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Submission from Sennheiser Australia Pty Ltd
To
Exploring the future use of the 1880–1920 MHz band
Discussion paper

Sennheiser Australia Pty Ltd thanks the Department of Australian Communications and Media Authority for the opportunity to respond to its Discussion paper titled Exploring the future use of the 1880–1920 MHz band.

Sennheiser Australia Pty Ltd is a wholly owned subsidiary of Sennheiser electronic GmbH & Co. KG, a family-owned German company founded in 1945 by Professor Fritz Sennheiser to manufacture electronic measuring instruments and audio equipment for professional applications. It has grown to be a global company with subsidiaries and distributors across the world and is universally recognised as a leader in high quality audio solutions for professional and commercial applications.

Sennheiser and its customers have significant interests in this part of the RF spectrum. This response seeks to ensure that the ACMA is aware of those interests and their importance. We also wish to confirm our active engagement in the development of new technologies that might operate in the spectrum that is under discussion here.

Broadly speaking Sennheiser customers use these products to carry audio content wirelessly in every kind of application imaginable. The technology currently used includes DECT, analogue FM and digitally modulated wireless audio systems. While Sennheiser and its customers wish to see these systems enjoy a long life into the future, we are also exploring new technologies to meet market needs and new spectrum landscapes. Technology being explored by Sennheiser for future deployment into wireless audio applications includes DECT 2020NR and 5G Ultra-Reliable Low Latency Communications.

This response has two sections:

The first section provides information about how Sennheiser's customers use the spectrum in and around the specific frequency range being addressed in this Discussion Paper. The second section directly addresses the Issues for Comment on Page 3 of the Discussion Paper.

Section One

DECT

Because of DECT's in-built intelligence, when used in wireless audio systems DECT allows users to operate multiple channels in a confined area without the need for the frequency planning that would be required with FM or digitally modulated systems. DECT's interference detection and frequency agility means that operators don't need the high-level skills required to create a frequency plan for successful multi-channel operation.

This feature has seen DECT wireless audio systems become very popular with both the Corporate & Government sector and the tertiary education sector.

Every University in Australia uses at least two wireless microphones in almost every teaching space. They serve a dual purpose:

1. of primary importance is the capture of the lecture for streaming and for recording, even more important since COVID-19 entered our world and
2. for sound reinforcement in the teaching space, through loudspeakers and through assistive listening systems for the hard of hearing which are mandated by Australian standards.

Most Universities would have something of the order of 500 wireless microphone systems in use. There are 43 Universities in Australia, meaning a total of 20,000+ wireless microphone systems in use in this sector alone, most of which are now DECT. Those that are not yet using DECT technology are planning for its deployment over the next few years, as budgets allow.

Another attractive property of DECT wireless microphone systems is their security. Analogue FM and digitally modulated wireless systems are not secure – they can be received by anyone with a suitable receiver; even just a simple scanner will often suffice for eavesdropping purposes.

The number of users in the Corporate and Government sector is somewhat difficult to know exactly. With many corporate meeting rooms equipped with at least three wireless microphone systems, it is not difficult to estimate that there are many thousands of these systems in use across Corporate and Government Australia.

DECT ensures that the content is secure, and this is a big incentive for Corporate and Government use to focus on DECT technology for wireless audio links.

DECT technology is also used for wireless audio links in the Video Production sector and is favoured by users who appreciate the simple setup of multiple systems. Again, there are some thousands of these systems in use in Australia.

As an Associate Member of the DECT Consortium Sennheiser is not the only major wireless audio manufacturer to build systems using DECT Technology, but we are certainly one of the DECT champions in the professional and commercial audio sector. Over the past 6 years we have delivered more than 10,000 systems that operate using DECT technology.

Because DECT has been so well received in so many market sectors and with so many systems in daily use in Australia, we would strongly encourage the ACMA to ensure that the frequencies available for DECT use today, i.e. 1880 – 1900MHz, continue to be available for use for many years to come.

It is vitally important for all those who have invested in DECT technologies in recent years, and those who will invest in them in the coming years, to be able to rely on this technology and frequency band for many years into the future.

For this reason, if there are to be new services introduced into the 1880-1920MHz band it is critical that they co-exist with the services currently in use today.

Analogue FM Radio

The 1800MHz Band 3 mobile band occupies the spectrum from 1710 – 1880MHz, directly adjacent to the frequency range addressed by this Discussion Paper.

While there is no spectrum currently licenced for use by wireless audio systems within the specific frequency range addressed by this Discussion Paper, the guard band frequencies of 1785 – 1805MHz in the 1800MHz Band 3 mobile spectrum IS licenced for use by wireless audio systems.

Sennheiser and others manufacture, and sell in Australia, wireless audio systems that use this 20MHz of spectrum. Users are typically those with limited budgets, such as churches, small theatre groups, pubs, sports clubs, music performers and the like.

Over the past 5 years we have delivered over 3,000 systems that operate exclusively within the 1785 – 1805 MHz spectrum.

With so many systems in operation across the country, many of them owned by organisations with limited financial resources, we would encourage the ACMA to consider any impact on the Band 3 Mobile band that changes to the 1880-1920MHz spectrum might have on this guard-band.

Planning for the Wireless Audio Links of the Future

Wireless audio can be a very demanding application for radio technology. Because it is used in many applications for carriage of the original audio content, where the highest audio quality and reliability with virtually zero latency are all imperatives, there are many hurdles to be overcome as technology moves from analogue to digital techniques.

The three imperatives mentioned above are relatively straight forward to deliver in a well-engineered analogue radio system. The difficult imperative to meet in the world of digital radio systems is latency. Latency of more than about 3 milliseconds is a stumbling block for many wireless audio applications, particularly where a number of systems (perhaps with slightly different latencies) are used together on one show, or when the performer/s rely on an “in-ear” feed in order to deliver their performance. Latency is even more of an issue when it might change during the course of a transmission.

Many of these traditional wireless audio systems currently operate in the UHF spectrum. This spectrum is being transitioned away from use for Free to Air TV as the primary spectrum use and wireless audio systems as a secondary use, into use for mobile telecommunications.

With traditional spectrum availability evaporating, the need to find new spectrum and deliver better spectrum efficiency is becoming more pressing every day. Wireless audio manufacturers, including Sennheiser, are busy researching ways to deliver the performance the users need by applying new technologies.

5G and DECT 2020NR

Sennheiser has been working with Nokia and others to investigate the potential for using 5G Ultra Reliable Low Latency Communications for professional audio wireless links. As an Associate Member of the DECT Consortium, Sennheiser continues to be engaged with developments building upon the foundations of the original DECT platform. Sennheiser is also researching opportunities to leverage the benefits that the new DECT 2020NR standards promise within the 5G environment and potentially in other ways.

Further information on this research can be found at the following links:

<https://www.bell-labs.com/institute/white-papers/low-latency-5g-professional-audio-transmission/#gref>

<https://www.5g-records.eu/>

<https://www.nokia.com/networks/insights/futurithmic-podcast-series/episode-46-5g-for-music-industry/>

While this research is interesting and providing encouraging results, it is still very early days and real products are a long way off.

However, it is important to recognise that this work is being done and will likely deliver solutions in due course.

For these reasons we encourage the ACMA to ensure that the regulatory framework is in place, along with sufficient spectrum, to allow for the realisation of all the potential that 5G and DECT 2020NR technologies promises to deliver.

Section Two

Issues for Comment

This section directly addresses the particular points raised in this section of the ACMA's discussion Paper

1. *What is the relevance of the Personal Handy-phone System (PHS) and should this use be retained?*

Sennheiser Australia has no experience of the Personal Handyphone System, so makes no comment.

2. *What is the interest in the use of new technologies to provide a service?*

As set out in Section One, Sennheiser is actively engaged in researching applications of these new technologies. We fully expect that this research will bring new solutions, using DECT 2020NR and 5G technologies to market.

a) *How much spectrum is required to provide the service?*

At this stage of research we are not certain of the bandwidth requirements.

b) *What interservice considerations need to be undertaken for the service to be deployed?*

The services that Sennheiser envisage for these new technologies will need to be able to operate successfully within their own environment and also have the ability to interconnect with other environments via the publicly available networks. They will need to be able to co-exist successfully while other services are also operating in the same environment.

c) *What are the deployment scenarios for the service?*

Because we are in the early days of researching these services, deployment scenarios are still being developed. Some early ideas for deployment scenarios can be found by scrolling to "USE CASES" at the 5G Records web site, at this link: <https://www.5g-records.eu/>

3. *Are services still using DECT or are they transitioning to DECT-2020 NR?*

As set out in Section One, there are many thousands of wireless audio systems deployed which rely on DECT technology in the 1880 – 1900MHz spectrum and these will not be transitioning to DECT 2020NR. For this reason it is imperative that existing DECT devices can continue to operate successfully after the introduction of DECT 2020NR and any other new technologies into this space.

4. *Are there any applicable coexistence scenarios not identified? Are there any scenarios that are unlikely to be practically achievable (and hence the associated planning scenario should be discounted), or are there any that are readily achieved?*

Because the deployment scenarios that we are working on are still in their infancy, we are unable to comment.

5. *What are possible planning scenarios and industry views on the overall future use of the 1.9 GHz band and its services:*

a) *How much spectrum is required (distinguishing between the minimum viable and desirable) to provide the service?*

At this stage of research we are not certain of the bandwidth requirements.

b) *Is there a clear geographical delineation – for example, metropolitan or regional – for the service?*

We envisage that the services we are planning would be able to operate anywhere in Australia; in the cities, in regional towns and in remote sites. Anywhere from a concert hall in the heart of the city to an outback movie set.

c) *Is there or will there be equipment readily available for the service?*

No equipment is available yet. Sennheiser is planning to develop equipment as the performance capabilities of the technology become clearer and the supporting regulatory frameworks and infrastructure are put in place across the world's major markets.

We would welcome an opportunity to actively participate in the consultative process around the planned changes.

Yours sincerely,

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