

September 16, 2020

The Manager, Wireless Broadband
Spectrum Planning and Engineering Branch
Australian Communications and Media Authority
PO Box 78
Belconnen ACT 2616
AUSTRALIA

**RE: Planning options for the 3700–4200 MHz band - consultation
22/2020**

Dear Sir/Madam,

Speedcast Australia, a subsidiary of Speedcast International Ltd, is pleased to make comments on the *Planning options for the 3700–4200 MHz band - consultation 22/2020* paper, July 2020 (the Paper), issued by the Australian Communications and Media Authority (the ACMA).

Speedcast Australia would like to thank the ACMA for raising questions and asking for comments to this Paper, and to give the opportunity to contribute to this national consultation for potential evolution of the 3700-4200 MHz band in Australia.

About Speedcast

Speedcast International Ltd is an Australian company specializing in communications satellite technology. Speedcast has more satellite capacity than any other service provider (C, Ka, Ku, X, L) combined with an extensive multi-technology terrestrial and offshore network (fiber, LTE, microwave). Speedcast Australia holds 200 apparatus licences with ACMA (Client No. 20008844) and is likely to acquire more licences.



Figure 1: Speedcast's Global Network

Speedcast International Ltd is the largest provider of remote communications and IT services in the world. Speedcast's fully managed service is delivered via a leading global, multi-access technology, multi-band and multi-orbit network of 70+ satellites and an interconnecting global terrestrial network, bolstered by extensive on-the-ground local support from 40+ countries. Speedcast with its 1,200+ employees and 240+ field engineers around the world, serves more than 2,000 customers in more than 140 countries in sectors such as Maritime, Energy, Mining, Enterprise, Media, Cruise, NGOs and Government.

Replies to the issues for comment

In Australia, Speedcast lands 140 satellite receive carriers from ten C-band satellites¹ at three Australian Teleports (Mawson Lakes, SA, Henderson, WA and Bayswater, WA) occupying 450 MHz of C-band receive bandwidth (3700-4200 MHz). Speedcast is therefore following with great interest the ACMA's consultancy process in relation to planning of the 3700-4200 MHz band, as the frequency band is very important to support Speedcast's customers' communication needs now and into the future. The ACMA would be aware that C-band performs better in adverse weather conditions such as rain compared to other higher satellite frequencies such as Ku- and Ka-band and for this reason is often chosen to provide reliable communication for maritime, defence and government services in Australia and into the Pacific region and Indian Ocean.

¹ APSTAR-6, APSTAR-9, ASIASEAT-9, E172B, INTELSAT-18, INTELSAT-33, INTELSAT-H3E, JCSAT-2B, NSS-9 & NSS-12

Speedcast would like to make the following comments in response to questions raised in the Paper.

1. Comment is sought on the case for action and desirable planning outcomes for the 3700–4200 MHz band, including the supporting information at Appendices A, B and C.

Speedcast would like to correct the perception that FSS use is decreasing in the 3700-4200 MHz band in Australia including Adelaide. Table 1 provides the number of Speedcast assignments across the band for Adelaide and Perth. This is an update to the number of FSS registration reported in Table 10 of Appendix B.

Region	3700-3800 MHz	3800-3900 MHz	3900-4000 MHz	4000-4100 MHz	4100-4200 MHz	Total
FSS Perth - Speedcast	8	21	5	1	2	37
FSS Adelaide - Speedcast	3	4	8	5	1	21

Table 1: Speedcast C-band Assignments in Perth and Adelaide

As indicated in Figures 2 and 3 (below), Speedcast lands 140 satellite receive carriers from ten C-band satellites at three Australian Teleports (Mawson Lakes, SA, Henderson, WA and Bayswater, WA) occupying 450 MHz of C-band receive bandwidth (3700-4200 MHz). 220 MHz of the total 400 MHz of C-band receive bandwidth used by Speedcast is in the 3700-3900 MHz range.

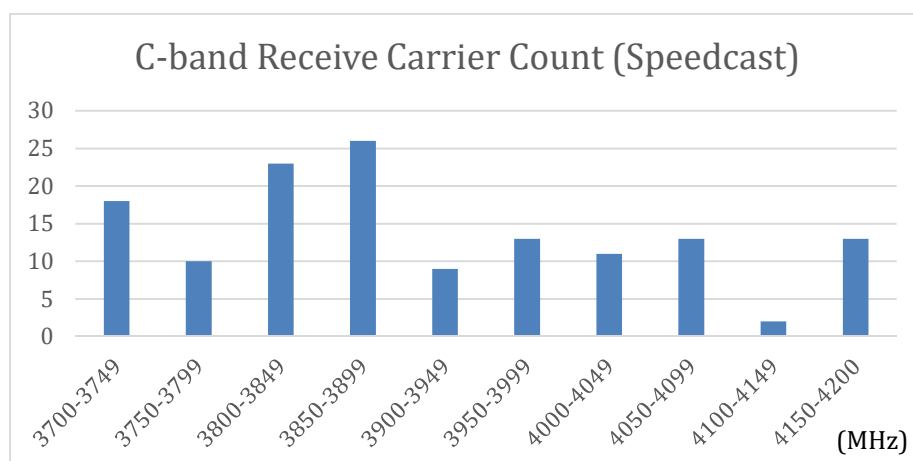


Figure 2: Distribution of Speedcast's C-band Receive carriers in Australia

Mawson Lakes, SA (a northern high tech hub of Adelaide) hosts the majority of the C-band services for Speedcast (80 carriers occupying 300 MHz of bandwidth). Using the number of assignments as an indication of spectrum use

ignores the fact that often a single assignment aggregates multiple satellite carriers.

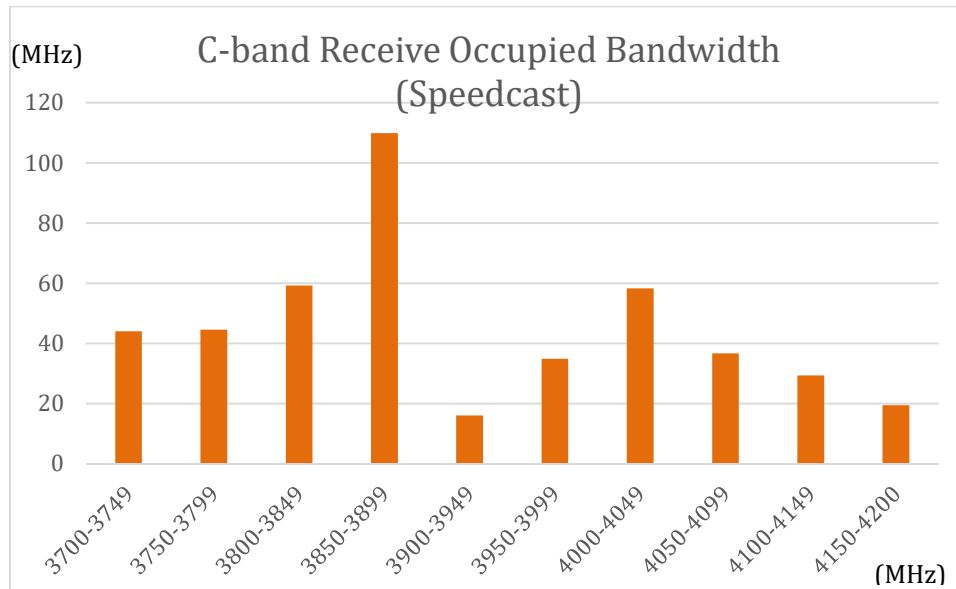


Figure 3: Distribution of Speedcast's C-band Receive carrier bandwidth in Australia

Speedcast C-band customers include the maritime, energy, government and telecommunication industries. Customers in tropical areas are big users of C-band due to its performance in high rainfall environments.

Unlike terrestrial services, satellite services have significant obstacles in relocating carriers to other sub-bands (i.e. restacking):

1. Satellite transponders are deployed into space with pre-determined operating frequency ranges, typically supporting the standard C-band of 500 MHz (3700 – 4200 MHz). If certain frequency segments cannot be used in Australia, this limits available bandwidth in Australia and the Pacific Region and Indian Ocean they serve. The lifetime of satellite systems of up to 20 years means that the satellite industry is locked into frequencies globally for a significant time. Limiting available bandwidth will either meaning that certain services will not be able to be provided and/or drive up the cost of satellite bandwidth prices from the satellite operators which need to be passed onto customers.
2. Speedcast leases certain portions of transponder bandwidths in C-band from satellite operators. Speedcast is one of many satellite service providers leasing the limited satellite bandwidth on satellites. If the lower frequency segment is not useable in Australia, and other satellite service

providers lease the higher frequency segments, this further limits bandwidth availability for Speedcast.

3. Geostationary satellites, used exclusively by Speedcast for C-band services, are limited due to the minimum longitudinal separation around the equator accessible by Australia.

The ACMA awarded 3575 – 3700 MHz (3.6 GHz band, referred to as the extended satellite C-band) to WBB in December 2018 which has negatively impacted Speedcast's access and operations in the adjacent 3700 - 3840 MHz band in Adelaide and Perth. Speedcast had to restack/relocate carriers and at Speedcast's expense install receiver filters to mitigate interference from the adjacent high-power 5G services. Speedcast would not support use of any segment of the 3700 - 4200 MHz band for WBB services that would further impact current and future use of this band by FSS in Australia.

FSS by nature operates in well-defined fixed areas (i.e. Teleports or Earth Stations) for significant periods of time. For this reason, Speedcast could support a sharing of the 3700-3800 MHz band with WBB if there is a mechanism that current and future FSS assignments required in the 3700 – 4200 MHz band at current FSS Teleports will not be adversely impacted by WBB services. FSS services in the 3800 - 4200 MHz should not be impacted by adjacent WBB services. Any measures required to protect FSS assignments should be implemented in the adjacent WBB band and paid for by the stakeholders introducing the WBB services.

Speedcast would support the ACMA designating an area around the Speedcast Teleports at Mawson Lakes, Bayswater and Henderson as Earth station protection zones (ESPZs)² for FSS in the 3800 – 4200 MHz band and other FSS receive bands used at these teleports. Since South Australia (SA) is a significant player in the Australian space industry, Speedcast would also support the ACMA establishing with the Australian Space Agency ESPZs in areas of SA.

For reasons already indicated, Speedcast opposes extending or introducing new ACMA embargoes in the 3700 – 4200 MHz band that would negatively affect FSS. Speedcast is particularly concerned about the recent introduction (20 July 2020) of Embargo 78 (No new frequency assignments for apparatus licences in the 3700-4000 MHz range Australia-wide) without consultation with Speedcast. This embargo will have a significant impact on Speedcast's operations into the future. Speedcast is in the process of applying for new licences in the 3700-4000 MHz range to support customer requirements at its Teleport (earth stations).

² See ACMA's RALI: MS44 – Frequency coordination procedures for the earth station protection zones

2. Comment is sought on the proposed options, including appropriate values for frequency segment breakpoints as well as any alternative options.

As already indicated, Speedcast currently operates a significant number of carriers with bandwidth across the 3700 – 4200 MHz band in metropolitan SA and WA, and market trends³ indicate that the demand for C-band FSS will increase significantly in the foreseeable future. Speedcast customers operate VSAT equipment around Australia, mainly in remote areas.

Option 1: Speedcast does not support exclusive use by WBB in the frequency segment of 3700 – 3900/4000 MHz band due to the unnecessary impact on existing and future FSS in Australia. Although demand for WA WBB bandwidth is forecast to increase in metropolitan areas, there is no bandwidth demand justification for exclusive use of the segment 3700 – 3900/4000 MHz band by WA WBB in all metropolitan and regional areas or LA WBB in remote areas. Before assigning new bands for WBB, it is suggested that the ACMA should consider re-farming the existing frequency bands that have been or are being used for 2G, 3G and 4G networks. Option 1 would at least double the cost of regional FSS bandwidth to Speedcast, resulting in a multimillion dollar increase in operating expenses that would need to be past onto end customers.

Option 2: Of all of the three options presented, a variation to this option is preferred. Speedcast could support a sharing of the 3700-3900 MHz band with WBB if there is a mechanism that current and future FSS assignments required in the 3800 – 4200 MHz band at current FSS Teleports will not be adversely impacted by other services. Effectively these are micro Earth station protection zones (ESPZs) for FSS in the 3800 – 4200 MHz band. Results of ITU-R studies will determine the geographic distances and maximum power levels that would apply to these zones. FSS services in the 3800 - 4200 MHz must not be impacted by adjacent WBB services. Any measures required to protect FSS assignments should be implemented in the adjacent WBB band and paid for by the stakeholders introducing the WBB services (i.e. guard band in the adjacent WBB band).

Option 3: This option is a mix of certain characteristics of Option 1 and 2. Speedcast can support a variation to Option 3, called 'Option 3 FSS', detailed in Speedcast's response to Question 5.

3. Comment is sought on possible variations to the proposed options and implementation considerations.

³ 100% increase in number of broadband connected commercial maritime vessels by 2027 (NSR Maritime Satcom Markets 6th.)
222% VSAT bandwidth growth for ocean going Yachts by 2023 (NSR 2018)

As indicated already in this response, Speedcast would like to correct the perception that FSS use is decreasing in the 3700-4200 MHz in Australia including Adelaide. As indicated in the response to Question 1, incumbent use of FSS by Speedcast in metro Adelaide and Perth is high.

As indicated in Speedcast's response to Question 2, Speedcast could support FSS sharing the 3700-3800 MHz band with PTP and LA WBB in remote areas and 3800-3900 MHz for PTP and LA WBB Australia wide if there is a mechanism that current and future FSS assignments required in the 3700-3800 MHz remote areas and 3800 – 4200 MHz band at current FSS Teleports will not be adversely impacted by WBB services. Effectively these are micro Earth station protection zones (ESPZs) for existing FSS earth stations in the 3700-3800 MHz remote areas and 3800–3900 MHz band Australia wide. Results of ITU-R studies will determine the geographic distances and maximum power levels that would apply to these zones. FSS services in the 3800 - 4200 MHz should not be impacted by adjacent WBB services. Any measures required to protect FSS assignments should be implemented in the adjacent WBB band and paid for by the stakeholders introducing the WBB services.

Speedcast is typically contractually bound for one or more years to bandwidth leases for spectrum they acquire from satellite operators. If there were any changes that would impact use of frequencies leased by Speedcast, a minimum of three year would be required to run out existing contracts and to obtain new leases for suitable frequencies.

Speedcast would strongly oppose having to establish new Teleports mainly for financial reasons. There are also some satellite spot beams that are not available in other areas of Australia⁴. If Speedcast was forced to establish a new Teleport in a regional or remote area, at least five years would be required to make these arrangements. Any setup and increased ongoing operating costs associated with such a move would need to be borne by the stakeholder(s) requiring the relocation.

The compatibility between WBB and FSS systems in adjacent bands should be addressed in any changes to the spectrum management framework. Should specific conditions be required to permit compatibility (such as a guard band), we encourage the ACMA to introduce these bands in the WBB band and make these conditions applicable only to the new service being introduced. For instance, should WBB be allowed into a band adjacent to FSS allocation, the potential guard band should be defined only within the WBB newly allocated spectrum.

⁴ Examples are INTELSAT-33 and INTELSAT-H3E

4. Comment is sought on the discussion and outcomes of the assessment of options, including the cost benefit analysis and its assumptions. This includes any evidence for the value placed on the band for WBB and FSS use.

The present number of FSS registrations in Adelaide and Perth is significantly higher than what is detailed in Table 10 of Appendix B. Both Adelaide and Perth have significant numbers of FSS assignments in the 3700 – 4200 MHz band as indicated in Table 1, Figures 2 and 3. Speedcast lands 140 satellite receive carriers from ten C-band satellites at three Australian Teleports (Mawson Lakes, SA, Henderson, WA and Bayswater, WA) occupying 450 MHz of C-band receive bandwidth (3700-4200 MHz). 220 MHz of the total 400 MHz of C-band receive bandwidth used by Speedcast is in the 3700-3900 MHz range (see response to Question 1 for further details).

A long term strategy worth considering is to establish at least one ESPZ in SA and depending on demand an extra ESPZ in WA.

Options considered for FSS continued use of 3700 – 4200 MHz in Appendix B are commented on here:

Restacking – This is only possible if there is sufficient bandwidth to move to. Satellite bandwidth capacity is held by the satellite operators and Speedcast has no control over this capacity. Restacking would result in Speedcast having to use more satellites resulting in additional infrastructure cost (antennas etc.). The ACMA's estimate for restacking found in Appendix F of \$300,000 per gateway including installing a new dish is a reasonable assumption. It is likely that more than one new satellite dish would be needed at each Teleport resulting in the order of \$300,000 being spent per new antenna. Restacking satellite carriers also requires procuring expensive replacement receive filters for the new frequencies of operation. The receive filters are not tuneable.

Clearing – moving satellite C-band services to a different band is impractical and cost prohibitive. Satellite bands need to be common globally for satellite services to be cost effective and useable.

Relocating – moving teleports to an ESPZ or regional/remote area would be a significant capital expense and would also result in an increase in operating costs (staffing, backhaul rental). The estimated relocation cost provided in Appendix F of between \$20 million and \$50 million per FSS Teleport is reasonable. These expenses could not be borne by Speedcast but the stakeholders requiring the relocation. Access to terrestrial backhaul services and suitably experienced staff to man a 24/7 service in a regional/remote area could be problematic.

5. The ACMA invites comment on its preliminary preferred option.

Speedcast notes that Option 3 is the ACMA's preliminary preferred replanning option. The concerns that Speedcast has about this Option are listed below:

1. Speedcast's satellite teleports are located in metro areas, so a minimum of 100 MHz of available bandwidth (3700 – 3800 MHz) would be inaccessible by Speedcast at these existing earth stations. The remaining bandwidth available to Speedcast would increase significantly in cost. There needs to be a guard band introduced to protect FSS devices from WBB operating outside of the 3700-3800 MHz band.
2. Another 100-200 MHz of FSS bandwidth (3800 – 3900/4000 MHz) would be jeopardised for future FSS licences at FSS earth stations depending on how much bandwidth the LA WBB services require in the metro area.

For these reasons, a variation to Option 3, '*Option 3 FSS*' (Figure 4) is proposed.

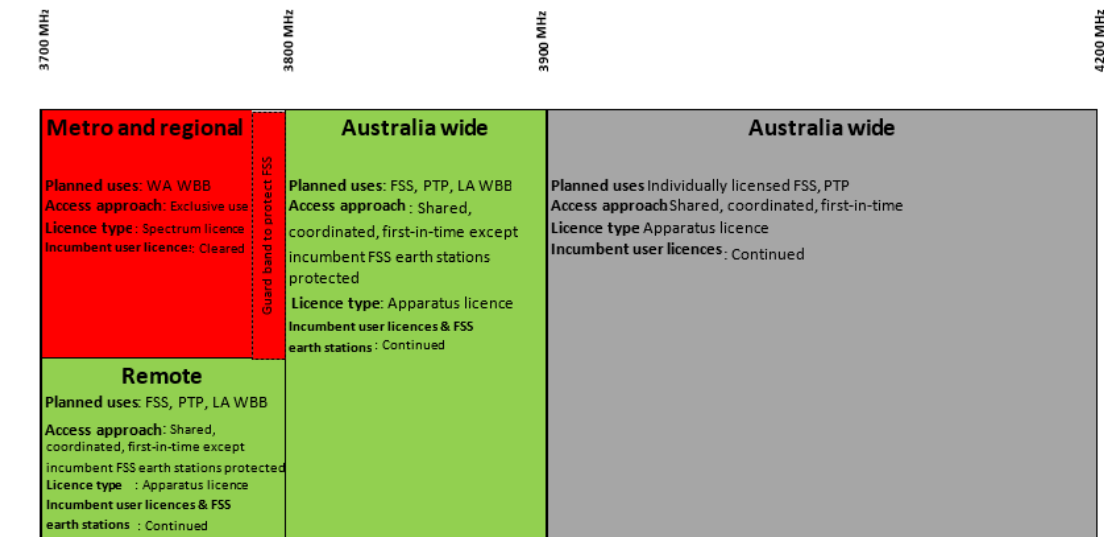


Figure 4: Illustration of Option 3 FSS

Changes by frequency segment

3700–3800 MHz

- > Issue spectrum licences, optimised for WA WBB deployments, in metropolitan and regional areas.
- > Remove arrangements for coordinated apparatus licensed FSS and PTP services in metropolitan and regional areas.
- > Introduce arrangements for apparatus licensed (AWL or PMP) to support LA WBB applications on a shared, coordinated, first-in-time basis with FSS and PTP services in remote areas. An exception is that incumbent FSS

earth stations would be protected for the whole band segment through geographical separation.

- > A guard band would be required to provide protection to incumbent FSS earth stations in the adjacent 3800-4200 MHz band.

3800–3900 MHz

- > Introduce arrangements for apparatus licensed (AWL or PMP) services to support LA WBB applications on a shared, coordinated, first-in-time basis with FSS and PTP services Australia wide. An exception is that incumbent FSS earth stations would be protected for the whole band segment through geographical separation.

3900–4200 MHz

- > No change. Continue shared, coordinated, first-in-time apparatus licence arrangements for FSS and PTP Australia wide.

Under this option, spectrum arrangements are provided for WA WBB in metropolitan and regional areas. Spectrum is provided for LA WBB in metro, regional and remote areas on a shared basis.

Spectrum available for FSS and PTP is reduced in metropolitan and regional areas but maintained in remote areas. Incumbent FSS earth station spectrum is maintained and protected (except for 3700-3800 MHz in the metropolitan and regional areas).

Concluding comments

Australia is widely used as a gateway for the Asia-Pacific region in the use of the 3700-4200 MHz band by Speedcast and other satellite service providers. Therefore, restrictions to the 3700-4200 MHz band in Australia will also impact satellite activities in other countries, and consequently satellite operators and the space industry in general. Speedcast is of the view that at least the 3800-4200 MHz band segment should remain accessible without restriction by incumbent FSS earth stations in Australia.

Speedcast thanks the ACMA for the opportunity to contribute towards these important decisions affecting C-band satellite and requests that the ACMA provides for the ongoing operation of FSS earth stations in Australia in the band 3700-4200 MHz, in line with the comments and proposals described above.

Speedcast respectfully requests that the ACMA discuss with Speedcast any further proposals that will impact FSS in the 3700-4200 MHz band before making any changes.

Yours sincerely,



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