

AMTA submission to the ACMA

Options for wireless broadband in the 26 GHz band

IFC 32/2018

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**Australian Mobile
Telecommunications
Association**

Executive Summary

The Australian Mobile Telecommunications Association (AMTA) welcomes the opportunity to respond to the Australian Communications and Media Authority's *Wireless Broadband in the 26 GHz band* Options Paper ("the Options Paper").

In summary, AMTA notes:

1. Australia needs to continue its progression of enabling access to 5G spectrum in a timely manner, including mmWave spectrum.
2. AMTA members support Option 2d as detailed below.
3. The 26 GHz band should be spectrum-licensed to support outdoor deployments between 24.7 GHz and 27.5 GHz.
4. Spectrum licences for indoor use below 24.7 GHz could be allocated on a 'buyer beware' basis; it would be useful to test the market appetite for spectrum licences in 24.25-24.7 GHz for low power indoor use only.
5. The 'defined areas' to be spectrum licensed must include the State and Territory capital cities (metro) as well as major regional centres. AMTA supports the inclusion of regional centres spectrum-licensed in part of the 3.4 GHz band (i.e. 3425-3442.5 MHz and 3475-3492.5 MHz), as proposed by the ACMA, as well as the Sunshine Coast/Gympie and Darwin. but also recommends the ACMA assess the inclusion of additional major regional centres where metro like demand and infrastructure exist as a guide. Please see response to Q3 for list of such areas.
6. There are also 'areas of interest' in Regional Australia which should be either (a) spectrum-licensed, or (b) if apparatus-licensed, the apparatus-licensing arrangements should support the deployment of multiple fixed/base stations within an area.

7. Coexistence studies show that IMT and FSS uplinks are compatible. As such, the 27-27.5 GHz segment should be spectrum-licensed within the defined areas.
8. Noting the work of the 26 GHz Working Group on Inter-Service Coexistence (ISC), AMTA supports out-of-band emission limits similar to those proposed by GSA: in the range -33 to -32 dBW/(200 MHz) for BS and -31 to -30 dBW/(200 MHz) for UE, with a lower band edge of 24.7 GHz for outdoor deployments.
9. Spectrum licences in 24.7-25.1 GHz spectrum would be on a 'buyer-beware' basis noting the strict filter performance required to satisfy the out-of-band emission limits supported above. Likewise, with spectrum licences in 24.25-24.7 GHz range, if the ACMA finds there is market appetite for those spectrum licences.
10. The issuing of conditional apparatus licences (including Scientific licences) must be supported in order to facilitate operation of mmWave 5G technologies prior to the commencement of spectrum licences.
11. Embargo 69 should be extended to include regional areas and sustained until the beginning of the re-allocation period. In order to support 5G trials (and use of currently unused spectrum more generally), Embargo 69 could be revised to state that exemptions to the embargo will be considered provided that the licence include a Special Condition stating that the licence must cease prior to the commencement of spectrum licences in the band.
12. AMTA does not agree to underlay class licensed use within spectrum-licensed spectrum space.
13. AMTA believes that segmenting part of the band for type 2 use should not be a primary objective, and as such does not believe that Options 3 and 5 are really 'options' at all. The primary objective should be allocating the maximum amount of spectrum that can be spectrum licensed while still ensuring protection of the EESS below 24 GHz.
14. AMTA members support the accelerated planning phase to determine the quantum of spectrum-licensed spectrum and licensing arrangements. AMTA members have their own views on the timing of allocation, auction and access.
15. Allocation of the 26 GHz band domestically must be supported in parallel by identification of the band for IMT through WRC-19 Agenda item 1.13.

Spectrum is required for 5G

5G will deliver substantial improvements in the speed, latency and reliability of mobile networks in order to meet the continually increasing demand for mobile services including new capabilities that will be enabled by this next generation of services.

AMTA notes that the Government has recognised the need to make spectrum 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.¹

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.²

The mobile industry is preparing for 5G and with trials being conducted. Optus has announced it is on track to commercially launch FWA 5G services in January 2019³ and Telstra has announced that it plans to have more than 200 5G-capable sites live around the country by the end of 2018⁴.

A recent report by Deloitte Access Economics, commissioned by Telstra, estimated that annual network spend by mobile network providers in Australia could be worth \$5.7 billion in FY 2017-18.⁵

Mobile broadband continues to play a key role in stimulating Australia's economic growth and productivity. It is a driving force in connecting people and businesses, stimulating innovation and technological progress, and transforming industries in both densely populated and remote regions. Future development of mobile technologies, such as 5G, the Internet of Things (IoT) and Machine to Machine (M2M) applications will re-shape the Australian economy and drive productivity improvements.

Research by Deloitte Access Economics⁶ commissioned by AMTA, found that mobile telecommunications created significant benefits in terms of productivity and workforce participation. Specifically, the research showed that Australia's economy was \$42.9 billion (2.6% of GDP) bigger in 2015 than it would otherwise have been because of the benefits generated by mobile technology take-up with an increase in:

- long term productivity of \$34 billion or 2% of GDP; and

¹ Department of Communications and the Arts, [5G-Enabling the future economy](#), Directions paper, Oct 2017.

² AMTA Mobile Minute – '[5G A connected future for Australia](#)' June 2017

³ [Telstra 5G trial](#); [Vodafone Hutchison Australia 5G trial](#); [Optus 5G trial](#); Optus [4.5 G trial](#).

⁴ Telstra Media Release, 15 August 2018, *Telstra turns on 5G on the Gold Coast*, available at: <https://www.telstra.com.au/aboutus/media/media-releases/Telstra-turns-on-5G-on-the-Gold-Coast>

⁵ Deloitte Access Economics, [5G-enabling businesses and economic growth](#), 2017.

⁶ Deloitte Access Economics, [Mobile Nation: Driving workforce participation and productivity](#), 2016.

- workforce participation of \$8.9 billion, or 0.6% of GDP.⁷

The research also found that 65 000 full-time equivalent jobs were supported by the increased GDP attributable to workforce participation (equivalent to 1% of total employment in the Australian economy).⁸

In another recently released report on 5G,⁹ Deloitte Access Economics found that 5G will add to these economic benefits:

“Mobile is an integral part of how Australian businesses and society function. 5G will continue this trajectory and with the digital economy to grow to \$139 billion by 2020, it is important to take action to harness the potential of 5G.”

In April 2018 research completed by the Bureau of Communications Research concluded ‘5G could improve productivity across the economy and increase gross domestic product per capita by up to \$2,000 by 2030’.¹⁰

Further indication of what the global path to 5G will entail is provided by Ericsson’s Mobility Report (June 2018) which takes a closer look at the trends that will drive the mobile industry over the next five years, with major milestones including the first commercial launches of 5G networks and large-scale deployments of cellular IoT. The Ericsson Mobility Report (June 2018) forecast that by the end of 2023 there will be 1 billion 5G subscriptions globally.¹¹

It is clear that the global demand for wireless services continues to grow and the evolution of 5G and IoT services will place even greater pressure on the capability of industry to deploy networks to meet growing demand without timely and sufficient spectrum allocations.

⁷ Ibid

⁸ Ibid

⁹ Deloitte Access Economics, [5G-enabling businesses and economic growth](#), 2017

¹⁰ <https://www.communications.gov.au/publications/impacts-5g-productivity-and-economic-growth>

¹¹ [Ericsson Mobility Report, June 2018](#)

Expansion of Embargo 69

Noting the response to Question 3 that details AMTA's view on licensing areas, Embargo 69 should be expanded to include regional areas and/or regional centres, as appropriate. For example, Cairns, Townsville, Rockhampton, Toowoomba, Albury/Wodonga, Bendigo/Ballarat—which are major regional centres being considered under variants b and d—are not currently covered by Embargo 69.

In order to continue investigation into the use of mmWave 5G technologies, it is critical that the ACMA support the issue of conditional apparatus licences (including Scientific licences). The results from 5G trials in the 26 GHz band will assist to inform equipment research and development, network planning and will provide critical input to the development of the technical framework under a future TLG.

In order to support 5G trials (and use of currently unused spectrum more generally), Embargo 69 could be revised to state that:

- exemptions to the embargo will be considered on a case-by-case basis; and
- exemptions would be considered favourably provided that the licence include a Special Condition stating that the licence (or the operation authorised by the licence) must cease prior to the commencement of spectrum licences in the band.

Parallel WRC-19 preparatory work

In parallel, the Australian sharing and compatibility studies led by the ACMA, along with the advanced considerations for allocation of the band for mmWave 5G through this consultation, should be consolidated with the development of an Australian position to support the identification of the 26 GHz band for use by IMT under WRC-19 Agenda item 1.13. AMTA recognises that this consultation is part of the domestic process, de-coupled from the international preparatory process, but considers it relevant and timely to make this suggestion.

Issues for comment & AMTA responses

1. Does the three-type model constitute an appropriate high-level representation of potential usage of the 26 GHz band? If not, are there any use cases that should be included, excluded or omitted?

From AMTA's perspective, the three-type model adequately captures the majority of use cases for mmwave 5G.

2. What are the implications for 26 GHz wireless broadband in Australia of the Electronic Communication Committee of CEPT (ECC) decision on emission limits to protect passive EESS¹²?

Outdoor deployments

As expressed by the GSMA—also acknowledged by the ACMA—the ECC limits would require around 20 dB additional attenuation. In turn, these power reductions would result in large throughput loss, while the introduction of filters results in very high insertion loss combined with a very substantial guard band¹³.

Noting the ACMA studies carried out in the Working Group on Inter-Service Coexistence (WG ISC), a relaxation of almost 6 dB would be a reasonable assumption based on the typically lower population density—and therefore deployment density—of Australian cities compared to the largest European cities, and the removal of the 3 dB apportionment factor.

Furthermore, we believe that the European studies on which the ECC studies were based (e.g. Study A from France in the TG 5/1 Chairman's Report¹⁴) considers the additional losses required to satisfy the EESS protection criterion. On the other hand, GSMA's study (Study G) does not take the *maximum* interference 'exceedance' level, rather a high percentile value of exceedance level that would ensure that the protection criterion would be satisfied in the vast majority of cases. This concept is particularly appropriate given that:

- these 'blanket' emission limits are being applied for all equipment, to account for protection of a very small and high gain passive sensor beam passing over the highest-density use area in Australia (which is of course, a very small percentage of the total Australian land mass); and
- as part of manufacturing processes, the vast majority of devices would perform well below standardised limits in order to satisfy those limits for all devices.

¹² Note: Responses to this question will be considered in the establishment of a domestic technical study group to identify the lower frequency boundary of the 26 GHz band.

¹³ GSA submissions to the ECC Plenary Meetings, Doc ECC(18)035 to the 47th Meeting (March 2018) and Doc ECC(18)091 to the 48th Meeting (July 2018).

¹⁴ Attachment 2 to Annex 3 to Task Group 5/1 Chairman's Report, Doc ITU-R 5-1/478, 19 September 2018.

AMTA notes that out-of-band emission limits in the range— -33 to -32 dBW/(200 MHz) for BS and -31 to -30 dBW/(200 MHz) for UE—overlap those proposed by GSA¹⁵ and also fall within the ranges calculated in the GSMA study, and as such are values that can reasonably be assumed to protect EESS sensors in Australia.

While AMTA acknowledges that the precise value(s) to support protection is a matter for the separate and parallel WRC preparatory process, reasonable emission limits can be taken into consideration for determining the required guard band.

If it can be assumed that filters would only need in the order of 10 dB attenuation (rather than 20 dB attenuation). Taking into account the filter response presented in the ACMA's working paper, a minimum 700 MHz guard band appears reasonable to observe given that:

- a) as pointed out by the ACMA, current manufacturing tolerances mean that there can be very little attenuation as far from the channel edge as 700 MHz;
- b) current manufacturing tolerances mean that about 1 GHz offset is required to reach in the order of 10 dB attenuation;
- c) the mean trace requires about 700 MHz offset to reach in the order of 10 dB attenuation.

Therefore, taking into account mmWave 5G channels of 200 MHz, the lower band edge for outdoor deployments would have to be 24.7 GHz for combined future improvements in both tolerances and roll-off, and 25.1 GHz for current manufacturing tolerances.

AMTA agrees—as per Figure 6 of the EESS working document—that no deployment restrictions are required above 25.1 GHz, noting the relaxed emission levels advocated. Moreover, no deployment restrictions would be required in 24.7 to 25.1 GHz, provided that licensees were confident that equipment could satisfy the out-of-band emission limits. This would approximate the 'buyer-beware' approach mentioned by the ACMA in the Options paper, and would allow the market to determine the value of accessing this portion of the band.

Indoor deployments

Indoor coverage will be an important part of the 5G services provided by major carriers. As such, it would be useful to test the market appetite for spectrum licences in 24.25-24.7 GHz *for low power indoor use only*.

3. Are the proposed defined geographic areas for wide-area licensing appropriate?

The '***defined areas***' to be spectrum licensed must include the State and Territory capital cities (metro) as well as major regional centres. AMTA supports the inclusion of regional centres spectrum-licensed in part of the 3.4 GHz band (i.e. 3425-3442.5 MHz and 3475-3492.5 MHz), as

¹⁵ GSA submission to the 48th ECC Plenary Meetings, Doc ECC(18)091 (July 2018).

proposed by the ACMA, as well as the Sunshine Coast/Gympie and Darwin. AMTA also recommends the ACMA assess the inclusion of major regional centres where metro-like demand and infrastructure exist as a guide. Examples include: Nowra, Jervis Bay, Byron Bay/Ballina, Foster/Tuncurry, Albany WA, Margaret River, Coffs Harbour, Port Macquarie, Bundaberg, Hervey Bay, Mackay, Mildura, Shepparton, Traralgon, Warrnambool, Victor Harbour, Bunbury, Bathurst, Armidale, Lismore, Wagga Wagga.

There are also **‘areas of interest’** in Regional Australia which should be either:

- a) spectrum-licensed, or
- b) apparatus-licensed, provided that the apparatus-licensing arrangements support the deployment of multiple fixed/base stations within an area, in order to reduce the burden of licensing/registration on licensees.

4. What is the expected proliferation of—or demand for—services deployed under type 2 (apparatus-licensed) and/or 3 (class-licensed) models?

No AMTA view.

5. Comment is sought on preferred option(s) for configuring and licensing the 26 GHz band.

AMTA’s preferred option is Option 2d, explained further below.

Summary of options

		<i>Apparatus-licensing in part of range?</i>	
		<i>No</i>	<i>Yes</i>
<i>Co-frequency class licence?</i>	<i>No</i>	Option 2	Option 3
	<i>Yes</i>	Option 4	Option 5

Preference for no co-frequency class licence

Class-licensed use—even if on a secondary ‘no rights’ basis—can reduce certainty and/or increase interference potential to spectrum licensed use. As such, AMTA members prefer option 2 over option 4.

Preference for option 2 over option 3 (and 5)

AMTA does not support Option 3 and 5. AMTA believes that segmenting part of the band for type 2 use should not be a primary objective, and as such does not believe that Options 3 and 5 are really ‘options’ at all. The primary objective should be allocating the maximum amount of spectrum that can be spectrum licensed while still ensuring protection of the EESS below 24 GHz.

Under the assessment of Principle 5, apparatus-licensing part of the band can increase interference cost due adjacent-band interference. Synchronisation with an unrestricted number of different users may not be a feasible interference management approach. As such, we prefer option 2 over option 3 (and 5).

Band/area 'variant' suffix

		<i>Area</i>	
		<i>Metro areas only</i>	<i>Metro + Regional centres</i>
<i>Upper band edge</i>	<i>27 GHz</i>	a	b
	<i>27.5 GHz</i>	c	d

Preference for 27.5 GHz Upper band edge

Coexistence studies show that IMT and FSS uplinks are compatible. As such, the 27-27.5 GHz segment should be spectrum-licensed within the defined areas.

Preference for variant d over variant c

See response to Question 3.

6. If options 3 or 5 (all variants¹⁶) are preferred, how much of the band should be available for spectrum licensing and apparatus licensing?

See response to Question 5.

7. If options 4 or 5 (all variants) are preferred, how much of the band should be available for class licensing?

See response to Question 5 explaining why Option 2 is preferred over Options 4 and 5.

AMTA does not agree to underlay class licensed use within spectrum-licensed spectrum space.

8. If options 4 or 5 (all variants) are preferred, what conditions should be applied to a class licence to protect co-frequency spectrum-licensed operations (in defined areas)? Would it be appropriate to define a means of making class-licensed use visible (for example, through a form of voluntary device registration)?

¹⁶ As explained in **Error! Reference source not found.**, variants are used to describe sub-options that contain differing frequency ranges for each of the primary planning options.

AMTA does not agree to underlay class licensed use within spectrum-licensed spectrum space.

9. Are there any other replanning options that should be considered?

AMTA members do not have a view on whether other replanning options should be considered.

10. Is there likely to be sufficient demand for type 1 services in regional centres outside metropolitan areas, and if so, what centres (either explicitly listed or by population threshold) should be included in the expanded licence areas?

See response to Question 3.

For any further questions relating to this submission please contact Lisa Brown, Public Policy Manager, AMTA at lisa.brown@amta.org.au or 02 8920 3555.