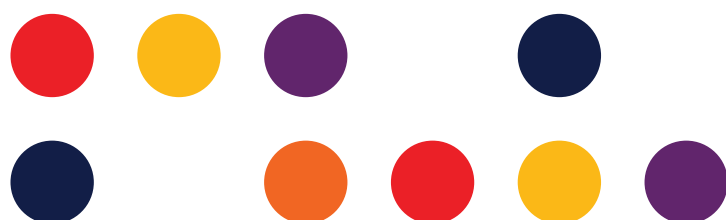


# ACMA replanning of the 3700-4200 MHz band options paper

Public submission

September 2020



Public

## Summary

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TPG Telecom Ltd (**TPG**) welcomes the opportunity to make this submission to the ACMA concerning the 3700-4200 MHz band (**3.8 GHz band**).

In summary, a variation of Option 3 would best promote the desirable planning outcome and achieve the Highest Value Use. Specifically, assuming the same geographic designation from 3.4 GHz spectrum licences are adopted (ie as specified in Appendix E of the ACMA's options paper):

- in “metro” areas:
  - > clear incumbent users in 3700-4000 MHz and introduce exclusive WA WBB use (ie spectrum licences)
  - > varied reallocation periods may be appropriate having regards to the complexity of band clearance in areas of higher incumbency, for example in Sydney and Perth in the 3800-4000 MHz range, and
  - > incumbent services should not be grandfathered in the spectrum licence areas, unless those services operate on a subservient basis, ie the incumbent service must make amendments to accommodate incoming services where there is actual interference
- in “regional” areas:
  - > clear incumbent users in 3700-3800 MHz for exclusive WA WBB use (no grandfathering of incumbent services)
  - > allow for shared use in 3800-4000 MHz for FSS, PTP and LA WBB, and
  - > a variation to this which TPG would support is to also designate WA WBB for 3800-4000 MHz frequencies but to ensure there are appropriate protections for existing FSS and PTP service where absolutely necessary. This variation is particularly attractive for Tasmania given its confined licence scope and very limited incumbency, and
- in “remote” areas, introduce shared use in 3700-4000 MHz for FSS, PTP and LA WB, and.

Lastly, TPG suggests that the ACMA considers imposing a procedural requirement on licensees to confirm actual interference (eg by way of testing) where one licensee's prospective device fails coordination due to another licensee's existing device. The existing process as per the *Radiocommunications Advisor Guidelines (Managing Interference from*

*Spectrum Licensed Transmitters – 3.4 GHz band) 2015* is overly conservative and a gap exists between results of coordination assessment and actual interference risk.

## A variation to Option 3 is preferred

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It is not contested that incumbent FSS and PTP use in the 3700-4200 MHz band is decreasing. This trend is seen locally and globally and is noted by the ACMA in a series of consultations (eg this current ACMA options paper and the preceding 2019 discussion paper). Stakeholders were in general agreement about this trend however some stakeholders have made representations about future FSS requirements in this band. TPG does not intend to traverse ground already covered on decreasing FSS and PTP use in the band.

TPG believes that the ACMA's preferred Option 3 is a reasonable starting position, however it could be further optimized.

### *ACMA Option 3*

The ACMA's Option 3 is:

- issue spectrum licences for WA WBB in 3700–3800 MHz covering “metro” and “regional” areas, existing FSS and PTP services in those areas and frequencies will be cleared and removed
- introduce apparatus licences (AWL or PMP) for shared use (FSS, PTP, LA WBB) in:
  - > 3700-3800 MHz in “remote” areas, and
  - > 3800-3900/4000 MHz Australia wide, and
- maintain current arrangements in 3900/4000-4200 MHz Australia wide.

The ACMA's Option 3 is depicted below:

3700 MHz	3800 MHz	[3900/4000] MHz	4200 MHz
<b>Metro and regional</b>  <b>Planned uses:</b> WA WBB <b>Access approach:</b> Exclusive use <b>Licence type:</b> Spectrum licence <b>Incumbent user licences:</b> Cleared	<b>Australia wide</b>  <b>Planned uses:</b> FSS, PTP, LA WBB <b>Access approach:</b> Shared, <b>Licence type:</b> Apparatus licence <b>Incumbent user licences:</b> Continued	<b>Australia wide</b>  <b>Planned uses:</b> Individually licensed FSS, PTP <b>Access approach:</b> Shared, coordinated, first-in-time <b>Licence type:</b> Apparatus licence <b>Incumbent user licences:</b> Continued	
<b>Remote</b>  <b>Planned uses:</b> FSS, PTP, LA WBB <b>Access approach:</b> Shared, coordinated, first-in-time <b>Licence type:</b> Apparatus licence <b>Incumbent user licences:</b> Continued			

The ACMA further notes that a possible variation is to also clear the “low incumbency metros” of Melbourne, Canberra, Adelaide and Brisbane in the 3800-3900/4000 MHz range in favor of spectrum licence arrangements for WA WBB, but maintain shared arrangements in this frequency segment for metro areas of Sydney and Perth.

### *A variation of Option 3 is superior*

As a starting point, TPG agrees with the ACMA that the “low incumbency metros” should also be cleared for exclusive WA WBB. However we believe that the Sydney and Perth can also be cleared for exclusive WA WBB use.

TPG believes that 3700-4000 MHz spectrum should be made available as soon as possible in all 6 metro areas (eg access in 2022/2023), except in Sydney and Perth where the 3800-4000 MHz range may be assigned an alternative reallocation period of ~3-4 years (eg access in 2024/2025). Where incumbent users have vacated the frequencies prior to the end of the reallocation period, a licensee may apply for early access.

In relation to “regional” and “remote” designations, TPG agrees with ACMA’s Option 3. Specifically that:

- the 3700-3800 MHz range should be cleared for spectrum licences, and that LA WBB should be introduced for the 3800-4000 MHz range in “regional” areas
  - > however a possible variation to this, which TPG would support, is to also introduce WA WBB in regional areas for 3800-4000 MHz, but with obligations

to protect existing FSS and PTP services where necessary (TPG notes that the Tasmania appears to be the most obvious candidate given its confined geographic scope and very limited incumbency issues)

- > this variation would promote the efficient allocation and use of spectrum, if market demand outstrips supply in the “regional” areas, and
- LB WBB should be introduced for the 3700-4000 MHz range in “remote” areas.

TPG’s proposed variation is depicted below:

3700 MHz	3800 MHz	4000 MHz	4200 MHz
<b>Metro</b> <b>Planned uses:</b> WA WBB <b>Access :</b> Exclusive <b>Licence:</b> Spectrum <b>Incumbent users:</b> cleared		<b>Australia wide</b> <b>Planned use:</b> FSS, PTP <b>Access:</b> shared <b>Licence:</b> Apparatus <b>Incumbent use:</b> continued	
<b>Regional</b> <b>Planned uses:</b> WA WBB <b>Access :</b> Exclusive <b>Licence:</b> Spectrum <b>Incumbent users:</b> cleared	<b>Regional and remote</b> <b>Planned use:</b> shared <b>Access:</b> shared <b>Licence:</b> Apparatus <b>Incumbent use:</b> continued		
<b>Remote</b> <b>Planned use:</b> shared <b>Access:</b> shared <b>Licence:</b> Apparatus <b>Incumbent use:</b> continued			

This proposal is in effect an extension of the possible variation to Option 3 flagged in the ACMA’s options paper (ie that the “low incumbency metros” of Melbourne, Canberra, Adelaide and Brisbane are also cleared for exclusive WA WBB use).

### *Assessment of TPG variant*

TPG’s proposed Option 3 variation is superior relative to the vanilla Option 3 based on the desirable planning objectives 1 and 2A canvassed in the ACMA’s options paper – ie introduce WA WBB and LA WBB and supporting ongoing FSS use in band respectively. Our proposal

would not alter the considerations with respect to the remaining planning objectives so we will not cover those in detail below.

From an objective 1 perspective, extending spectrum licensing from 3700 to 4000 MHz in all six metro areas (as opposed to just 3800 MHz) requires considering a possible trade-off. On one hand, WA WBB supply increases translates to a significant uplift in public benefits derived from using this spectrum relative to any other uses. In metro areas, where demand is the highest, supply increases from 100 MHz to 300 MHz, and for the entire 3.4-3.8 GHz band total supply increases from about 400 MHz to 600 MHz. On the other hand, the opportunity cost may be the introduction of LA WBB in the metro areas in the 3800-4000 MHz range, although this possible cost can be avoided as we discuss below.

From an objective 2A perspective, extending spectrum licensing from 3700 to 4000 MHz in all six metro areas may negatively impact existing FSS operators, particularly in Sydney and Perth where existing usage appears high. Whilst the ACMA has assessed this impact in its options paper, we believe the “costs” are much lower in practice and the ACMA’s calculations are overly conservative. In any case there are ways to mitigate any residual impact.

We believe that the consideration favors extending spectrum licensing to 4000 MHz because of three key reasons.

First:

- It is not disputed that the economic benefits of introducing WA WBB in the band would outweigh the cost of retuning or relocating to ESPZs. Even the ACMA’s CBA of its Option 1 of a complete band clearance Australia-wide shows a significant net economic benefit (see Appendix F of the ACMA’s options paper).
- We do not agree with some inputs into the ACMA’s assessment of the costs and benefits to its Options 1 and 3, particularly the 30/70 and 50/50 split between retuning and relocation of FSS services in 3700-3900 MHz range. TPG understands that the majority of existing FSS operators in Sydney (as an example) are already in the process of retuning services to above 4 GHz. This means the retune/relocate ratio should be much higher.
- Based on market intelligence, we believe all the FSS services can be retuned to above 4000 MHz as there is sufficient capacity in 4000-4200 MHz to accommodate existing FSS users. Furthermore, some operators have already committed to relocating their services out of the highly populated metro areas. And lastly, some services like broadcast content transmission can be delivered over alternative technologies more economically.

- Given this, using the ACMA's assumptions for CBA for option 3, but adjusting the ratio of retune/relocate to a more reasonable 80/20 split (which is still very conservative but allows for a margin of error), the FSS related costs are valued thus:

Category	Retune %	Relocate %	Retune \$	Relocate \$	Costs \$
FSS gateway— 8 sites in 3700– 4000 MHz in all areas	80%	20%	\$300k	\$20- \$50 mn	\$33.9- \$81,9 mn
Individual FSS— 6 sites in 3700–3900 MHz in all areas	80%	20%	\$30k	\$1-\$2 mn	\$1.3- \$2.5 mn
<b>Total</b>					<b>\$35.3- \$84.5 mn</b>

- Furthermore, we believe the estimated retune/relocate unit cost relied upon by the ACMA are overly conservative. We understand that the basis for the ACMA's unit cost assumptions are from the ACMA paper titled: *Future use of the 3.6 GHz band: Highest value use—Quantitative analysis*. Specifically on page 40 the ACMA notes:

*The cost of relocating all C-band licences for a single FSS earth station facility is expected to range between \$20 million and \$50 million, as per stakeholder feedback to consultation, desktop research and ACMA staff assumptions. This range of potential incremental costs will therefore be applied to all facilities that are expected to be constant output cases and for which relocation costs are unknown. This includes all facilities operated by Telstra, Optus and Lockheed Martin.*

*These costs ranges are not applied to Inmarsat or Atwood Oceanics Pacific. Inmarsat has already indicated that relocating its Landsdale facility would cost between \$25 million and \$30 million, while it is not expected that Atwood Oceanics Pacific would be able to effectively geographically relocate its offshore licences—as such, they are considered a variable output case with incremental costs that are unable to be subject to quantification.*

- However without further detail from the ACMA regarding the assumptions it has used, we are unable to comment on this specifically other than that based on market intelligence, we believe the unit costs assumed by the ACMA are multiples higher than the actual cost.



- On the benefits side, the value of extending WA WBB up to 4000 MHz in just the six metro areas would increase the benefits column significantly. Using the ACMA's assumptions but adjusting for population (assume 70% of population in metro) and scaling up to 4000 MHz, the benefits are valued thus:

Category	Population	\$/MHz/pop	Benefit
WA WBB in metro/regional in 3700-3800 MHz	24.3 mn	\$0.29	\$704.7 mn
WA WBB in metro in 3800-4000 MHz	17 mn	\$0.03-\$0.145	\$102.06-\$493.36 mn
<b>Total</b>			<b>\$806.76-\$1,198.06 mn</b>

- In addition, the benefits do not simply scale in a linear fashion with quantum of MHz being made available. An operator with a 100 MHz contiguous holding (for example) has overwhelming incentives to commit to a wide-spread deployment of its 5G network. In comparison, an operator with only a 20 MHz holding (for example) will likely seriously contemplate only tactical network deployment for capacity relief in discreet hot spots. What this means is that the likely public benefits produced from a release of 3700-4000 MHz is materially greater on a per MHz basis compared with just releasing 3700-3800 MHz. We note that this type of "network effect" due to having larger contiguous holdings is not captured in this type of CBA assessment.
- Based on the above observations, the CBA is significantly in favor of TPG's proposed variation of Option 3.

Second:

- Under the ACMA's Option 3, AWLs would be available in the metro areas in the 3800-4000 MHz range. The potentially fatal flaw with this is that the demand will likely far outstrip supply in the metro areas. And the availability of AWLs will incentivise inefficient opportunistic land-grab behavior which would exclude the spectrum from being put to the Highest Value Use. Plus AWLs present a significant risk to fragmentation and adjacent area denial, which amplifies the downside of the ACMA's idea. This outcome would not be consistent with the objects of the Radcomms Act.
- Indeed, demand would be the greatest in the metro areas and may still outstrip supply even if the entire 3700-4200 MHz is made available for spectrum licensing. A market

based allocation for spectrum licences in the six metros in the 3800-4000 MHz range would achieve a far superior outcome in these circumstances.

Third and lastly, there is an opportunity to deploy LA WBB on AWLs in the 4000-42000 MHz range, subject to interference management considerations to protect incumbent services. Whilst the ACMA did not canvas this possibility in its options paper, we believe this is a reasonable option if the ACMA is determined to introduce some form of LA WBB in metro areas.

Having considered the above, the assessment of the various options is:

Option	WA WBB rating	LA WBB rating	FSS Rating	CBA rating	Overall rating
1	H	L	L	M	L/M
2	L	M	H	L	M
3	H	H	M	H	H
<b>TPG proposal</b>	H+	M+	M	H+	H+

In summary, TPG believes that our proposed replanning variation will put the spectrum to its Highest Value Use and maximize returns as measured against the desirable replanning objectives for this band. Specifically that the TPG proposal would:

- promote objective 1 by introducing WBB use, and extend WA WBB into the six metro areas where the demand for additional spectrum for WA WBB is greatest (option to introduce LA WBB in 4000+ MHz), and
- promote objective 2A by maintaining access for incumbent services in the same manner as Option 3, ie dedicate 4000-4200 MHz range for incumbent services.

## 3900 MHz vs 4000 MHz

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One variation the ACMA canvassed in its options paper is whether the lower edge of the “incumbent” use frequency in metro/regional should start at 3900 MHz or 4000 MHz.

TPG believe a 4000-4200 MHz designation for exclusive incumbent use in metro and regional areas is appropriate as TPG believes that a contiguous 200 MHz block is sufficient bandwidth to accommodate those users.

As mentioned above, TPG understands that the majority of incumbent FSS operators in Sydney and Perth (the two most complicated metro areas for band clearance) are already in the process of retuning services to above 4000 MHz. This means that there is no reasonable justification why the lower edge boundary should be set at 3900 MHz.

There is also international movement to migrate FSS operations to above 4000 MHz. As the ACMA would be aware the FCC decided in August this year to auction the 3700-3980 GHz spectrum and to migrate existing C band satellite operations to 4000-4200 MHz. The FCC’s decision demonstrates that FSS operations can “fit into” the upper 200 MHz from a bandwidth perspective. Furthermore, it indicates that equipment vendors will be highly incentivized to make 5G network equipment to operate up to 4000 MHz due the USA being such a significant market. If the ACMA sets the boundary at 4000 MHz, then it follows that Australian MNOs can benefit from that scale more than if a boundary was set at 3900 MHz.

As a general point, TPG believes that the FCC’s decision in regard to C band allocation should be studied in greater detail as it may indicate how best to approach various design matters. One such issue, which we also address in the next section, is managing interference between services in adjacent frequencies but overlapping in geographic area.

## Coordination

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TPG's recent experience with registering 3.6 GHz devices suggests that there is a gap between the coordination requirements and actual interference. TPG believes that coordination checks (based on ACMA parameters) are too conservative. In most cases where coordination would fail, there is no observed interference based upon practical experience.

In most cases where TPG could liaise with the incumbent device operator to test actual interference and thus ascertain the low level of interference risk and could then continue with device registration with the consent of the incumbent device operator.

However, where an incumbent device operator refuses (for whatever reason) to test interference risk, the registration process will stall and become unworkable.

In these circumstances – for example, where TPG has high confidence that interference is highly unlikely, but coordination tests fail – we believe the ACMA should allow a process where the incumbent device operator would have an obligation to work with the prospective device operator to determine the level of actual interference. Where it is demonstrated that interference risk is low, the prospective device can be registered even if coordination test fails.