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**COMMUNICATIONS ALLIANCE
SATELLITE SERVICES WORKING GROUP (SSWG)**

SUBMISSION

to the

Australian Communications and Media
Authority's (ACMA) spectrum management
work program

Consultation draft

Five-year spectrum outlook 2021–26

5 May 2021

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EXECUTIVE SUMMARY

The Communications Alliance Satellite Services Working Group (SSWG) welcomes the opportunity to provide this submission to the Australian Communications and Media Authority's (ACMA) *Five-year spectrum outlook 2021–26 work program (the FYSO Consultation Draft)*.

The SSWG is once again pleased to make a submission to the FYSO consultation process, allowing the industry to regularly engage and contribute to the ACMA's work program.

The SSWG welcomes the recognition given to the satellite community in this edition of the FYSO and is encouraged that the ACMA appears to now be thinking beyond the stated (but, in our view, unproven) needs of the 5G community and is taking a more holistic view of the benefits of protecting satellite services.

This submission offers, for ACMA consideration, some suggestions that the SSW believes offer a relatively simple path toward a more equitable and somewhat less constrained operating environment for FSS in C Band.

The submission provides commentary on developments and priorities on a number of frequency bands being studied under WRC-23 Agenda Item 1.2.

The SSWG welcomes the ACMA's recent pricing initiative for services in the 28 GHz band.

Note: The submission does not necessarily represent the views of Telstra, as a member of the SSWG. It is understood that Telstra is lodging its own submission on the FYSO Consultation Draft.

About Communications Alliance

Communications Alliance is the primary telecommunications industry body in Australia. Its membership is drawn from a wide cross-section of the communications industry, including carriers, carriage and internet service providers, content providers, equipment vendors, IT companies, consultants and business groups.

Its vision is to provide a unified voice for the telecommunications industry and to lead it into the next generation of converging networks, technologies and services. The prime mission of Communications Alliance is to promote the growth of the Australian communications industry and the protection of consumer interests by fostering the highest standards of business ethics and behaviour through industry self-governance. For more details about Communications Alliance, see <http://www.commsalliance.com.au>.

1. Introduction

The SSWG welcomes the latest update of the Five Year Spectrum Outlook (FYSO) and thanks the ACMA for the opportunity to comment.

While some attention is paid to the needs of the satellite community and Australia plans to play an important role in the global space community with the establishment of Australian Space Agency which have the objectives to triple the size of the Australian space sector by 2030, the SSWG is disappointed by the amount of energy expended to meet the terrestrial mobile industry's ongoing appetite for additional spectrum.

The SSWG believes that regulators should appraise the damage this demand is having on other industries and their ability to provide services to people who do not live in large population centres. Indeed, the harm caused by the voracity of the terrestrial mobile industry is felt disproportionately by the satellite community and SSWG believes the ACMA and other global regulators should step in and protect what little spectrum that remains unencumbered by terrestrial mobile including 5G.

Examples of satellite bands lost or under threat include:

- L Band MSS is suffering from constraints imposed by sharing with terrestrial systems.
- C Band. The Earth receive segment, 3700-4000 MHz, is in the process of being allocated to 5G in addition to the previous C-band spectrum that have been made available for 5G deployment (i.e. 3400 – 3700 MHz). Only the 4000-4200 MHz Earth receive segment being preserved for FSS which the bands will not be shared with 5G services. The uplink bands (6 GHz) are under consideration for Wi-Fi and 5G.
- 26 GHz. Satellite has essentially been displaced by 5G in most of the world.
- 28 GHz. Satellite has been displaced in Australia in 27.5 – 28.1 GHz in major population centres and the band is under attack from 5G proponents internationally.
- Q and V band are 'under consideration' for 5G services.

In addition, SSWG regrets that the ACMA agrees with the mobile industry claims with regard to the spectrum needs of 100 MHz of contiguous C-band spectrum per operator, despite the recent OFCOM findings¹ demonstrating that with only 40 MHz of non-contiguous C-band spectrum was sufficient to provide all the main services anticipated under 5G services ((see 1.20, 1.35 and Figures 1, 2 and 3).

Nonetheless the SSWG welcomes the recognition given to the satellite community in this edition of the FYSO and is encouraged that the ACMA appears to now be thinking beyond the stated (but unproven) needs of the 5G community and is taking a more holistic view of the benefits of protecting satellite services.

One example of where such thinking could benefit the community in many ways is the 'C-Band' satellite service and the respective uplink and downlink bands. In Australia and indeed much of the world, the C-Band downlink bands have been disproportionately given over to 5G terrestrial services and FSS have been effectively evicted. Australia supports the maritime industry, Asia-Pacific countries and the Antarctica through C band Gateway Earth Stations in Australia providing much needed reliable broadband (public and private) services to the region. Also, countries that have very high rainfall, and rely on C-band, such as the equatorial Asia-Pacific region, are struggling to access satellite broadband directly. The isolationist view taken by regulators over the years, including Australia, means it is now not viable to launch a C-Band payload simply to cover these smaller nations.

¹ https://www.ofcom.org.uk/__data/assets/pdf_file/0023/195521/consultation-sut-modelling-700mhz-3.6-3.8ghz-spectrum.pdf

While one of the ACMA's responsibilities is to ensure spectrum is used and managed to maximise overall public benefit, SSWG believe that the current C-band spectrum planning in Australia does not represent the use of spectrum for overall public benefit and could see Australian national broadcasters (e.g. ABC) struggling to distribute their content to citizens and customers in Australia, in particular in metropolitan and regional areas.

The ACMA has, in the view of SSWG members, created an unfair competition environment between the satellite industry and mobile industry in the metropolitan and regional areas, with only 200 MHz of C-band spectrum exclusively available for FSS and 600 MHz of C-band spectrum exclusively available for terrestrial 5G. Please see section 2 sub section 3700 – 400 MHz below for the detail explanations why FSS would be hard to use 3800 – 4000 MHz band in metropolitan and regional areas.

While there is 200 MHz of C-band exclusively made available for FSS in the metropolitan and regional areas, it will still be challenging for FSS to fully use these 200 MHz of C-band spectrum, because Out of Band Emission (OOBE) interference, due to 5G services operating in the adjacent band services, needs to be managed.

The SSWG believes it would be beneficial if the ACMA's planners adopted a more holistic approach to their tasks, rather than risk focussing on Australia's needs in isolation. Indeed, we believe that focussing on regional needs would, in the big picture, be of great benefit to Australia.

As a proposal to advance this (and prompted in part by an announcement in the FYSO of an impending paper on 6 GHz), the SSWG believe that progress on the preservation of satellite services could simply be achieved by:

- Allowing ubiquitous (albeit unprotected in the downlink) FSS services in all of C band.
- Designating the FSS uplink (the 6 GHz band) for secondary Wi-Fi services.

This would permit the limited reintroduction of C-band FSS in Australia and may help balance the business case for continuing to provide services to the Asia-Pacific, while adding valuable Wi-Fi spectrum into the public spectrum pool.

2. The Detailed Work Program

Including bands being studied under WRC-23 agenda item 1.2

Resolution 245 (WRC-19) as the main reference for the on-going ITU-R studies under agenda item 1.2 (WRC-23) clearly stated that Region 3 will only consider the band 7025 – 7125 MHz for the possible IMT identification and therefore the ACMA should only consider these bands for the possible IMT identification in Australia once the outcome of WRC-23 is known.

With regard to the possibilities of IMT identification in other frequency bands in other Regions, Australia and other countries in Region 3 should only focus on the impact of the possible IMT identification of those other frequency bands in other Regions (i.e. Region 1 and Region 2) to the current existing services in Region 3. These considerations have been reflected on the output paper under agenda item 1.2 (WRC-23) resulted from the recent APG23-2 meeting.

1.5 GHz (1427 – 1518 MHz) and MSS Extended L-Band (1518 – 1525 MHz & 1668 – 1675 MHz)

These extended L-band frequencies have been allocated to MSS for over 10 years and are widely used by GSO systems in other parts of the world. Emergency responders, military users and diverse industries rely upon land-based MSS terminals. MSS terminals, for example, enable the maritime industry to comply with IMO Safety-of-Life at Sea communications equipment requirements (including GMDSS requirements). The aviation industry relies on MSS for AMS(R)S and related flight safety purposes, including for flight in high-capacity airspace routes.

Airlines are also expected to make greater use of MSS for distress and safety capabilities via GADSS and will require additional spectrum capacity. Hence, SSWG supports opening these bands for MSS in Australia. SSWG notes that the ITU-R and APT have been studying the adjacent band sharing between MSS above 1518 MHz and possible IMT below 1518 MHz for several years and is developing sharing arrangements. In view of the importance of MSS operations to key communications services in Australia, including critical safety operations, protecting MSS should be a consideration for the ACMA in its work program.

SSWG recommends excluding the 1492-1517 MHz frequencies from any plans for IMT use in the 1.5 GHz band. This is the best option for mitigating harmful interference to MSS terminals from OOB and receiver overload, considering the ubiquity of MSS deployment throughout Australia. If the upper portion of the 1.5 GHz band is considered for IMT, ACMA should condition any such availability on strict adherence to technical measures necessary to protect MSS, such as PFD, in-band EIRP, and OOB limits for IMT base stations and exclusion zones around airfields, waterways, and other areas where MSS terminals are used extensively. SSWG encourages ACMA to work closely with the satellite industry in developing robust protection measures, absent decision to restrict use of the 1492-1517 GHz frequencies in the 1.5 GHz band.

3.3 GHz (3300 – 3400 MHz)

This band is not allocated to satellite services and SSWG does not have a position on its future usage

3700 – 4200 MHz

With regard to the band 3700 -4200 MHz, Australia has made reference to what happened in the United States, to reallocate part of the band 3700 – 4200 MHz for the deployment of wireless broadband (5G) in Australia. A total of 600 MHz of C-band spectrum has been made available to be used for 5G deployment in Australia, whereas only 280 MHz of C-band spectrum has been made available for 5G deployment in United States. This disparity raises questions about whether the Australian allocation is excessive.

Mobile connectivity challenges in Australia are typically not caused by spectrum shortage – but, rather, by infrastructure, affordability, and coverage. The Australian government should not prioritise mobile broadband services – above revenue maximization – when awarding new frequencies.

Ensuring optimal 5G spectrum licensing is key, particularly when there are low and mid bands still available to be licensed. For example, in the sub-1 GHz bands there is significant spectrum allocated. Then mid band 2.5/3.5GHz where towers can cover several-mile radius with 5G that currently ranges from 100 to 900Mbps

We strongly encourage ACMA to take a balanced approach between wider geographic areas in low bands and ultra-high speeds and the lowest latencies for higher bands.

Especially when satellite continues to provide critical services that cannot be provided by other means and where 3400-3700 MHz remains sufficient to use for 5G services as we can potentially infer from recent auctions around the world such as in the UK. Ofcom recently released the official results² after mobile operators came to the end of a negotiation period in which they had to reach agreement with each other to reshuffle licences throughout the

² https://www.ofcom.org.uk/spectrum/spectrum-management/spectrum-awards/awards-in-progress/700-mhz-and-3.6-3.8-ghz-auction?utm_medium=email&utm_campaign=Ofcom%20spectrum%20auction%20final%20results%20announced&utm_content=Ofcom%20spectrum%20auction%20final%20results%20announced+CID_d7a1b0c2f591300a25be2fa49b84b683&utm_source=updates&utm_term=final%20results

3.4—3.8 GHz band. Yet after this latest spectrum auctions in the UK we see Vodafone and Telefonica swapping their spectrum in C band.

- Vodafone have 90 MHz in total but not contiguous (50 MHz in 3410-3460 MHz) & (40 MHz in 3500-3540 MHz)
- EE have 80 MHz in total but not contiguous (40 MHz in 3540 -3580 MHz) & (40 MHz in 3680- 3720 MHz)

So both EE and Vodafone will be using carrier aggregation, as we believe is possible, based on the ITU recommendation which mentions that contiguous spectrum is not necessarily needed to achieve 5G throughput speed (See ITU-M.2410³, page 10 section 4.13). There is no mention of a need for 100 MHz per operator or 100 MHz contiguous spectrum. Rather, it makes the point that bandwidth is the maximum aggregated system bandwidth. The bandwidth may be supported by single or multiple radio frequency (RF) carriers. So, the requirement for bandwidth of 100 MHz could be aggregated from other bands and this is certainly possible with TDD technology. Today Mobile network operators can use Dynamic spectrum sharing (DSS) which allows operators to use the same spectrum band for different radio access technologies such as 4G and 5G.

The conclusions of Ofcom's model are backed up by real-world observations of operators around the world, who have launched high-quality 5G services using less than 80-100 MHz of C-band spectrum per MNO. Some relevant statistics are shown in Table 1 below:

Country	C band Allocated to MNO (MHz)	Number of Nationwide MNOs
Singapore	200	4
Italy	200	4
UK	390	4
France	310	4
Hong Kong	200	4

Table 1 C-band Allocation for 5G services in Several Countries

In addition, based on the outcome paper on the replanning of the 3700 – 4200 MHz band, the band 3800 – 4000 MHz plan to be shared between local area wireless broadband, FSS, and PTP. The following considerations need to be taken into account with regard to the plan to share the band 3800 – 4000 MHz in particular between local area wireless broadband and FSS:

- 1) The ITU-R Report S.2368; "Sharing studies between International Mobile Telecommunication-Advanced systems and geostationary satellite networks in the fixed-satellite service in the 3 400-4 200 MHz and 4 500-4 800 MHz frequency bands in the WRC study cycle leading to WRC-15" concludes that the sharing between IMT-Advanced and FSS is feasible only when FSS earth stations are at known, specific locations, and deployment of IMT-Advanced is limited to the areas outside of the minimum required separation distances (i.e. at least 10s of km and typically exceed 100km) for each azimuth to protect these specific FSS earth stations.
- 2) Co-frequency sharing in the same geographical area between FSS and IMT systems is neither feasible nor practical. Numerous studies have shown this fact, and both satellite and terrestrial mobile industry agree that this is true. Even when 5G and FSS

³ https://www.itu.int/dms_pub/itu-r/opb/rep/R-REP-M.2410-2017-PDF-E.pdf

operate in adjacent bands, interference to FSS receivers will occur unless mitigation techniques are implemented.

- 3) When reading the outcome paper on the replanning of the band 3700 – 4200 MHz, SSWG believe that the FSS and probably PTP at the end will get secondary status compare to local area wireless broadband for the band 3800 – 4000 MHz in Australia. If it happened, then FSS will only able to use the band 4000 – 4200 MHz in metropolitan and regional areas. Even with the available 200 MHz of C-band spectrum in the metropolitan and regional areas, it will still be a challenge to use the band 4000 – 4200 MHz for FSS in both areas considering the OOB (Out Of Band Emissions) interference issues due to the deployment of 5G operating in the adjacent band which need to be managed.
- 4) Currently, a total of 530 MHz in the 5 GHz band have been allocated to RLAN in Australia. SSWG believe RLAN and local area wireless broadband are quite similar applications.

Based on the above considerations, SSWG questions the need to share the 3800 – 4000 MHz band in Australia between local area wireless access, PTP, and FSS.

Therefore, SSWG believe the current available spectrum for the deployment of terrestrial 5G (i.e. 3400 – 3700 MHz) should be more than enough to accommodate the demand for 5G services in Australia in addition to the other mid band spectrum (i.e. 1800 MHz, 2 GHz, and 2.3 GHz)⁴. A total of 470 MHz of mid-band spectrum have been made available for the deployment of 5G services in Australia. Based on these facts, the ACMA should postpone releasing the decision paper and make further thorough review to the outcome paper on the replanning of 3700 – 4200 MHz band.

40 GHz (37.5 – 43.5 GHz) and the 47 GHz (47.2 – 48.2 GHz) Bands

Portions of the 40 GHz band are identified via 5.516B for High Density FSS services. These services are also planned for the 47 GHz band and able to provide high throughput satellite broadband services to gateway earth stations and users anywhere, but are somewhat limited during periods of high rainfall. These band are also excellent candidate bands for Aeronautical ESIM and, at altitude, would not be affected by rain fade.

Naturally, as with all other 'low hanging fruit' these bands have been identified for IMT. The SSWG does not support this identification because, given the vast amount of alternative spectrum available to 5G we believe it is simply not needed.

While there is planning activity in the US and Europe, Australia is not like them. Australia has a population concentrated in the 'J Curve' with most of the rest of the country poorly served by way of communications services. Australia's small population simply does not need more 5G services, but many Australian's certainly need access to some form of broadband which is often provided by FSS backhauls or FSS directly.

The ACMA should take steps to ensure that future FSS in these bands are protected and are not subject to any interference (RF or licensing) that causes them to be displaced. The ACMA should also adopt a Regional and Global view on these bands, because taking the 'Australia only' view could result in such substantial damage to their utility that provision of services in Australia becomes unviable.

⁴ See, 5G spectrum in Australia, available online at <https://www.communications.gov.au/what-we-do/spectrum/spectrum-allocations>

Forward Allocation 2 GHz MSS

The SSWG welcomes the recent ACMA plan for 2 GHz MSS and looks forward to the allocation. This plan recognised the limited incremental benefit of this spectrum to terrestrial services compared to the large increase of available MSS services available to Australia and the region.

The viability of MSS services in this band, and thus the benefit they provide to Australians, is dependent on access to, as far as possible, the entire regional market to 'close' the launch and operate business case. Unfortunately, the ACMA appears to be adopting an isolationist view on the band. At a recent APT AWG meeting where the inevitable attack came from terrestrial 5G proponents, satellite industry delegates were severely constrained from speaking and the oft use reason was 'it is not Australia's issue', despite an Australian satellite filing including this band. The viability of this band for MSS depends a lot on what happens regionally and indeed globally, and on how quickly the proposed MSS/CGC and satellite IoT services can be introduced in Australia. The SSWG implores the ACMA to take a wider view at such meetings in order to influence the outcomes and help provide affordable services for Australians and the Asia-Pacific.

The SSWG considers that following the outcomes of the replanning of the 2 GHz MSS S-band, planning for early implementation of MSS/CGC should be undertaken in this FYSO period.

The discussion in the FYSO indicates that implementation has to wait for the existing TOB services to be transitioned to new arrangements anticipated to occur over 5 years.

This is far too long and the SSWG urges the ACMA to develop a transition mechanism that would allow an expedited transition of TOB to MSS/CGC when determining the method of allocation for MSS/CGC and satellite IoT services for which there is an immediate demand. The ACMA should also establish a Technical Liaison Group to determine the technical sharing conditions and adopt the appropriate regulatory framework to reinclude this band under Class licencing.

These activities should be scheduled and included in Table 1 (Band planning activities).

Forward Allocation 3700 – 4200 MHz

As per section above on the band 3700 – 4200 MHz, SSWG do not agree to the forward allocation timing as indicated in Table 2 of the Consultation paper, Therefore, the ACMA need to postpone releasing the decision paper and make further thorough review to the outcome paper on the replanning of 3700 – 4200 MHz band.

3. Satellite Planning

The SSWG welcomes the FYSO section on satellite planning but again asks the ACMA to take a holistic view of the industry and protect FSS spectrum from further damage inflicted by the terrestrial 5G lobby.

Of note in this section is the proposal to undertake further work on the parts of the band where ubiquitous FSS are excluded (in certain populated areas). The SSWG believes that the assumptions made in the planning of the band were overly conservative and those used in the recent boundary coexistence paper were unduly conservative. The use of these assumptions has (and may) result in wasted spectrum and loss of opportunity. The SSWG asks that the ACMA continue to refine these studies as we believe that realistically ubiquitous FSS should not be denied access to any geographic area in 27.5 to 28.1 GHz band and that the loss of service to FWA would be minor compared with the increase in service availability and choice driven by FSS.

4. Pricing

The SSWG welcomed the recent pricing initiative for services in the 28 GHz band and hopes that to some extent our response to various papers helped this come about.

In most cases satellite systems use paired bands. In the case of 28 GHz (uplink) the paired downlink is the 18 GHz band. While FSS are sole primary in the so called 'Teledesic' bands, they are secondary in the other parts.

There is currently no proposal to investigate pricing (possibly via Area Wide licencing) in the 18 GHz band to match that completed in the 28 GHz band, and SSWG believes this should be a priority.

5. Issues for comment

The following comments have been provided on the questions provided in the draft FYSO 2021–26 Consultation Paper.

5.1. Part 1 – FYSO

1. Do you have any feedback on the ACMA's approach to the five-year spectrum outlook?

The reintroduction of the FYSO, while some time ago, was a very welcome move to keeping industry engaged. The subsequent legislative requirement for it recognises its value and is also welcome.

The current FYSO however seems to have drifted away from spectrum planning to some operational issues and SSWG wonders if FYSO is the correct platform for these.

5.2. Part 2 – 2021-2022 detailed annual work program

2. Do you have any feedback on the ACMA's plans for monitoring, initial investigation, preliminary replanning or implementation of bands?

These project phases are easily understood and the SSWG supports them.

3. Do you have any comments about the ACMA's approach to forward allocations?

The SSWG believes forward allocations remains somewhat biased towards terrestrial IMT (5G) services. Given the large amounts of spectrum now available to these services we believe the approach should become more holistic.

5.3. Overall: FYSO format

4. How do you use the FYSO (for example, read once a year or regularly refer to)?

The SSWG members experience of the FYSO differs, however some refer to it on a weekly basis for guidance on other spectrum issues. One thing some members believe is missing is the companion 'Frequency Audit Table'. This document was invaluable when looking at actual allocations in Australia and also licensing trends and changes. While not needed on a 6-monthly basis SSWG believes an annual update would be useful

5. Do you find the 6-month and annual progress reports useful?

Yes. They allow both ACMA and industry to adapt to the sometimes rapid changes in the industry.

Appendix A: Communications Alliance Satellite Services Working Group membership

Amazon Web Services
APN
Coutts Communications
EchoStar Global Australia
Foxtel
FreeTV
Inmarsat
Intelsat
Ipstar
Nbn
Omnispace
OneWeb
Optus
Orion Satellite Systems
Pivotel Satellite
SES
Skybridge
SpaceX
Speedcast
Telesat
Telstra
ViaSat



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