

AMTA Submission to the ACMA:

30 January 2017

Five Year Spectrum Outlook 2017 -21



Introduction

The Australian Mobile Telecommunications Association (AMTA) welcomes the opportunity to provide feedback to the ACMA regarding the Five Year Spectrum Outlook 2017-21 (FYSO).

AMTA notes that the FYSO has been re-structured as a result of the Spectrum Review process and stakeholder feedback. We note that the re-structuring of the plan and work program as well as the associated reporting timetables have provided stakeholders with greater transparency and more focussed engagement with the ACMA's spectrum planning processes.

Provided below are some general comments on the spectrum work plan and the mobile broadband work plan as well as specific responses to the questions included in the FYSO.

The 2017-18 Spectrum Work Plan

AMTA believes that it is premature to redefine the 600 MHz band as 614-694 MHz as has been proposed in the Work Plan. At this early stage, the ACMA should leave the 600 MHz band as 520-694 MHz. Further, this proposal should appropriately be reflected under the MBB Work Program, not under Broadcasting Planning work in the 2017-18 spectrum work plan.

Mobile Broadband Work Plan

Investigation, re-planning and re-farming

[mmWave bands being studied under WRC-19 Agenda item 1.13](#)

AMTA notes that work on a 5G NR standard that could cover mmWave up to 40 GHz in support of the eMBB use case is expected to be completed by mid-2018. This leaves a window of 18 months between technical standardisation and potential official international spectrum harmonisation expected at WRC-19.

However, around the world, carriers and vendors are preparing for pilots, pre-commercial deployments—and in some cases even commercial networks—prior to 2020. These developments show that the international mobile telecommunications industry is not waiting for the establishment of harmonised spectrum bands likely to result from WRC-19; instead it is anticipating international harmonisation decisions and focusing device development and trials on those spectrum bands where consensus is strongest.

26 GHz has developed into a pioneer band for mmWave – discussed further below.

It is noted that apart from the 26 GHz band, all mmWave bands being studied under WRC-19 Agenda item 1.13 are currently in the *monitoring* stage of the MBB Work Program. At least for some of these bands, it is possible that the progression through subsequent stages of the MBB Work Program is concurrent with, or even follows, major developments such as spectrum harmonisation and technology standardization—expected by the end of 2019—which continue to be vital for the commercialisation of a band.

At this point in time, AMTA believes that the next mmWave bands to progress to the *initial investigation* stage (and onwards to subsequent stages) would be the bands 37-43.5 GHz and 66-76 GHz, or parts thereof, noting domestic sharing issues, in particular with terrestrial fixed services in Australia.

Irrespective of the domestic spectrum planning agenda; AMTA strongly believes that in international forums the Australian Government’s objective is to support maximise flexibility in internationally harmonised spectrum options for future mobile broadband use.

AMTA’s position is therefore that other mmWave bands should be identified for IMT under WRC-19 Agenda item 1.13, and seeks identification of 37-43.5 GHz and 66-76 GHz as a minimum target.

AMTA notes that Australian support for more internationally harmonised bands for 5G—signalled through identifications for IMT in the Radio Regulations—will serve as a step towards maximising flexibility in potential spectrum options for future generations of mobile broadband networks. This will likely allow Australia to access a suite of harmonised spectrum options—in turn supported by an international device ecosystem—for allocation to mobile broadband with a view to boosting network capacity or facilitating new applications as required.

26 GHz band

International developments

AMTA notes that at a regional level, the European Commission (EC) Radio Spectrum Policy Group (RSPG) has recommended that work on 5G spectrum above 6 GHz be focussed on the bands 24.25-27.5 GHz, along with the bands 31.8-33.4 GHz and 40.5-43.5 GHz. In December 2016, this was followed up with the EC’s Mandate to CEPT to “harmonise technical conditions for the development of EU-wide 5G equipment”, with a focus on the 3.6 GHz and 26 GHz bands¹.

At a domestic level, the governments of at least eleven countries across the Asia-Pacific (Australia, China, Hong Kong, Singapore, South Korea) and Europe (Finland, France, Germany, Spain, Sweden, UK) are consulting on the 26 GHz band with a view to releasing the band, or parts thereof, for mmWave 5G².

¹ ECC, Spectrum for wireless broadband, <https://cept.org/ecc/topics/spectrum-for-wireless-broadband-5g>

² GSA Spectrum Group, September 2017, *Making 26 GHz a successful 5G band in Europe*

The USA³, Japan and South Korea are focusing efforts on the adjacent 28 GHz band. 28 GHz band deployments in these large markets would further grow the potential device ecosystem if devices support a broad tuning range covering both the 26 GHz and 28 GHz frequency ranges. That said, the USA is consulting on part of the 26 GHz band as part of the FCC's Further Notice of Proposed Rule Making,⁴ while South Korea is also planning to allocate 26.5-27.5 GHz for 5G.⁵

In other words, the international support for the 26 GHz band within Europe and the Asia-Pacific is likely to provide opportunities for economies of scale for devices supporting 24.25-27.5 GHz in these large markets. This would increase further if devices also support the 28 GHz band—with an extended tuning range covering both bands—on which North America, Japan and South Korea are focused.

Domestic considerations

The 26 GHz band has developed into a pioneer mmWave band and therefore should progress from initial investigation to preliminary replanning. As part of this progression, important factors that need to be taken into account are international standardisation, spectrum harmonisation as well as the results of technical trials and development of a device ecosystem. To this end, the nascence of a device ecosystem in the adjacent 28 GHz band could also support the 26 GHz band with the implementation of extended tuning ranges.

37-43.5 GHz band

International developments

In the FCC's "Spectrum Frontiers" Report & Order, the USA has adopted rules for licensed use of the bands 37-38.6 GHz and 38.6-40 GHz for wireless broadband services. Canada is also proposing to make the band 37-40 GHz available for flexible use for mmWave 5G. The USA is also consulting on the band 42-42.5 GHz as part of the FCC's Further Notice of Proposed Rule Making.

In its Opinion on spectrum-related aspects for 5G, the EC RSPG has stated that it considers the band 40.5-43.5 GHz as a viable option for 5G in the longer term.

Part of this Opinion is that "shift of use from other bands to 40.5-43.5 GHz should be avoided as far as possible in order to keep the option open to make it available for 5G in the future".

In line with this recommendation several European administrations, along with Ericsson, Huawei and Samsung and the GSA Spectrum Group, also identified the band 40.5-43.5 GHz as a high priority band under WRC-19 Agenda item 1.13, in response to the CEPT Questionnaire on *Use and future plans for frequency bands in relation to studies in CEPT on WRC-19 Agenda item 1.13*.

Notably, Ofcom has identified the 40 GHz band as a longer-term potential priority which is promising for 5G, noting low utilisation within 40.5-43.5 GHz and emerging harmonisation internationally⁶.

³ Canada is also consulting on releasing the 28 GHz band to support 5G: <https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11298.html>

⁴ 14 July 2016, FCC, *Report and Order and Further Notice of Proposed Rulemaking*, https://apps.fcc.gov/edocs_public/attachmatch/FCC-16-89A1.pdf

⁵ 23 December 2016, Business Korea, *South Korean Government to Secure 40 GHz Frequency Width for 10 Years*, <http://www.businesskorea.co.kr/english/news/ict/16837-strategic-securement-south-korean-government-secure-40-ghz-frequency-width-10-years>

⁶ Ofcom, 28 July 2017, *5G spectrum access at 26 GHz and update on bands above 30 GHz*

Trial activity in this frequency range includes 5G fixed wireless access demonstrated by US carriers with Nokia and Ericsson.

As for the 26 and 28 GHz bands, a broader tuning range could also apply across 37-43.5 GHz, which means that devices could support potential future 5G operations both in 37-40 GHz (e.g. in North America) as well as in 40.5-43.5 GHz (e.g. in Europe).

Domestic considerations

AMTA notes that much of the band 37-39.5 GHz overlaps the '38 GHz' fixed link band, except for 37-37.5 GHz and the mid-band gap in approx. 38.2-38.7 GHz. There are several hundred 38 GHz fixed links in Australia, concentrated in more highly populated areas, which are also the areas of highest demand for mmWave 5G. The compatibility of mmWave 5G and 38 GHz fixed links is an incumbency issue which would require careful consideration under subsequent stages of the MBB Work Program.

Above 39.5 GHz, and assuming a primary allocation to the mobile service in 40.5-42.5 GHz under WRC-19 Agenda item 1.13, the band 39.5-43.5 GHz offers a contiguous block of 4 GHz bandwidth for mmWave 5G, which could readily support several competitive mobile broadband network operators. The band's minimal incumbency—there are currently no licensed services in Australia within this band—coupled with the wide bandwidth, clearly represents a significant opportunity to bring very high capacity services to many urban/suburban communities throughout the country.

66-76 GHz band

International developments

AMTA notes the outcomes of the FCC's "Spectrum Frontiers" Report & Order which adopts rules for "unlicensed" use (equivalent to class-licensed use in Australia) in the band 64-71 GHz^{7,8}, and that Canada is also considering mirroring the US arrangements in this band⁹. The USA was also consulting on the band 71-76 GHz as part of the FCC's Further Notice of Proposed Rule Making, however in its Second Report & Order, the FCC decided to preserve the 70 GHz band for traditional and innovative fixed wireless services.

Support for part of the band is also developing in Europe, most notably with Ofcom confirming its intention to start working on making spectrum available in 66-71 GHz, due to it being unencumbered spectrum and adjacent to licence-exempt use by multi-gigabit applications (e.g. WiGig).

In 2016, the GSA Spectrum Group has highlighted this spectrum as important for backhaul; noting that co-existence with backhaul and converged access/backhaul require further study. There has also been significant trial activity at frequencies around 73 GHz. Nokia built a 5G prototype platform and performed trials with a number of North American and Japanese carriers, including UHD video transmission trials at the Copa America 2016 with Sprint. Huawei performed mmWave transmission tests with Vodafone in the UK and, closer to home, performed a mmWave 5G trial with Optus at 73 GHz.¹⁰

⁷ *Spectrum Frontiers R&O and FNPRM*, <https://www.fcc.gov/document/spectrum-frontiers-ro-and-fnprm>

⁸ *FCC Adopts Rules to Facilitate Next Generation Wireless Technologies*, https://apps.fcc.gov/edocs_public/attachmatch/DOC-340301A1.pdf

⁹ *Consultation on Releasing Millimetre Wave Spectrum to Support 5G*, <https://www.ic.gc.ca/eic/site/smt-gst.nsf/eng/sf11298.html>

¹⁰ Optus trial, 10 November 2016

<https://media.optus.com.au/media-releases/2016/optus-and-huawei-successfully-complete-5g->

As technical field trials and standardisation work continue, the relative priority of bands may change. For example, despite the higher propagation losses at higher mmW bands, smaller, more efficient antennas with higher gains could be produced at these higher bands, presenting a more favourable spectrum option.

Noting some of the above developments, it appears that while there was significant early interest in the 75 GHz band (71-76 GHz), progress towards arrangements supporting wireless broadband access networks is consolidating in the lower 66-71 GHz range. That is not to say that the 75 GHz band won't play a major role in 5G, as it could still be very useful for backhaul links, in conjunction with the 85 GHz band.

Domestic considerations

The band 66-71 GHz offers a potential 5 GHz of unencumbered spectrum for mmWave 5G. It is AMTA's view that no decision should be made with respect of this band until the outcome of WRC-19 is known.

AMTA notes that there may be value in accelerated consideration of the band 66-71 GHz in the future. However at this stage:

- a) there is no existing use of the band within Australia;
- b) licensing arrangements focused on supporting operation of North American "unlicensed" devices would naturally be based on class licensing (or spectrum authorisations under the proposed future legislative framework);
- c) sharing and compatibility studies on the band are ongoing within TG 5/1; and
- d) there may be developments in other countries with respect to this band focussed on other licensing regimes (i.e. based on licensed spectrum).

Noting (c) and (d) above, there are reasons for which it may be prudent to continue *monitoring* the band, while noting (a) and (b) above, class licensing (or equivalent) arrangements in this unused band could be prepared relatively quickly if the need arose.

In fact, the ACMA has already released a consultation on amending the *Radiocommunications (Low Interference Potential Devices) Class Licence 2015* (the LIPD Class Licence) to allow data communications transmitters in 57-66 GHz to also be used outdoors at a maximum EIRP of 20 W, in addition to existing provisions for outdoor transmitters in 59-63 GHz. This is evidence of the ACMA's ability to modify, in an agile manner, licensing arrangements to align with those of the USA.

For the reasons noted above, international developments should continue to be monitored so that Australia can strike the appropriate balance between efficient spectrum use, robust and reliable high-speed communications, economies of scale for commercial devices and feasibility to enforce compliance.

Above 71 GHz lies the 75 GHz 'self-coordinated' fixed link band, in which there are several hundred of these fixed links. The compatibility of mmWave 5G and 75 GHz fixed links is an incumbency issue

<http://www.huawei.com/en/news/2016/7/huawei-vodafone-5g-test>;
<https://www.mobileworldlive.com/featured-content/top-three/vodafone-huawei-reach-20gbps-speed-in-5g-trial/>

which would require careful consideration under subsequent stages of the MBB Work Program. Because of the use of this band for fixed links both in Australia and internationally, as mentioned earlier, the global mobile broadband community is investigating opportunities for accommodating the expected increased requirement for 5G backhaul/fronthaul, and even in-band backhaul (i.e. converged access/backhaul).

Other “Non-1.13” mmWave bands

AMTA notes that there is significant overlap between the item “Bands being studied under WRC-19 agenda item 1.13” and “Bands being considered internationally for 5G”. By definition, the former set of bands are being considered internationally for 5G, so this inherent repetition will continue to grow as more regions and countries make statements about their visions and policies on the mmWave 5G future.

Looking at Table 2 of the MBB Work Program, this overlap actually becomes problematic. For example, the ACMA marked “No” under International spectrum harmonisation for “Bands being considered internationally for 5G”, even though these include bands being studied under WRC-19 Agenda item 1.13 with a view to being internationally harmonised.

Presumably, the ACMA created the section “Bands being considered internationally for 5G”, initially to capture the 28 GHz band, which is not being considered under WRC-19 Agenda item 1.13. As such, AMTA believes that this section should be changed to explicitly cover bands that are *not* being studied under WRC-19 Agenda item 1.13, referred to as “Non-1.13” mmWave bands. AMTA provides a marked-up extract of the MBB Work Program as a suggestion of how to implement this distinction.

If the ACMA accepts AMTA’s proposal, the “Non-1.13” mmWave bands are effectively limited to the 28 GHz band, 64-66 GHz and bands above 95 GHz.

890–915 MHz and 935–960 MHz

AMTA members have differing views on the proposed ACMA approach to the reconfiguration of the 890-915/935-960 MHz band and will make their own individual submissions. AMTA has raised concerns with the ACMA regarding the issue of interference in this band from ISM devices that remain common in this band, despite being illegal.¹¹ This is primarily due to inconsistencies with the USA’s spectrum plan and the ability of consumers to purchase devices online from the USA. This is a problem that can be managed but probably never be adequately resolved.

1.5 GHz

AMTA supports the progression of the 1.5 GHz band to the preliminary planning stage. AMTA has previously stated a preference for a SDL configuration in its response to IFC 2016/25; noting that would align with harmonised arrangements in Europe for SDL in the band 1452-1492 MHz. However, since then, technical assessments are underway to review the use of the band for Supplementary Uplink (SUL), and so at this stage it is AMTA does not have a specific preference for to lock in either SDL or SUL. That said, these simplex configurations are preferred to full duplex arrangements, on the basis that:

- contiguous spectrum is maximised—i.e. no mid-band gap as with FDD;
- it reduces challenges with network self-interference—i.e. associated with synchronisation issues with TDD and duplex filter issues of FDD;

¹¹ AMTA submission to ACMA’s consultation 890-915/935-960 MHz reconfiguring the band: way forward, 22 Dec 2017.

- the benefits of larger propagation distances achievable with “mid band” spectrum are less likely to be compromised with an efficient band arrangement;
- it would allow a staged release of spectrum facilitating earlier MBB deployments where incumbency issues vary across parts of the band and/or geographic areas.

3.6 GHz

The 3.6 GHz band has been identified as an important option for early use by 5G mobile networks use as it is suitable for providing a ‘coverage layer’ due to its propagation characteristics.

AMTA has supported the progression of the 3.6 GHz band to the *re-farming* stage. And we agreed with the ACMA’s conclusion in its ‘Highest value use assessment: Quantitative Analysis’ (HVV paper) that MBB is unequivocally the highest value use of the 3.6 GHz band.

More specifically, AMTA supported re-allocation of the entire 3.6 GHz band for MBB, through the issuing of spectrum licences, in line with the ACMA’s preferred Option 3c.

AMTA has provided comments on the re-allocation process to the ACMA in our submission made in November 2017.¹²

¹² AMTA submission to ACMA’s consultation on re-allocation of 3.6 GHz band, 29 Nov 2017.

Responses to Questions included in FYSO

1. Will the proposed structure of the work program assist you in your business planning?

AMTA appreciates the work that has occurred to refine and improve the structure of the work program, which as noted in the consultation is based on feedback provided in previous years. The focus of the work plan around the ACMA's major spectrum functions makes it easy to understand forthcoming ACMA work across the range of functions, including allocation, licensing, pricing, interference management, etc. This structure also makes it easier for AMTA members to feed the ACMA's indicative timelines into investment planning processes.

2. Does the content provide adequate detail for you to engage with the ACMA's planned work in a meaningful way?

Noting that the FYSO had undergone a transition and many improvements have been made; AMTA believes that there is still room to improve the FYSO in terms of its strategic purpose.

The FYSO should be a strategic instrument that provides a holistic view of the ACMA's spectrum work program and planning processes. It should include an indicative timetable that sets out potential next steps in relation to decisions or processes that would result if different scenarios were adopted. This will assist stakeholders to get an overall view and understanding of how decisions around spectrum planning are made and the underlying reasoning behind decisions made. This will provide greater certainty for stakeholders and assist with defining regulatory inputs to investment decision making processes.

We believe that there is still room to include greater detail around the identification of key decisions and changes to the work plan and greater nexus between the FYSO and the ongoing processes of the ACMA's spectrum management.

Specifically, we suggest that there could be an improvement in how changes are identified in the plan with each yearly update. And where changes are not made, this could similarly result in a reduction of content in the annual plan.

With regard to facilitating engagement with the ACMA, the consultative format of FYSO is useful, but if processing of feedback and subsequent updates is not timely, this facilitation is less effective. Also, where stakeholders have divergent views, the FYSO is a less effective tool for facilitating engagement. AMTA notes that forums such as the 'Spectrum Tune-Up' sessions can be a more efficient mechanism to get many stakeholder views aired simultaneously, and where there is divergence, to facilitate discussion on issues and concerns that can produce options for solutions that can be explored and resolved more efficiently. We propose that the ACMA's planning for its work program could benefit from greater use of a forum approach, for example, to quickly and efficiently explore the scenarios outline in Part 1 Section 2 of the FYSO, and to either reach consensus amongst stakeholders, or identify where concerns lie.

3. Does the consultation process provide sufficient opportunity for you to contribute to the work program?

See our response to Q2.

4. Do you have a preference for how the ACMA should communicate changes during the period of a work program?

AMTA members have a preference for “continuous” updates where there are changes that materially affect the timing of items on the work plan, rather than waiting for changes, particularly delays in processes, to be communicated in the next year’s FYSO. AMTA suggests that quarterly updates would be an appropriate frequency, and changes should be provided as a list of variations to the previously published plan via on-line delivery on the ACMA’s website.

5. Does the inclusion of a forward allocation work plan by the ACMA assist with the planning of your spectrum and network technology decisions?

The forward allocation work plan assists AMTA members in planning their spectrum and network technology decisions.

6. Do you have any comments on the scenarios? Are there other scenarios you believe warrant identification and particular attention at this time? Why?

7. Is there interest in the ACMA running sequential staggered allocations over the next four-year period?

8. Which bands would you like to see prioritised for allocation under the planning scenarios? Why?

AMTA members have put forward their own views in relation to questions 6-8 in individual submissions.

9. Do you agree that these reform objectives appropriately reflect the direction the ACMA should take in implementing the recommendations of the government’s Spectrum Review?

AMTA notes that the legislative and regulatory reforms stemming from the Government’s Spectrum Review are still very much a work in progress. While the intentions behind the recommendations of the Review seem clear; how many of these recommendations will be implemented remains to be seen.

AMTA therefore believes that there is scope for the ACMA to consider how the recommendations and objectives of the Review could be implemented. In particular, we believe that the fundamental property rights associated with spectrum licences should be further considered and revisited in consultation with stakeholders. There is potential for the management of spectrum to be improved, consistent with the objectives of the Spectrum Review, and there is scope for the ACMA’s planning processes to play a greater role in making spectrum management and allocation more efficient and flexible.

In consultations at previous stages of the Spectrum Review process, AMTA has advocated for a licensing framework which will facilitate greater use of market mechanisms for allocation and reallocation of licences and encourage a secondary trading market.

The foundation for greater market-based activity is a licensing framework that delivers a set of simple but well-defined access rights. This is not the case with the set of spectrum, apparatus and class licences that are used today.

AMTA supports the proposed approach for the new licensing framework to establish a single licence category, provided it promotes greater transferability of licences between different uses than the existing framework and the access rights of existing licensees are not compromised. We also support

the proposal for the new licensing framework to facilitate and encourage secondary market activity by allowing assignment, sharing, aggregation and subdivision by licensees.

AMTA also supports a generic licensing mechanism which clearly records subordinate uses and can be used to accommodate incumbents in licence transfers, including the initial allocation of encumbered spectrum. We suggest that this could be achieved by requiring parameter based licensing to include a pro-forma arrangement for recording such uses. More specifically, this could be implemented with a special form of parameter based licence that is issued by the lessor and linked to the lessor's licence.

The ACMA has listed nine implementation objectives to guide its implementation of the Government's Spectrum Review. Before the ACMA implements these 9 objectives; AMTA suggests it would be worthwhile for the ACMA to consult with stakeholders to better understand the Government's intention and best way forward around the licensing regime.

At a high level, AMTA is not opposed to the nine implementation objectives, noting that at this time, we have not yet seen a draft of the Transitional and Consequential (T&C) Bill. AMTA submits that ahead of a draft of the T&C bill being made available, the objectives seem satisfactory, although further refinement is likely to be required once the T&C bill is available.

As AMTA has noted in submissions and meetings with ACMA and DoCA, we need to see examples of many of the proposed tools within the new Radiocommunications Bill, such as regulatory undertakings and designated statements. We note the ACMA's intention to "*consult in more detail shortly on its licensing system design and licence reform proposals*" (at item (i) first bullet point on page 17) and AMTA and its members look forward to this opportunity to engage with the ACMA on the design of these tools prior to their implementation.

10. Are there any other reform objectives toward which the ACMA should direct its implementation activity?

In our engagement with DoCA's consultations on the spectrum reform process, AMTA has always emphasised the importance of maintaining property rights under existing spectrum and, to a lesser extent, apparatus licences. AMTA recommends that an objective to maintain existing property rights would be a useful addition to the nine objectives listed by the ACMA (see also response to 9 above)

11. What more information do stakeholders require about the ACMA's implementation engagement plan, and when, in order to plan their engagement with ACMA consultation activities?

DoCA has indicated that an Exposure Draft of the T&C Bill will likely not be released until early 2018, however this is not likely to happen prior to the consultative workshop now scheduled for 20 Feb 2018.

. We propose that this question is better answered once the Exposure Draft of the T&C Bill is available, and recommend that an industry forum such as a Spectrum Tune-Up session would be most useful for engaging with all stakeholder views.

Conclusion

AMTA recognises and appreciates the efforts of the ACMA in planning for and progressing spectrum bands for 5G and looks forward to continued engagement in the planning and re-farming processes.

For any questions in relation to this submission please contact Lisa Brown, Policy Manager, AMTA at lisa.brown@amta.org.au or (02) 8920 3555.