

12 August 2020



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cc: Daniel Gocentas, Daniel.Gocentas@acma.gov.au

Dear Eleanor,

RE: 26 GHz band spectrum licence draft legislative instruments

The Communications Alliance Satellite Service Working Group (SSWG) welcomes the opportunity to comment on this consultation and commends the ACMA for the obviously very thoughtful and detailed package of documents it has put together. As a satellite services group, the SSWG focuses this submission on the conditions which the ACMA has proposed to apply to the sharing of the 27.0-27.5 GHz band between satellite and terrestrial services.

However, the SSWG is concerned that there appears to be some linkages remaining between what is suggested for 26 GHz and the very different 28 GHz plan. This has been of concern at least to some of our members and threatens to jeopardise both processes. The SSWG would again call on the ACMA to separate these processes.

In terms of technical linkages, the SSWG would like to reinforce the following views:

- no increase in Total Radiated Power (TRP) should flow past the boundary of 27.5 GHz under any circumstances. This is a busy satellite service band and any interference would reduce the throughput and thus the value derived from the band.
- AWLs should not be used for Fixed-Satellite Service (FSS) in areas where Fixed Wireless Access (FWA) are secondary (outside the zones beyond 28.1 GHz) as this represents an unnecessary impost for FSS and would actually limit the ability to deploy FWA without further negotiation. It is simply over-regulation and would create inefficiencies.
- no support for the guard bands and guard spaces recently announced for Embargo 74. Given the off axis Effective Isotropic Radiated Power (EIRP) of FSS these two combined also result in extreme inefficiency and do not seem to be based on a thorough engineering analysis.

Sharing principles

Before delving into the specifics of the SSWG proposals, the SSWG considers it worthwhile to elaborate on the general principles which we understand to be the basis for establishing a successful sharing regime. This is partly driven by a recognition of the precedent that could be set by the conditions established in the 27.0-27.5 GHz band and the obvious implications for the upper adjacent FSS band.

It is clear that a great deal of care and attention has gone into the development of the conditions for sharing proposed by the ACMA. This follows, and has been informed by,

Australia's deep involvement in the WRC-19 study cycle, which was coordinated by the ACMA and strongly supported by the SSWG. It is with this in mind that the SSWG outlines the principles which it believes would best guide the development of a successful sharing environment:

- *Consistency with ITU-R studies* Given the major volume of work that was undertaken by WRC-19 to identify the 27.0-27.5 GHz band for IMT-2020 (among others), in which Australia was a prominent participant, any credible spectrum sharing regime must be consistent with these studies. This means that, while acknowledging that some degree of sharing should be accommodated, successful sharing should only be expected to occur if the assumed IMT-2020 model is implemented in spectrum licence conditions.
- *Departures from ITU-R studies* Given the long timeframes of domestic and international regulatory provisions, and the high degree for customisability of standardised terrestrial radiocommunications equipment, it may be reasonable to implement some deviation from a rigid implementation of ITU-R study assumptions. When considering any deviation, the principle of zero additionality should be observed, whereby the relaxation results in no additional interference compared with the baseline assumptions derived from ITU-R studies.
- *Equal status* Given the co-primary status shared by satellite and terrestrial services in the 27.0-27.5 GHz band and the ACMA's clear intention to allow for ongoing satellite access to this band (granted, with some geographic differentiation), it should be assumed that equal regulatory status among FSS, Fixed Service (FS), and Mobile Service (MS) should apply. In practice, this means that, irrespective of type of service or method of licensing, there is no inherent right conferred on either service to cause interference or to deny access on reasonable terms.

In light of these principles, the SSWG makes observations and suggestions below on a number of relevant aspects of the satellite and terrestrial spectrum sharing regime proposed by the ACMA.

Conditions below 27.0 GHz

As a band not used in Australia for the provision of commercial satellite services, the SSWG does not have a strong view on this band.

General Considerations in 27.0-27.5 GHz

The ACMA is proposing to allow increased base station TRPs in the 27.0-27.5 GHz band shared with the FSS, provided that certain additional measures are met (e.g. pointing restrictions and an EIRP mask). The SSWG members are concerned about the practical workability of an EIRP mask, since the concept was proposed during the lead up to WRC-19 and rejected by the IMT community, ostensibly because of difficulties in measuring EIRP and determining compliance with such a mask.

The SSWG acknowledges that the ACMA proposal is conceptually more rigorous than the EIRP mask proposed during the WRC process, in that the mask is augmented by pointing restrictions and a TRP limit (albeit one higher than the 25 dBm used during the WRC-19 studies). Nevertheless, given the questions raised by the IMT community during WRC-19 about its own ability to comply with such a mask, the SSWG would urge that the ACMA put in place rigorous measures for ascertaining and enforcing compliance with any such mask, noting that antennas installed in a working environment will be affected by near field infrastructure and by reflections and refraction in the far field, which will not be captured by anechoic chamber measurements.

The SSWG also notes that, in increasing the TRPs beyond those set out in Article 21, the ACMA places itself in a precarious position, any subsequent authorisation for IMT would be subject to

Article 4.4. In the view of the SSWG and given this is not just an 'NBN' FSS band this would mean that any IMT deployment would be subject to complaints via the ITU. This means the Commonwealth would be placed in a position of significant risk when deciding between supporting a treaty level obligation or an interfering IMT system.

Finally, the SSWG would caution that any decision to adopt an EIRP mask in 27.0-27.5 GHz is not appropriate in the 27.5-29.5 GHz band, given the much higher levels of FSS deployment in the latter band.

Conditions in 27.0-27.5 GHz – inside gateway zones

The SSWG believes the ACMA has found an appropriate balance for the sharing conditions in the 27.0-27.5 GHz band within the defined gateway beam zones. Specifically, the baseline conditions appear to be a faithful reproduction of the model extensively simulated in the ITU-R study process, and represent perhaps the least possible restrictive means of providing a meaningful degree of protection and ongoing certainty to satellite services. Additionally, the conditions for a TRP increase, which is appropriately modest given the finely balanced nature of the sharing environment, are sufficient to ensure no more interference than the baseline scenario.

Conditions in 27.0-27.5 GHz – outside gateway zones

The SSWG believes that an increase to TRP within the 27.0-27.5 GHz band outside the gateway beam zones could be tolerable, on the understanding that no TRP increase within the gateway beam zones¹ is implemented, and that such an approach does not in any way precondition what may be implemented in the band above 27.5 GHz.

In contrast to the above, the conditions proposed to apply outside the gateway beam zones appear to lack the same balance as those applying inside these zones. In particular, the SSWG notes that, beyond the boundaries of these zones, defined by a nominal satellite beam -3 dB relative gain contour, an additional 12 dB of interfering power would be permitted, and no pointing restrictions would apply. In areas close to close to, but outside, the gateway beam zones, this would create a minimum 9 dB interference deficit, plus the unknown additional interference component deriving from a lack of pointing or emission mask restrictions.

The SSWG does not believe it is ACMA's intention for interference into satellite services to be dominated by terrestrial emissions outside satellite main beams but advises this may yet occur.

Noting the ACMA's prudent approach to TRP increases in 27.0-27.5 GHz within gateway beam zones, which ensure no additional interference to the baseline case, the SSWG suggests a similar approach to apply to a TRP increase outside the gateway beam zones. To this end we propose an adjusted set of conditions to apply in this case, as follows:

- A new baseline of 30 dBm, increased by 5 dB to account for the mitigation provided by the satellite beam off-axis suppression. The same baseline pointing restrictions applying inside the gateway zones would also apply outside.
- An additional allowance of TRP up to 37 dBm, on the condition of no additional interference compared with the baseline. This could be achieved by taking the EIRP mask applying inside the gateway beam zones and relaxing it by 5 dB.
- No invocation of No. 4.4, which would be inadvisable in a band used by a number of domestic and international high throughput satellite services, including the critical national infrastructure operated by nbn.

¹ Beyond the allowance for emissions up to 30 dBm conditional on meeting EIRP mask limits

These modifications are summarised in the tables below, and would in the view of the SSWG, ensure a more balanced interference environment in which emissions outside gateway beam zones would be no more interfering than those inside.

Frequency/area	TRP limit	Additional conditions
25.1–27 GHz all areas	40 dBm/200 MHz (baseline)	No extra conditions
	45 dBm/200 MHz (upper limit)	Antenna pointing restrictions* and EIRP mask
27–27.5 GHz outside gateway footprint areas	37 30 dBm/200 MHz (baseline)	Extra antenna restrictions developed in the TLG** No extra conditions
	42 37 dBm/200 MHz (upper limit)	Antenna pointing restrictions* and EIRP mask
27–27.5 GHz inside gateway footprint areas	25 dBm/200 MHz (baseline)	Extra antenna restrictions developed in the TLG**
	30 dBm/200 MHz (upper limit)	Antenna pointing restrictions* and EIRP mask

* The main antenna beam is not to be mechanically or electrically steered above the horizon. This restriction applies to all outdoor transmitters.

** Outdoor base stations must not be mechanically steered above the horizon and must not direct the main beam (via electrical steering) to elevation angles greater than 5° above the horizon for more than 5% of time within a 24-hour period. Outdoor fixed transmitters, which are not base stations, must not direct their main beam to within defined angles from the geostationary orbit.

Elevation angle above the horizontal plane (el)	Radiated maximum true mean power (dBm/200 MHz EIRP)		
	For transmitters in 25.1–27 GHz	For transmitters in 27–27.5 GHz and outside footprints	For transmitters in 27–27.5 GHz and inside footprints
$5^\circ \leq el < 15^\circ$	$= 62 - 1.3(el - 5)$	–	–
$15^\circ \leq el < 25^\circ$	49	46.39	34
$25^\circ \leq el < 55^\circ$	$= 49 - 0.43(el - 25)$	$= 46.39 - 0.43(el - 25)$	$= 34 - 0.43(el - 25)$
$55^\circ \leq el \leq 90^\circ$	36.1	33.1 26.1	21.1

Alternative Conditions in 27.0-27.5 GHz – outside gateway zones

As an alternative proposal, which could work in place of the conditions proposed above, the SSWG proposes all the Greater Perth spectrum licensed zone is converted to inside gateway footprint zone, such that the baseline TRP above 27.0 GHz is 25 dBm/200 MHz for all of Perth, and the upper limit TRP is 30 dBm/200 MHz.

Emission bandwidth scaling

Given the large amount of technical and operational flexibility inherent in terrestrial communications standards, there is considerable unpredictability and uncertainty in the interference environment for any satellite operator to attempt to manage. It is for this reason that the SSWG commends the ACMA for its proposal that TRP limits must be scaled appropriately and applied to an entire antenna array, as this substantially reduces the degree of this uncertainty.

While fully in alignment with the ACMA on the concept and implementation of bandwidth scaling, the SSWG would see some benefit in clarifying this concept so that it can be better understood by operators of both satellite and terrestrial services in the 27.0-27.5 GHz band. To this end, the SSWG proposes a modification to one of the notes of Schedule 5 of the draft marketing plan², to clarify the maximum allowable level of interference in any 1 MHz bandwidth:

17. *The licensee complies with Core Condition 16 by ensuring that the maximum permitted level of radio emissions caused by the operation of radiocommunications transmitters under this licence does not, in any place, exceed a total radiated power of:*
 - (a) 45 dBm/200 MHz for radiocommunications transmitters operating in the frequency range 25.1-27 GHz; or
 - (b) 37 ~~42~~ dBm/200MHz for radiocommunications transmitters operating in the frequency range 27-27.5 GHz and located outside a gateway footprint area; or
 - (c) 30 dBm/200 MHz for radiocommunications transmitters operating in the frequency range 27-27.5 GHz and located inside a gateway footprint area.

Note 1: For radiocommunications devices which employ an antenna array, the total radiated power limit applies to the aggregate power of all antenna elements in the antenna array.

Note 2: Logarithmic scaling should be used to find the appropriate level in alternative bandwidth. To calculate the TRP limits in alternative bandwidths, a minimum emission bandwidth of 1 MHz should be assumed, such that TRP within any 1 MHz must be reduced by a factor of 23 dB compared with the above limits.

Conclusion

The SSWG once again thanks the ACMA for the opportunity to comment and commends the ACMA for its efforts to implement regulations in support of a balanced interference environment between satellite and terrestrial services in the 27.0-27.5 GHz band. While supportive of the principles on which the ACMA has based its work, the SSWG has some suggestions to better balance interference potential across geographic divides and recommends clarifying the bandwidth scaling requirement for terrestrial emissions.

² ACMA 26 GHz band spectrum licence draft legislative instruments. Draft marketing plan - for consultation; Schedule 5—Sample spectrum licence; Licence Schedule 2 Core Conditions. Item 17. Page 35

In particular, the SSWG again strongly suggests the two processes be separated so that 26 GHz can proceed without affecting the 28 GHz band. If you have any queries with respect to this submission, please contact Mike Johns on 0414 898 841.

Yours sincerely,

A handwritten signature in black ink, appearing to read 'John Stanton'. The signature is fluid and cursive, with a large initial 'J'.

John Stanton
Chair, SSWG

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:

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