**Comments to the ACMA on the Draft Five Year Spectrum Outlook 2021-2026**

**April 26, 2021**

**FILED ELECTRONICALLY**

Spectrum Management Outlook and Strategy Section

Australian Communications and Media Authority (ACMA)

**Re: Five Year Spectrum Outlook 2021-2026 (FYSO)**

Ladies and Gentlemen,

Shure Incorporated welcomes the opportunity to comment on the Draft Five Year Spectrum Outlook 2021-2026 (“FYSO”) of the Australian Communications and Media Authority (ACMA).

For more than 95 years, Shure has been a respected manufacturer of high-quality, innovative audio products. Shure products ([www.shure.com](http://www.shure.com)) are utilized worldwide in applications known as audio-PMSE (also known as SAB/SAP/ENG), which includes deployments in industries such as broadcast and film production, theatre and music productions, and other professional indoor and outdoor media content creation, in addition to a variety of other civic, business, and special event contexts. These applications continue to grow annually in scale and density to meet the needs of broadcast and event producers engaged in increasingly complex productions to meet audience expectations. Audio is of prime importance in the world of PMSE. Without the "audio" component, the principal purpose of an event can be completely undermined. A For example, in an event where wireless PMSE is compromised by interference or lack of suitable spectrum, a CEO, political leader, or entertainer, simply will not be able communicate with the audience or give the performance that the audience expects.

The continued availability of sufficient, interference-free spectrum is key to meet demand for wireless PMSE technologies (e.g. wireless microphones, In-Ear-Monitor Systems). With this in mind, Shure has actively participated in various proceedings around the world considering spectrum policies affecting PMSE, e.g. by filing comments in the recent consultation of the Saudi Arabian Regulator CITC on its Spectrum Outlook[[1]](#footnote-1), New Zealand[[2]](#footnote-2) , the United Kingdom (Ofcom)[[3]](#footnote-3) and various EU (RSPG)[[4]](#footnote-4) and U.S. (Federal Communications Commission - FCC) filings.[[5]](#footnote-5)

In the “Issues for Comment” section of the Draft FYSO, ACMA asks: “*Are there other technology developments or sources of spectrum demand that the ACMA should be aware of in considering spectrum management over the next 5 years?”*

We note that the FYSO does not specifically mention any provision for the future spectrum needs of wireless microphones[[6]](#footnote-6), which currently share spectrum with digital television services in the 600 MHz band and operate under the LIPD class licence. We also note that the ACMA intends to re-plan the use of the 617-698 MHz band in the future, potentially consolidating television services into the lower part of the UHF band. Elsewhere, this has resulted in a critical lack of spectrum for wireless microphones. Given that UHF (470 – 698 MHz) remains the primary global band for wireless microphone operation, Shure is concerned that ACMA’s re-plan for this spectrum will harm existing PMSE uses and greatly inhibit further innovation and use notwithstanding the continued increase in demand for PMSE. We ask the ACMA to take this into account in its future plans for the 600 MHz band.

Shure fully agrees with the statement in Part 1, “Overview of Current Industry Landscape”[[7]](#footnote-7) of the Draft FYSO that states: “*As a wholesale input, the value of spectrum for commercial uses comes from its use in downstream output markets to deliver services to end-users such as consumers and businesses*.” Wireless microphones deliver very high value in relation to the small amount of spectrum they use, because they support all downstream content creation industries including radio and television broadcasting including programme distribution and streaming via mobile and satellite networks, benefiting consumers and businesses. The ultimate output of these services affects a broad array of industries and economic segments including TV broadcasting, film production, theater, music, sports, education, religious and civic activities, among others, all of which routinely rely on wireless microphones.

We comment below briefly on the importance of wireless microphones and on the spectrum needs and new technologies that are very significant for the FYSO.

**1. Importance of wireless microphones in Australia and impact on its economy**

Wireless microphones are vital to the production of all types of contents. They are indispensable to Electronic News Gathering (ENG). They are also used in every television production studio and for live events. Without wireless microphones, it would be impossible to produce high quality, engaging programs for broadcast over the air or on satellite and mobile networks or via the internet. Ultra-High Definition (UHD) video would be of little interest without high quality sound to accompany it.

Wireless microphones are critical to every type of content creation, from movies, to sports, to live theatre, live music, political events and many others. During the COVID pandemic, the demands for high-quality online content and meetings has dramatically increased worldwide. Today, it is virtually impossible to produce creative content without wireless microphones. In all of these applications, wireless microphones must operate flawlessly. Interruptions, interference, and noise are not tolerated. Productions have increased in complexity over time. Today, “performers” -- whether they be in a broadcast, theatre, sports or civic activity – require the flexibility of wireless microphones. This highlights the need for adequate amount of appropriate, clean spectrum.

Wireless microphones are ubiquitous to public life. They are widely used and relied upon in schools, houses of worship, government buildings, museums, and many other public places. The lives of most citizens are touched and enhanced by wireless microphones every day, whether in one of these places or by enjoying programs that were produced using wireless microphones. Wireless microphones and In-Ear Monitoring Systems are indispensable.

To give you an example, Australian universities rely heavily on wireless microphone systems to deliver content to students, both on campus and remote.  Most of the larger universities run hundreds of channels on campus.  One large user is Monash University in Victoria with around 1200 channels. The majority of these systems currently operate in the 600 MHz UHF band.  A reduction in available TV-UHF would require replacement of thousands of systems throughout the Tertiary Education sector, and impose a significant financial burden on a sector that is already suffering due the reduction in overseas student enrolments as a result of COVID-19 related travel restrictions.

Moreover, the association PAC Australia (Performing Arts Connections Australia) representing performing arts venues reported a combined A$285 million turnover in their 2019 Economic Activity Report.[[8]](#footnote-8) This data was provided by just 49 Australian venues[[9]](#footnote-9). Hence the actual national turnover generated by wireless microphones is likely much higher.

**2. Technical considerations why wireless microphones need access to the TV-UHF Band**

The TV-UHF band is and will likely remain the primary global spectrum band for wireless microphone operation. It has been successfully shared with television broadcasting services for many years on a cooperative basis. For technical reasons, UHF spectrum is uniquely suited and vitally important to the operation of these devices.

Wireless Microphones including In-Ear Monitors and Interruptible Foldback Monitors (IFBs) are small, highly portable devices that give users mobility, which is critical for many types of content production activities. As mobile devices they are dependent on batteries, making power consumption, size, and weight important considerations. The characteristics of the spectrum in which wireless microphones operate are the single most important high-level determiner of power consumption and link reliability. UHF spectrum below 1 GHz is ideal for wireless microphone applications from a technical standpoint.

One characteristic of the TV-UHF spectrum that makes it useful for wireless microphone operation is wavelength. Because wireless microphones are physically small devices, antenna size is an important consideration. In this UHF band, it is possible to obtain relatively good efficiency using antennas that fit inside the device or extend a short distance outside of it. Lower (e.g., VHF) frequencies require larger antennas for efficient operation. It is possible to use electrically short antennas, but this results in lower efficiency, narrower bandwidth, or both. Lower efficiency causes higher power consumption and reduced transmission range.

Another characteristic of UHF spectrum that is relevant to wireless microphone operation is the ambient noise level. Electrical noise typically declines with increasing frequency. Thus, the amount of background noise present at UHF frequencies is lower than at VHF frequencies. The noise level is important because it determines how much power is required for a reliable radio link to be established. A higher noise level requires more transmitting power, which in turn means higher power drain and shorter operating time on batteries.

At frequencies above the 1 GHz range, both body absorption and path loss increase. Since wireless microphones are normally worn on the body or held in the hand, these losses have a negative impact on operation. Lab measurements indicate losses of 20 dB or more due to body absorption and shadowing. In addition, wireless microphone signals must often travel through obstructed paths; for example, the scenery on a theatre stage. Once again this translates into a need for higher power, resulting in shorter battery life. UHF signals are better able to pass through such obstructions than higher frequency signals. We appreciate that the ACMA has allocated the band 1785 – 1800 MHz to wireless microphones and this allocation should be kept. However, it is insufficient to accommodate the needs of the PMSE industry: the bandwidth is too narrow for professional users and it is located in a centre duplex gap with high potential of interference from high power services in the adjacent bands.

Reallocations and auctions of UHF television channels in some countries have dramatically reduced the amount of spectrum available for wireless microphones to use, particularly in cities where a great deal of content production takes place. In response, wireless microphone manufacturers have invested millions of dollars in developing spectrally efficient digital technologies. However, this technology requires clean spectrum in order to work properly. It is not suitable for use in a channel that is contaminated with out-of-block emissions produced by e.g. mobile wireless systems operating on adjacent frequencies.

**3. Additional technologies for wireless microphones**

We kindly ask ACMA to also consider the DECT and WMAS technologies for the FYSO.

**(a) Current technology DECT**

DECT (Digital Enhanced Cordless Telecommunications) is one of the most successful communication technologies, and ACMA should support this success story now and even more in the future. Due to the success of this technology an expansion band 1900-1920 MHz is under discussion by the European CEPT.

With the reduction of the TV-UHF band, some PMSE applications have adopted DECT technology, e.g. talkback, Intercom and AV conferencing, thereby taking the place of systems that would traditionally share spectrum with wireless microphones and IEMs. It has the advantage of maximizing availability of spectrum for wireless microphones and IEMs in the range 470-698 MHz. The robust nature of DECT and the ability to deploy complex private networks is particularly attractive, and it serves a valuable purpose, though it does not achieve the low latency required for high quality PMSE applications.  
  
Please find more details about DECT in the attached DECT Professional Overview 2020.pdf.

**2. Future technology WMAS**

The future technology WMAS (Wireless Multichannel Audio System) in its RF Interface Requirements and Licensing schemes is also important for the FYSO and generally for ACMA’s long-term spectrum planning. We ask ACMA to consider authorizing the use of WMAS for PMSE.  
  
(a) Example USA

The U.S. Federal Communications Commission in the United States has opened a Notice of Proposed Rule Making (NPRM)[[10]](#footnote-10) to consider amending Parts 15 and 74 of its Rules for Wireless Microphones in the TV Bands and other bands and frequencies where they are authorized to operate in order to permit the use of newly developed Wideband Multi-Channel Audio System (WMAS) technology. This technology will enable further improvements in spectral efficiency beyond what has been achieved with narrowband digital systems, and it is well-suited for operation in the TV-UHF band.

(b) Example European Union  
The wireless microphone standard EN 300 422[[11]](#footnote-11) describes test procedure for WMAS. Although WMAS systems are not available in the market yet, regulation has prepared the future by deleting the maximum bandwidth limitation of 200 kHz, which was part of ERC Recommendation 70-03.

**Conclusion**

It is extremely important for the Australian market and its economy as a whole that wireless microphones continue to have access to an adequate amount of viable spectrum. Wireless microphones provide an important service that is vital to the public and to the Australian economy. The 470 – 698 MHz band remains the most important and widely used wireless microphone band globally. From a technical perspective, this band is ideally suited to wireless microphone operation also in Australia. The existing allocation of the 1785-1800 MHz band to wireless microphones in Australia alone is not sufficient to keep up with the demands.

Maintaining the viability of this service should be a high priority for the ACMA, considering how many industries depend on wireless microphones for their operation and success.

Please do not hesitate to contact us for any further question. We would be pleased to provide further information in wireless microphones, their use and spectrum needs.

Respectfully submitted,

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Attachment:

DECT Professional Overview 2020.pdf

1. <https://www.citc.gov.sa/en/new/publicConsultation/Pages/144201.aspx> [↑](#footnote-ref-1)
2. [https://www.rsm.govt.nz/assets/Uploads/documents/consultations/2020-1710-2300-mhz/shure-new-zealand-submission-re-planning-frequency-bands-1710-2300-mhz.pdf](https://protect-us.mimecast.com/s/foowC82zYYCw54nLSnDK_6?domain=rsm.govt.nz) [↑](#footnote-ref-2)
3. <https://www.ofcom.org.uk/__data/assets/pdf_file/0017/55601/shure.pdf> [↑](#footnote-ref-3)
4. E.g.: Public consultation on the Draft RSPG Work Programme for 2020 and beyond(<https://rspg-spectrum.eu/public-consultations/> (Responses) [↑](#footnote-ref-4)
5. E.g.: FCC Docket on “Next Generation” Broadcast Television Standard (GN Docket No. 16-142) <https://ecfsapi.fcc.gov/file/1022064357718/Shure%20Next%20Gen%20Broadcast%20Comments%20(FINAL%20022018).pdf> [↑](#footnote-ref-5)
6. Wireless Microphones are essential equipment for Programme Making and Special Events (PMSE), along with In Ear Monitors (IEM), Interruptible Foldback Monitors (IFB) and similar equipment. [↑](#footnote-ref-6)
7. Draft ACMA Five Year Spectrum Outlook 2021-2026 at Page 4. [↑](#footnote-ref-7)
8. Link: https://paca.org.au/wp-content/uploads/2019/12/2019-PAC-Australia-Economic-Activity-Report.pdf [↑](#footnote-ref-8)
9. According to this report, professional performances in Australia account for 52% of all performances, while 48% are community performances, e.g. school productions, amateur performance groups, dance and drama training presentations. [↑](#footnote-ref-9)
10. <https://docs.fcc.gov/public/attachments/DOC-371281A1.pdf> [↑](#footnote-ref-10)
11. [EN 300 422-1 - V2.1.2 - Wireless Microphones; Audio PMSE up to 3 GHz; Part 1: Class A Receivers; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU (etsi.org)](https://www.etsi.org/deliver/etsi_en/300400_300499/30042201/02.01.02_60/en_30042201v020102p.pdf) [↑](#footnote-ref-11)