada (ISED)
Ottawa, Ontario

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Consultation on the Technical, Policy and Licensing Framework for Wireless Microphones
Notice Reference Number: SMSE-019-17

COMMENTS OF SENNHEISER CANADA

A. SUMMARY

We applaud Innovation, Science and Economic Development Canada (ISED) for its recognition of the vital role and ubiquitous nature of wireless microphones in professional applications as well as civic life. As ISED points out, harmonized bands for wireless microphone use benefit operators logistically and economically.

Wireless microphones should be allowed to operate in the entire duplex gap and lower guard band of the repurposed spectrum. Usual wireless microphone radiated power levels of 50 mW should be permitted in these bands.

ISED should also reserve two UHF vacant channels to ensure clean prime spectrum for hyper-critical applications.

Wireless microphones should be permitted in the frequency bands 941.5-952 MHz and 953-960 MHz in harmony with the United States.

Operation should be allowed in the 6930-6955 MHz and 7100-7125 MHz, but wave propagation and body absorption characteristics in these bands will limit their applications.

Wireless microphones should be permitted in 960-1164 MHz in harmony with the U.K, as well as 1435-1525 MHz in harmony with the U.S. and several European nations (1518-1525

MHz) as well as 1350-1400 MHz, and consistent with the conclusion of ITU-R 2338 that additional spectrum below 2 GHz needs to be identified and made available to wireless microphones.

License eligibility should be consistent with that in the United States. ISED should consider including operators that may become newly eligible after the FCC finalizes a pending proceeding on expanding eligibility.

ISED should consider opening the 169-172 MHz band to wireless microphones, in harmony with the regulations in the United States, primarily to accommodate civic applications.

Leasing and importation of existing 600 MHz equipment should be permitted for professional tours until mobile service deployment.

B. ABOUT SENNHEISER

Sennheiser Canada is a wholly-owned subsidiary of Sennheiser electronic GmbH & Co. KG, headquartered in Germany. The parent company is a global leader in microphone technology, RF-wireless and infrared sound transmission, headphone transducer technology, and active noise cancellation. The Canadian subsidiary, based in Point Claire, Québec, represents Sennheiser products in Canada and distributes a variety of other professional audio lines.

C. WIRELESS MICROPHONES ARE VITAL TO THE ECONOMY AND CANADA'S PUBLIC LIFE

Wireless microphones are more than a convenience. They are vital to a major component of Canada's economy. Wireless microphones are ubiquitous in all aspects of the entertainment

business, in news reporting, in sports, and in commercial, civic, and religious life. They are essential to the production of virtually all non-studio broadcast events, and to nearly all studio-produced programs as well. These include team sports from local college games to the Stanley Cup and the Grey Cup; political events; post-election national and local coverage; major award shows; and one-time events such as the Olympics; and on-the-scene news reporting of all kinds, both local and national. These broadcasts routinely attract countless viewers. Motion-picture production, from professionally made movies down to student work at the local college, relies heavily on wireless microphones for clear, accurate audio. Live events, from big-city theatre productions to stadium-sized outdoor concerts, need wireless microphones to reach the back row. Presenters in auditoriums, lecture halls, and houses of worship find them indispensable.

The repurposing of spectrum from traditional over-the-air TV to mobile broadband promotes the *distribution* of content, which has largely become commoditized. Wireless microphones, in contrast, contribute to the *creation* of content, with value limited only by the quality of writing and production. The public expects the very highest standards of production quality in all forms of television, radio, film, and live entertainment. Driven by these expectations, North American news and entertainment content is globally acknowledged as the best in the world. The widespread popularity of these products has made entertainment content not only a major domestic industry, but also a leading export. Wireless microphones are key production tools that fuel these successes. Whether news, entertainment, or emergency alerts arrive through your TV, radio, smart phone, tablet, computer, or at a live event, the audio was most likely captured with wireless microphones. They benefit millions of Canadians each day.

The products available in unlicensed bands, such as the 902-928 MHz and 2.4 GHz bands, are generally unsuited to professional applications. The low available power and high

interference levels lead to unreliable performance. Critical users insist on professional-grade TV band microphones because nothing else works as well. The producers of live musical theatre, for example, need microphones having both the highest quality sound reproduction and absolutely reliable, drop-out-free performance.

In short, clean prime spectrum, including the UHF TV band for wireless microphones, are important to Canada and its economy.

D. Wireless Microphones Require Clean UHF

Worldwide, virtually all professional wireless microphones operate in vacant UHF TV bands because UHF spectrum fulfills the requirements of demanding microphone applications. Wireless microphone owners and operators, especially licensed professionals, have been deeply impacted by the 700 MHz reallocation a few years ago, the repurposing of the 600 MHz band, and the subsequent repacking of TV stations that will congest the lower UHF channels. Currently, a typical studio or live production uses six to ten UHF TV channels to operate their wireless links, often shared by a hundred microphones. Within a few years UHF for wireless microphones will become scarce.

Many wireless mics can operate outside UHF, but hyper-critical applications demand and deserve the propagation characteristics that only UHF can provide. This is vital for licensed professionals. Live performances and many other situations involve the use of both microphones and in-ear monitors (also regulated as wireless microphones). These have to operate on different blocks of spectrum, separated by at least several megahertz, in order to prevent interference (as

with other duplex radio systems). ISED should reserve two six-megahertz UHF channels for wireless microphone operations.

Other portions of 600 MHz that will allow for wireless microphones – the duplex gap and the guard band – are buffers for out-of-band emissions from wireless services. Studies show this noisy spectrum could cause harmful interference to microphones. This problem is exacerbated if microphones are allowed only very low power levels. The duplex gap and the guard band do not qualify for mission critical microphones—which is why reserved UHF microphone channels are so vital.

E. ADDITIONAL BANDS SHOULD ALSO BE MADE AVAILABLE TO WIRELESS MICROPHONES

Demand for content creation has never been more robust. As audiences become more demanding, productions become increasingly sophisticated and complex. The future will require exacting resolution and multi-channel audio formats. Per the conclusions of the International Telecommunications Union (ITU-R 2338),¹ the United Nations specialized agency on information and communications, additional spectrum below 2 GHz is required to meet the growing needs of wireless microphones. The FCC in the United States has also recognized this. Thus, the FCC now permits microphone operation in 1435-1535 MHz with provisions to protect the incumbent service, aeronautical mobile telemetry. Portions of this band (1518-1525 MHz) as well as 1350-1400 MHz are approved for wireless microphones in several European countries (e.g., Austria, Germany, Slovenia). Likewise, OFCOM in the United Kingdom finalized

¹ Report ITU-R BT.2338-0 (03/2015), *Services ancillary to broadcasting/services ancillary to programme making spectrum use*, available at https://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-BT.2338-2014-PDF-E.pdf

extensive studies and now allows wireless microphone operation in the 960-1164 MHz aviation band. European CEPT (47 countries) has mandated studies of wireless microphones for this band. United Arab Emirates, Australia, and New Zealand are also considering wireless microphone use of this band.

F. ANSWERS TO QUESTIONS POSED BY ISED

Q1) Sennheiser supports the ISED proposal to allow wireless microphones to operate in the guard band (614-617 MHz) and the 11 MHz Duplex Gap (652-663 MHz).

A.) ISED should allow the usual 50 mW output power for wireless microphones operating in the guard bands and duplex gap. A 20 mW power level will make wireless microphone operations less reliable. By definition, the guard bands are likely to have high noise floors and out-of-band emissions from adjacent services. A maximum power of 20 mW would create a low carrier-to-noise ratio and therefore impaired range, subjecting wireless microphones to much more interference than at 50 mW (or 20 mW on a clean channel). ISED should allow a maximum power output of 50 mW for wireless microphones that meet the ETSI masks, as out-of-band emissions are very low outside these masks.

Even at 50 mW, wireless microphones are flea-powered devices that are far more often victims of interference rather than instigators. Operators proactively avoid co-channel operation in order to forestall receiving potential interference and thus prevent causing it as well. In the United States the FCC relied upon a theory that the aggregated power of several wireless microphones operating on one channel requires a lower power limit than White Space Devices or currently operating wireless microphones. The FCC

failed to factor in evidence in the record that body attenuation will decrease the interference potential from wireless microphones by a significant margin, thereby enabling wireless microphones to operate in the same channel and at higher power (50 mW) without causing harmful interference to wireless services.

B.) A 1 MHz guard band is not needed around the down-link block to protect mobile services. Wireless microphones have a successful history of peaceful coexistence with adjacent services, even when operating at higher power (e.g., 250 mW) and immediately adjacent (with no guard band) to mobile and broadcast services.

Q2) Sennheiser supports the ISED proposal to allow wireless microphone operation in the frequency bands 941.5-952 MHz, 953-960 MHz, 6930-6955 MHz, and 7100-7125 MHz. These will partially coincide with the bands that have been adopted in the United States by the FCC.

The bands 941.5-952 MHz and 953-960 MHz in particular can be a good alternative to the 600 MHz band because of generally similar wave propagation characteristics.

In contrast, applications in the 7 GHz will be limited due to high body absorption rates, power limit restrictions imposed on wireless microphones, and short-wavelength propagation characteristics. These frequencies are best suited for short range, line-of-sight applications such as a reporter using a handheld microphone transmitter directly in front of a video camera equipped with the mating microphone receiver.

Q3) Sennheiser supports the ISED proposal to allow license exempt and voluntary licensing in the broadcasting bands. This structure has worked well throughout the world. Broadcasters,

motion picture producers, cable stations, and certain other creators of content have traditionally been eligible to operate wireless microphones under a license. In the United States, license eligibility has been expanded to include venues and sound companies routinely using 50 wireless microphones or more. The FCC is considering expanding eligibility further to include parties that can demonstrate a particular need for, and the capability to provide, professional high-quality audio through use of fewer than 50 wireless microphones, where the use is an integral part of events or productions. ISED should also adopt this standard.

Q4) All licensed operators should be permitted to use the 941.5-952 MHz, 953-960 MHz, 6930-6955 MHz, and 7100-7125 MHz bands. Previously in the United States, the FCC limited the 944-952 MHz STL band to licensed wireless microphone operators that were broadcasters, but now allows use of the effectively expanded 941.5-960 band to all licensed wireless microphone operators. ISED should follow suit.

G. 169 – 172 MHz BAND

In the United States, the rules governing the 169-172 MHz band (below the high band VHF TV channels) were revised to make this range more practical for wireless microphones. Specifically, the FCC adopted optimized channelization that will allow more wireless microphones to operate simultaneously in this band. Operation will be uniform nationwide – an advantage for performers and providers who travel. This band can accommodate many semi-pro yet important entities such as local government agencies; commercial entities in general; educational, philanthropic, or ecclesiastical institutions; houses of worship; hospitals, clinics, and

medical associations; and countless others. We ask ISED to permit wireless microphones in this band.

H. LEASE AND IMPORTATION OF 600 MHZ EQUIPMENT

We urge the ISED revise the wording of paragraph 18b in the following manner:

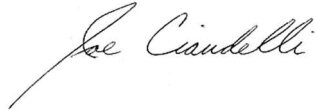
*The manufacturing, importation **for sale**, distribution, ~~lease~~, offer for sale or sale of wireless microphones able to operate in the frequency bands 617-652 MHz and 663-698 MHz will no longer be permitted as of November 2, 2018. **The leasing of wireless microphones operating in these bands, and the importation of wireless microphones operating in these bands other than for sale or distribution, will be permitted until mobile service deployment.***

This will allow legitimate major touring productions to enter Canada and operate equipment that would otherwise be legal throughout the transition period and is consistent with the intent of paragraph 18e of the Consultation. In the United States, wireless microphone manufacturers stated on the record that the launch of products that comply with new regulations would require at least three years after all the technical requirements were defined. The FCC only finalized the last equipment regulations in Q3 of 2017. Therefore, North American products operating in alternate ranges outside of TV spectrum will likely not become available until 2020, well after the ISED November 2, 2018 deadline.

I. CONCLUSION

Adequate spectrum resources for wireless microphones are vital to the Canadian economy and a smooth transition of the 600 MHz band.

Respectfully Submitted,



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