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**Microsoft Response to the Future approach of the 3.6 GHz band consultation**

Microsoft appreciates the opportunity to respond to the Australian Communications and Media Authority (ACMA)’s request for feedback on its consultation package on its future approach to the 3.6 GHz band. Microsoft commends the ACMA for its leadership and vision in planning for Australia’s future digital and spectrum needs through its mobile broadband strategy and related plans.

There has been an explosive growth of wireless data traffic and the ensuing heightened demand on spectrum resources. Microsoft believes that these developments mandate a significant shift in spectrum management policies and practices, away from a predominantly exclusive licensing regime to a modernized policy framework that balances both licensed and license-exempt spectrum access and facilitates spectrum sharing in both categories of access. While we believe that licensed spectrum will continue to play a dominant and important role in the 5G wireless network buildout, under the existing carriers’ business models, we also believe that the anticipated demand from 5G networking will require a significant expansion of the available license-exempt spectrum across low (sub 1 GHz), mid (1-7 GHz), and high (above 7 GHz) bands, in order to satisfy the projected increases in bandwidth consumption, especially at the network edges. This will serve as a complement to licensed spectrum access.

As exemplified by Wi-Fi®[[1]](#footnote-1), the license-exempt ecosystem spurs competition by lowering barriers to entry, allowing a larger number of participants individually to make smaller investments, and introducing new products and services quickly and affordably. Numerous studies have shown that opening a portion of spectrum for license-exempt access can bring about greater economic value in terms of consumer surplus.[[2]](#footnote-2) A vibrant Wi-Fi ecosystem is a great example of such economic value and Wi-Fi has become a major on-ramp to the Internet for a majority of the population worldwide. License-exempt spectrum is also expected to play a major role in connecting the Internet of Things (IoT) for smart city applications.

In general, Microsoft believes that spectrum sharing is key to making spectrum more abundant, more efficient, and more affordable for 5G and beyond. We commend the ACMA for considering the options for both licensed and license-exempt access, as well as opportunities for spectrum sharing in its consultation on the 3.6 GHz and 5.6 GHz bands. We have therefore focused our responses on questions 8–10, and 17 in this public consultation and recommend:

* ACMA authorize license-exempt use (class-licensed LIPD) in the 5.6 GHz band to help meet Australian’s seemingly insatiable appetite for accessing data over their portable Wi-Fienabled devices; and
* further consideration of opening the VHF/UHF TV bands for license-exempt (class-licensed) access, as an additional venue to migrate the point-to-multipoint wireless ISP operations in regional and rural areas.

If you need clarifications, please do not hesitate to contact us.

Yours sincerely,

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## Question 8: Is the 5.6 GHz band a viable option for wireless broadband systems?

With the proliferation of IEEE 802.11n and 802.11ac Wi-Fi in consumer and enterprise IT devices, the 5 GHz band is already playing an indispensable role as part of the wireless broadband ecosystem. In fact, similar to the traditional 2.4 GHz Wi-Fi band used by earlier editions of 802.11 technologies, Wi-Fi in the 5 GHz band is expected to become increasingly overcrowded and will run short of spectrum in 2025 in several regions of the world, according to a Wi-Fi Alliance study.[[3]](#footnote-3) The availability of additional Wi-Fi spectrum will allow for larger channel sizes and greater data speed delivered to devices.

In such a context, allowing license-exempt access to the 5.6 GHz band, represents a rather crucial addition to enable more 80 MHz and 160 MHz wide channels for gigabit Wi-Fi operations. Specifically, license-exempt access to the 5.6 GHz band will allow for one additional 160 MHz channel or one additional 80 MHz channel or two additional 40 MHz channels or three additional 20 MHz channels.[[4]](#footnote-4)

Globally, regulators are expanding access and channels within the 5 GHz band to allow for more license-exempt use in metro areas to support mobile broadband deployments, and in rural areas to expand access. For example, within the last five years, both the US and UK regulators have moved to expand access in the 5 GHz band to support license-exempt Wi-Fi use.

* The Federal Communications Commission (FCC) in 2014 amended rules to allow for an additional 100 MHz of spectrum for outdoor license-exempt use in the 5 GHz band.[[5]](#footnote-5)
* In March 2017, Ofcom in the UK also announced it would expand the 5 GHz Wi-Fi band with an additional 125 MHz of spectrum in the 5.8 GHz band to support rising demand for higher Wi-Fi bandwidth.[[6]](#footnote-6)

And as noted by the ACMA consultation paper in Appendix 3, most countries (including Europe and the US) utilise the 5.6 GHz band in their general authorization regimes for uses such as Wi-Fi, on the condition they employ the use of Dynamic Frequency Selection (DFS) so it can protect weather radars sharing the band. Microsoft believes a similar approach will be successful in Australia. Australia (and New Zealand) already requires DFS capabilities for short range devices operations in the 5.250 – 5.350 GHz and 5.470 – 5.725 GHz frequency bands. Under the applicable radio standard (AS/NZS 4268), devices can comply with either the European (EN 301 893) or the United States’ (FCC Part 15.407(h)(2)) procedures for evaluating DFS capabilities, allowing them to be used without interfering with incumbent weather radars.

It is essential that Australia align and harmonize with this global trend by adding the 5.6 GHz band to the rest of the 5 GHz Wi-Fi channel raster, in order to take advantage of broad device economies and compatibilities, and to be well prepared for the expected wireless data growth.

## Question 9: Under what circumstances should apparatus- and class-licensed arrangements be considered for the 5.6 GHz band?

To support future wireless broadband and 5G deployments, and to align with the global trend, Microsoft highly recommends that the ACMA consider the 5.6 GHz band for inclusion for low interference potential devices (LIPD) class-licensed operations. Including the 5.6 GHz band into the Wi-Fi raster immediately allows for an additional 80 MHz or 160 MHz channel that may be used for gigabit Wi-Fi applications. Such capabilities could be used for cellular offloading by carriers, for nomadic use by consumers, or for alternative high-speed broadband access offerings by Wireless ISPs (WISPs). The use of DFS in such devices operating in the 5.6 GHz band will be able to protect meteorological radars operating in the 5.6 GHz band from harmful interference.

Around the world, national regulators are moving towards opening more spectrum for license-exempt use for the 5 GHz and other bands such as the TV White Space (TVWS) UHF and VHF bands, 900 MHz, 6 GHz, and 60 GHz band amongst others to support user demand for more bandwidth for a range of operations including IoT applications and expanding Wi-Fi access. Microsoft urges the ACMA to consider including the 5.6 GHz band into the Wi-Fi raster for class-licensed operations, and to also look towards opening more spectrum for class-licensed operations in other bands to support future IoT and smart city applications, and mobile broadband deployments.

## Question 10: If apparatus licensing arrangements are developed for wireless broadband systems in the 5.6 GHz band, are the notional arrangements proposed in Appendix 3 suitable?

Microsoft does not encourage the ACMA to issue apparatus licences for wireless broadband systems in the 5.6 GHz band but instead allocate the 5.6 GHz band for low interference potential devices (LIPD) class-licensed operations in support of wireless broadband and 5G deployments. This allows for carriers and WISPs to use the additional 80 MHz or 160 MHz channel to provide gigabit data rates in support of their respective wireless broadband offerings.

There are currently no point-to-point or point-to-multipoint licensees in Area 1 nationwide, where there is the most intensive Wi-Fi use and where the additional 5.6 GHz license-exempt capacity would be fully utilized, particularly during the busy hours of the day. Moving further away from metro areas into Areas 2 and 3, there is likely less intensive 5 GHz Wi-Fi usage today as compared to within Area 1. However, the continued growth in mobile data will likely lead to greater demands for additional Wi-Fi spectrum in Area 2 and 3 communities. Thus, ACMA could run the risk of relocating licensees from the 3.6 GHz band to the 5.6 GHz band in the near term, only to have to relocate these same licensees a few years later to accommodate rising demands for Wi-Fi spectrum.

## Question 17: Are there any other sharing arrangements that should be considered?

While acknowledging that the National Broadband Network (NBN) is aiming to provide universal connectivity in Australia, Microsoft suggests that the ACMA consider the use of dynamic sharing options in the TVWS bands (470 MHz to 698 MHz) to help migrate part of the point-to-multipoint WISP operations, especially for rural services (Area 4).

Unused TV channels are not only plentiful in rural and remote areas, but the long-range propagation characteristics and lower path loss of radiofrequencies in the band, make them ideal for rural connectivity. These frequencies open up opportunities for wider propagation of NBN satellite services in remote areas or particular service delivery scenarios such as health and education.

We recently published findings from the Boston Consulting Group (BCG) which concluded that TVWS radios are the most cost-effective ways to connect rural areas with population densities of between 2 and 200 people per square mile.[[7]](#footnote-7) As such, TVWS bands when used together with fixed wireless and satellite services, not only help reduce capital and operating costs compared to fibre or LTE fixed wireless technologies, but also represent the best approach to reach underserved rural communities. When used on a dynamic spectrum access basis, such devices operate on a secondary basis in accordance with a set of restrictions (including maximum power levels, antenna heights, channel sizes etc.) so as to avoid interference with primary users. In a number of countries including Canada, Singapore, United Kingdom, United States, and South Korea, national regulators have already established regulatory frameworks for license-exempt use of TVWS bands on a dynamic spectrum sharing arrangement.

We suggest that employing a class-licensed dynamic spectrum sharing approach to support and supplement point-to-multipoint WISP operations will not only help manage re-farming the 3.6 MHz band for 5G and future mobile broadband deployment by ensuring WISPs are able to continue operations with minimal disruptions, but it may also reduce capital and operation costs for WISPs. This class-licensed approach allows WISPs to reduce capital outlay on spectrum licenses and enables more efficient use of unused frequencies in the TVWS bands for broadband connectivity.

Microsoft has been at the forefront of TVWS innovation and use since 2006, and has considerable experience working with industry consortiums and regulators worldwide to leverage TVWS technologies to expand Internet access and connectivity. We have deployed more than 20 TVWS projects worldwide that have served 185,000 users. Most recently Microsoft has proposed a “Rural Broadband Strategy” in the US to connect 23.4 million Americans in rural communities who currently lack broadband access, through the use of TVWS technologies, in conjunction with a number of other connectivity technologies.[[8]](#footnote-8)

Microsoft would welcome the opportunity to provide further support and share resources on Dynamic Spectrum and TVWS technologies with the ACMA.

1. Wi-Fi is a registered trademark of the Wi-Fi Alliance [↑](#footnote-ref-1)
2. Telecom Advisory Services, LLC (2014) Assessment of the Economic Value of Unlicensed Spectrum in the United States, <https://pdfs.semanticscholar.org/5d81/ff994b7cbc9ccc0d067f1e102b0409755bbb.pdf> [↑](#footnote-ref-2)
3. The regions studied were China, the US, and Europe. Wi-Fi Alliance (2017) Additional unlicensed spectrum needed to deliver future Wi-Fi® connectivity, <https://www.wi-fi.org/news-events/newsroom/additional-unlicensed-spectrum-needed-to-deliver-future-wi-fi-connectivity> [↑](#footnote-ref-3)
4. ACMA (2017) 3.6 GHz Band Options Paper, Figure 11. <http://www.acma.gov.au/theACMA/~/media/8C4B47BE6C4B48EC860D24B8ED058D31.ashx> [↑](#footnote-ref-4)
5. FCC (2014) FCC Increases 5GHz Spectrum for Wi-Fi, Other Unlicensed Uses, <https://www.fcc.gov/document/fcc-increases-5ghz-spectrum-wi-fi-other-unlicensed-uses> [↑](#footnote-ref-5)
6. Ofcom (2017) Improving spectrum access for consumers in the 5 GHz band, <https://www.ofcom.org.uk/consultations-and-statements/category-1/5-GHz-Wi-Fi> [↑](#footnote-ref-6)
7. Microsoft (2017) A Rural Broadband Strategy, Connecting Rural America to New Opportunities, <https://msblob.blob.core.windows.net/ncmedia/2017/07/Rural-Broadband-Strategy-Microsoft-Whitepaper-FINAL-7-10-17.pdf> [↑](#footnote-ref-7)
8. Microsoft (2017) A Rural Broadband Strategy, Connecting Rural America to New Opportunities, <https://msblob.blob.core.windows.net/ncmedia/2017/07/Rural-Broadband-Strategy-Microsoft-Whitepaper-FINAL-7-10-17.pdf> [↑](#footnote-ref-8)