AMTA Submission to the ACMA:

21 May 2019

IFC 9/2019 Replanning of the 28 GHz Band- Options Paper (April 2019)

Australian Mobile Telecommunications Association

Introduction

The Australian Mobile Telecommunications Association (AMTA) welcomes the opportunity to provide feedback to the ACMA regarding its Options Paper on replanning of the 28 GHz Band.

AMTA strongly supports the ACMA's progression of enabling access to 5G spectrum in a timely manner, including mmWave spectrum.

Delivering the greatest economic and social benefit to Australia

AMTA recognises and acknowledges the important role satellites play in delivering a range of communication services from delivery of commercial and military communications, television services, emergency communications, and more. At the same time, the potential uplift to Australia's economy and social wellbeing on the back of 5G, the next generation of mobile technology, is undeniable. Higher bandwidth and lower latency capabilities of the technology will enable a raft of new services and improve productivity in every industry.

We believe that the forecast economic and social benefits of 5G to Australia's economy mean that the highest value use for the 28 GHz band can only be achieved if some of the spectrum is allocated to 5G. We therefore welcome the ACMA's acknowledgement in the Five- Year Spectrum Outlook (FYSO) of "the importance and urgency of addressing the 5G spectrum needs" and its commitment to "ensuring that Australia is well placed to take advantage of the opportunities offered by 5G"[1].

Australian mobile carriers have committed to deploying 5G mobile services from as early as 2019. The deployment of 5G requires significant capital investment in both spectrum resources and network infrastructure to both densify and expand network capacity.

[1] ACMA Five- Year Spectrum Outlook, 2019-2023

The demand for mobile technologies continues to be strong and ever increasing. In terms of forecast demand, by the end of 2024 it is estimated that globally there will be 1.5 billion 5G subscriptions for enhanced mobile broadband, with 5G networks covering 40 percent of the world's population and carrying 25% of the world's mobile data traffic.[2]

AMTA estimates that each mobile operator will need 100 MHz of mid band and 1 GHz of mmWave spectrum for initial phase of 5G deployments to reach their full potential and deliver on what it is designed to do. Further phases of deployment will require access to more spectrum in additional bands.

AMTA notes the Government's recognition that spectrum must be made available in a timely manner to enable innovation and productivity across industry sectors with a particular focus on enabling the early deployment of 5G mobile networks in Australia.[3]

We strongly believe this is needed to ensure ongoing demand for all types of services can be met and Australia remains at the forefront of rolling out the next generation of mobile technologies to enable transformative social and economic benefits across industries such as transport and logistics, health, education and the automotive industry,[4] as well as consumer benefits.

Recent research points to the potential of 5G for consumers [5] with a key finding that data usage for one in five users could reach more than 160GB per month on a 5G device by 2025. Other key findings were:

- Australian consumers expect 5G to provide relief from urban network congestion in the near term - *especially in Australia's bigger cities, where nearly half (47%) smartphone users report facing network issues in crowded areas* - and to create more home broadband choices.
- Current 4G usage patterns are not indicative of future usage behaviours. Video consumption is set to rise significantly with 5G. Australian consumers expect to not only stream video in higher resolutions but also use immersive video formats such as Augmented reality (AR) and Virtual reality (VR), resulting in an additional two hours of video content being watched weekly on mobile devices by users in the 5G future when they are out and about, including half an hour wearing AR glasses or VR headsets.
- Consumers are willing to pay a premium on 5G, with Australian smartphone users stating that they are willing to pay 20 percent more for fifth-generation services, and early adopters as much as 42 percent more.

The *Mobile Nation 2019 – The 5G Future*[6] report by Deloitte Access Economics found that the mobile industry continues to make a significant contribution to Australia's economy. Deloitte Access Economics estimates that the mobile industry contributed $22.9 billion of value added to GDP in 2017-18. This figure includes $8.2 billion contributed directly from mobile industry activities as well as $14.7 billion supported through indirect activity in related sectors and across the economy. The

[2] Ericsson Mobility Report, Special Edition, World Economic Forum, January 2019
[3] Department of Communications and the Arts, 5G-Enabling the future economy, Directions paper, Oct 2017.
[4] AMTA Mobile Minute '5G A connected future for Australia' June 2017
[5] Ericsson 5G Consumer Potential report, 2019 l
[6] Deloitte Access Economics, Mobile Nation 2019- The 5G Future, commissioned by AMTA 2019.

mobile industry also supported approximately 116,100 full time equivalent employees. For every full-time employee in the mobile industry there are 3.7 full time roles supported in other sectors.

Beyond the value added to GDP and the employment contribution of mobile telecommunications, mobile technologies, including 5G, continue to drive productivity throughout the Australian economy. While productivity has generally declined over the last decade, mobile technologies have boosted both labour and capital productivity. Deloitte Access Economics estimates that the productivity impact of mobile will be equivalent to $2 500 for every Australian by 2023. This amounts to a total of $65 billion of additional GDP by 2023, or 3.1% increase in GDP which is more than the 2.8% contribution of the agricultural sector in 2018.

We believe that 5G will drive the current technological revolution – Industry 4.0 – as businesses move to increase automation and become ever increasingly reliant on data. Australian businesses will rely on mobile to drive innovation, develop new revenue streams, and streamline operations. A survey of 550 Australian businesses in 2018 by Deloitte Access Economics found that 80% reported that they have already implemented at least one emerging technology, or that they expect to implement one in the next 3 years.[7]

Mobile technology also provides significant social benefits with 60% of Australians reporting that their smartphone has replaced 3 or more other devices or items. And 94% of mobile users do not leave the house without taking their smartphone with them. Mobiles are now a multi-purpose utility tool that enable us to remain connected both at work and socially.[8]

Preferred Options for 28 GHz

AMTA notes the frequency range 27.5-28.35 GHz has been allocated in some major markets around the world for 5G wireless broadband, and some mobile network operators have launched services[9]. This is already resulting in a device and network equipment ecosystem in the 28 GHz band. While Australia's current focus is on the 26 GHz band as the first mmWave band for 5G/IMT, we recommend it is prudent to have a small allocation of spectrum in Australia in the 28 GHz band in capital cities to accommodate devices configured for the 28 GHz band. This might include devices owned by overseas visitors to Australia, or for multinational corporations who procure end devices globally with the demand for global roaming services driving an expectation they will work in Australia. The economic uplift and social benefit to Australia from 5G will be enhanced by some degree of overlap with international markets, so it is prudent to have an allocation of spectrum in the 28 GHz band in the 34 large population centres for 5G/IMT.

The 2.4 GHz of spectrum allocated in the 26 GHz band for wireless broadband provides 800 MHz to each of three incumbent mobile network operators (MNO). This quantum of spectrum is short of the 1 GHz target quantum (as mentioned earlier). Therefore, it falls short of the spectrum requirements of even three incumbent MNOs, and more so noting that the ACCC believes the market requires more than three MNOs. For these reasons we believe that the 26 GHz band could be insufficient for

[7] Ibid p24.
[8] Ibid chapter 5
[9] Global Mobile Suppliers Association (GSA), 7 March 2019, *Spectrum for Terrestrial 5G Networks: Licensing Developments Worldwide*

the first phase of mmWave 5G and that a portion of 28 GHz spectrum could serve to satisfy the potential demand.

Since the 26 GHz band—currently being re-allocated for spectrum-licensed WWB in the major population centres up to 27.5 GHz—and the lower 600 MHz of 28 GHz are immediately adjacent, so a broadened allocation covering both bands would be efficient without the additional frequency boundary between them.

3GPP standardisation of the 28 GHz band (3GPP Band n257), the auctioning of the band in major world markets and an existing range of chipsets supporting the band means that 28 GHz spectrum is a highly viable future spectrum option for mmWave 5G wireless broadband, with a viable equipment ecosystem.

With regard to the four planning options now put forward by the ACMA in relation to 28 GHz, AMTA prefers Option 1b which would allow for wide-area wireless broadband suitable for 5G as well as fixed wireless access (FWA) and satellite services to use the band. Specifically, AMTA seeks the allocation of 600 MHz in at the bottom of the 28 GHz band in the 34 large population centres around Australia.

Lastly, AMTA appreciates the ACMA's introduction of Embargo 74 to maximise flexibility during the consultation process at least until a planning decision can be made by the ACMA.

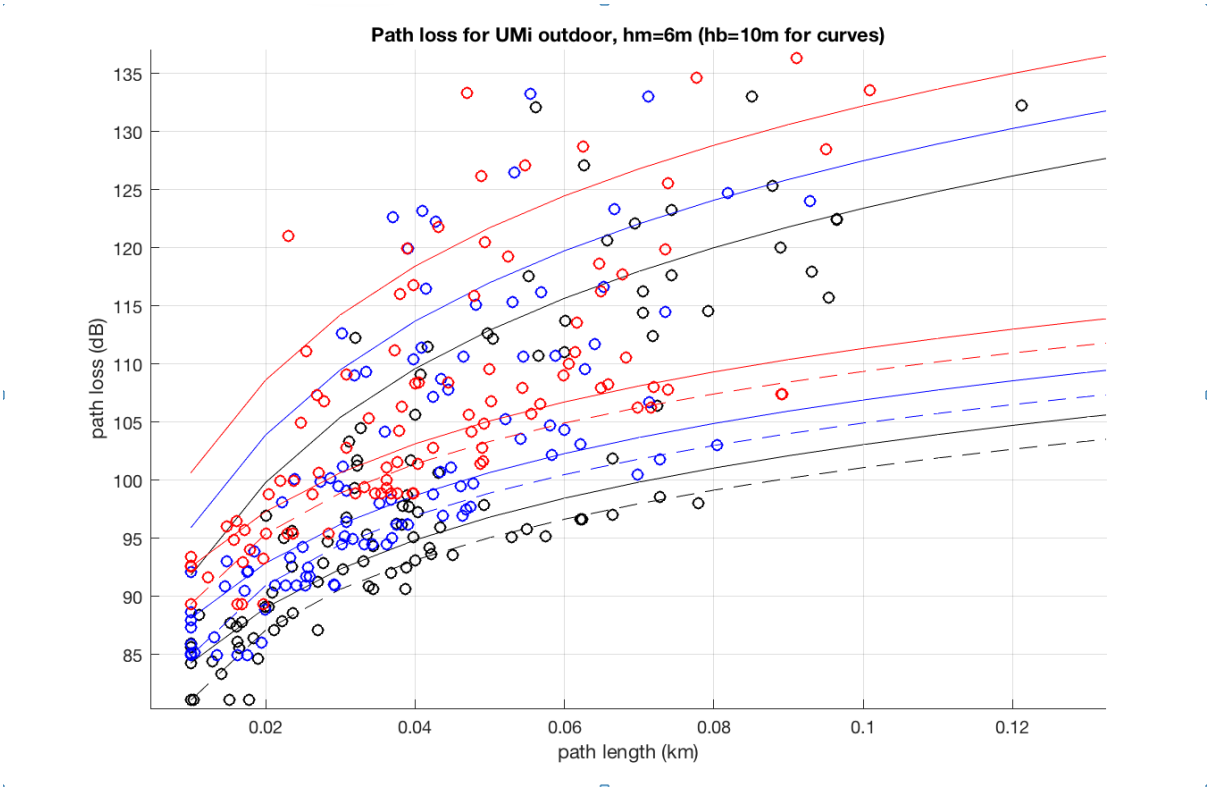
Comments regarding higher-frequency spectrum

In its response to the 26 GHz Options Paper, the Communications Alliance Satellite Sub-Working Group (SSWG) submitted that "WRC-19 Agenda item 1.13 will consider more than 33 GHz of spectrum in aggregate as potential candidate bands for IMT-2020. It should be possible to find more than enough spectrum within this 33 GHz to meet any realistic projection of data consumption growth, without impinging upon bands already actively being used or planned to be used for current and next-generation GEO, LEO and MEO satellite systems"[10]. However, while seemingly "offering up" other spectrum in higher bands as a reason to limit introduction of WWB into 26/28 GHz band (the "Ka-band uplink"), the satellite industry *in the same document* also stakes claim to parts of the other bands of interest under AI 1.13, such as around 40 GHz and 50 GHz, and offers up the following bands for WWB: 31.8-33.4 GHz, 66-76 GHz and 81-86 GHz. However, the 31.8-33.4 GHz band will not be identified for IMT at WRC-19 Agenda item 1.13, and the 81-86 GHz band is looking unlikely. As such, the "33 GHz" mentioned initially quickly boils down to 10 GHz (66-76 GHz) by the SSWG's own admission, and at much higher frequencies (~70 GHz) with very different propagation characteristics and deployment model. AMTA therefore wishes to pre-emptively call out a repetition of this argument by the satellite sector as invalid.

Furthermore, not all spectrum is substitutable. While there may be more spectrum under consideration, if the next tranche of spectrum exhibits different properties, it is not necessarily a 1:1

[10] Communications Alliance Satellite Services Working Group (SSWG) submission, Nov 2018, *Wireless broadband in the 26 GHz band*, available at: https://vision2020.acma.gov.au/theACMA/options-for-wireless-broadband-in-the-26-ghz-band

a substitute; it is complementary. Path loss values for randomised path lengths at 27.0 GHz, 42.0 GHz and 70.0 GHz—calculated in accordance with the parameters used in ITU-R TG 5/1 studies—show a tendency for both (a) lower path loss values for line-of-sight (LOS) paths and (b) longer NLOS paths.



Coexistence between WWB and FSS/ESIMs

27.5-29.5 GHz is the uplink for Ka-Band satellites (the downlink is 18.3-18.8 and 19.7-20.2 GHz). So, earth stations (gateways, fixed ubiquitous, ESIMs) are ***transmitting*** in the 28 GHz band. They will be the source of interference to other users, not the victim of interference. In other words, if 5G is to enter part of this band, it is 5G that needs 'protecting' from FSS, not the other way around.

To this very point, the ACMA's consultation on page 23 under the heading "Sharing and Coexistence between WWB/FWA and FSS" notes that "*Sharing studies conducted by Task Group 5/1 of the ITU-R suggest separation distances of less than 100m up to about 10 km (depending on the scenario) are required to enable WWB/FWA and FSS gateways to share the same frequency.*" Clearly, this is in relation to FSS Gateways, and not in relation to either FSS-U or ESIMs. However, what it does suggest is that in terms of ***gateway*** stations, they could, if necessary, be placed very close to the edge of large population centres without causing interference to a 5G network operating on the same frequency.

Also, on page 23, the ACMA considers whether it would even be possible to restrict FSS-U and/or ESIMs from entering the large population centres. The ACMA consider options such as restricting aeronautical and marine ESIMs from operating below a certain height or within a certain distance from shore, as a mechanism for preventing interference (i.e., ESIMs operating in 27.5-28.1 GHz have to be turned off before they reach a certain proximity of the large population centres). Another

option to consider is that ESIMs terminals are restricted to frequencies above 28.1 GHz. This would allow a full 600 MHz for gateway earth stations, and would lower the risk of interference to 5G/IMT.

For FSS-U, it would appear that the most important use cases for unlicensed earth stations such as very small aperture terminals (VSATs) is to allow connectivity to remote areas of the country. In major population centres where infrastructure including fibre and power provide the ability to deploy base stations in terrestrial networks, far greater broadband capacity (per GHz of spectrum) can be delivered to each user through these networks that are far more densified, compared to satellite networks. The important regional/remote area connectivity objectives of the satellite industry through unlicensed earth stations can be successfully achieved through geographical separation (i.e. demarcation of major population centres) from WWB networks. Sharing through such geographical separation provides both sufficient spectrum for mmWave 5G as mentioned in the previous section—including the promotion of competition, consumer benefits and further investment—and provision of connectivity to regional and remote areas through satellite uplinks.

With respect to NBN and Skymuster, these services operate with a lower frequency edge of 27.0 GHz, and the ACMA has decided on allocating the entire 26 GHz band up to 27.5 GHz on the basis of co-channel sharing between WWB and NBN Co FSS-G transmitters (and the associated satellite receivers). Therefore, there are no additional issues with respect to managing interference to and from NBN uplinks through the introduction of WWB in 28 GHz, relative to 26 GHz. Noting the exceptions of Perth and Hobart, NBN Co gateways have been located in regional/remote areas rather than major population centres, which greatly limits widespread compatibility issues.

Other coexistence issues

AMTA accepts that body scanners are authorised under the *Radiocommunications (Body Scanning – Aviation Security) Class Licence 2018*. The class licence extends down to 24.25 GHz, covering the entire 26 GHz band, so there are no additional issues with respect to managing interference to and from body scanners at airports through the introduction of WWB in 28 GHz, relative to 26 GHz. AMTA takes this opportunity to stress the importance of these class licensing arrangements being limited to airport security purposes and that MNOs need access to reliable and accurate information about the exact location of the body scanners.

High Altitude Platform Stations (HAPS). The consultation paper[11] also notes WRC-19 Agenda item 1.14 is considering additional identifications for HAPS both regionally and on a global basis. This includes options for deletion or modification of **No 5.537A** of the ITU-R Radio Regulations (RR), which currently identifies the 27.9–28.2 GHz frequency range for use by HAPS in a number of countries. The ACMA notes that Australia is not currently part of **No 5.537A** of the RR, however, it is still considering its position on this agenda item. If the ACMA were to decide to introduce HAPS into 27.9-28.2 GHz, it would overlap with the spectrum identified under Option 1 (27.5-28.1 GHz) for the 34 large population centres. This would mean that HAPS would need similar restrictions as those to be applied to ESIM/FSS-U that would require them a certain geographic separation with respect to the 34 large population centres to avoid interference to/from 5G/IMT.

[11] Page 22

Conclusion

Together with 2.4 GHz of 26 GHz band spectrum for mmWave 5G in major population centres, the provision of an additional 600 MHz in the immediately adjacent 28 GHz band spectrum would be required to ensure adequate provision of spectrum for the initial phase of mmWave 5G deployments. In these lower 600 MHz, a geographical separation of WWB in population centres and FSS (both gateways and unlicensed) provides no barrier to: (a) continued provision of NBN/Skymuster uplinks for which gateway transmitters are primarily in regional/remote areas (except for Perth and Hobart) and (b) broadband connectivity to remote areas through ubiquitously deployed VSATs.

For any questions in relation to this submission please contact Lisa Brown, Public Policy Manager, AMTA at lisa.brown@amta.org.au or (02) 8920 3555 or Juan Pablo Casetta (Open Spectrum), AMTA Spectrum Consultant at juanpablo@openspec.com.au.