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### **Submission on “Making the most of the 3.5 GHz band in future”**

The Wireless Institute of Australia (WIA) welcomes the opportunity to comment on possible future licensing arrangements in the 3.5 GHz band (3400–3600 MHz).

The Australian Radiofrequency Spectrum Plan (ARSP) provides an allocation at 3300-3600 MHz for the Amateur Service on a secondary basis. Over 3400-3600 MHz, the current primary services are Fixed, Mobile and Radiolocation (footnoted, 282, 433 and AUS101A).

Advanced amateur licensees are permitted the use of 3300-3600 MHz (9 cm band) as a secondary service, with geographic prohibitions on use at 3425-3492.5 MHz and 3542.5-3575 MHz..

### **WIA Response**

The WIA is committed to maintaining Amateur service allocations across the radiofrequency spectrum – both primary and secondary. Over decades, the Institute has defended assiduously the retention of Amateur access to frequency bands throughout the spectrum.

Over the past two decades, the WIA notes that there has been significant loss of segments from the amateur allocations in the 70 cm, 23 cm, 13 cm and 9 cm bands, with re-allocation to new services. Australian amateurs are facing the prospect of further loss of access in the 9 cm band resulting from future licensing arrangements in the 3.5 GHz band (3400–3600 MHz).

Loss of amateur access to 3400–3600 MHz would severely hamper the following amateur activities within Australia:

- a) weak-signal narrowband terrestrial communications within Australia and around the region;
- b) the exploration and use of wideband transmission modes;
- c) earth-moon-earth (EME, or moonbounce) communications, within Australia, around the region and globally; and
- d) future Amateur Satellite use in the 3400-3410 MHz segment.

The WIA seeks to preserve the ability of amateurs to explore the technologies and techniques involved in all the above activities, as well as the ability to experiment with, or adapt, emerging technologies and applications in the future, including those not yet invented, all of which is in keeping with the ITU definition of the Amateur Service and the objects of the *Radiocommunications Act 1992*.

Where geographic restrictions are to be maintained, or new ones applied, the WIA seeks preservation of the use of amateur allocations in the 3.5 GHz band outside those geographic areas where future licensed services are deployed.

## **Context**

With the resumption of amateur licensing following World War 2, Australian amateur licensees gained access to a range of frequency bands above 30 MHz, right through the VHF, UHF and SHF spectrum through to 10 GHz. However, only the VHF bands at 50 MHz and 144 MHz were allocated on a primary basis and in all the higher amateur bands, amateurs were the secondary service, generally sharing with Defence as the primary service. The 288-296 MHz band was withdrawn in 1963. In 1964, the 420-450 MHz (70 cm) allocation was added, with the Amateur Service secondary, again sharing with Defence as the primary service, and the 50-52 MHz sector of the 50-54 MHz band was re-allocated to the Channel 0 television service (occupying 45-52 MHz). In 1989, amateur access to the 576-585 MHz (50 cm) band was withdrawn.

Over the past two decades, the WIA notes that there has been significant loss of segments from the amateur allocations in the 70 cm, 23 cm, 13 cm and 9 cm bands, with re-allocation to new services. The 70 cm band has lost 10 MHz (420-430 MHz), the 23 cm band has lost 25 MHz (1215-1240 MHz), the 13 cm band lost 98 MHz (2302-2400 MHz) – with 2300-2302 MHz currently proposed to be withdrawn and reallocated for future spectrum licensing. The 3400-3600 MHz (9 cm) band has geographically-based operating prohibitions for amateurs affecting some 100 MHz, as set out in Schedule 2 of the Amateur Licence Conditions Determination No.1 of 1997.

Radio amateurs seek to explore and experiment with new technologies, yet retain an interest in, and continued use of, technologies of the past, albeit in a modern context.

Innovation in the use of radio/wireless technologies in increasingly diverse applications continues relentlessly, both within and beyond the sphere of amateur radio activities, and the WIA sees that it is important to facilitate radio amateurs' ability to adopt or adapt innovations without unnecessary impediments.

While commercial and defence operations focus on reliable, high signal-to-noise ratio communications, radio amateurs deliberately seek to explore testing and establishing communications under difficult circumstances where weak-signal reception is the norm, rather than the exception. The amateur radio community, globally and in Australia, has built up a commendable record of investigation and achievement in advancing the state of the art with weak-signal communications technologies and techniques.

The WIA's notes that the 9 cm band is free of interference from the ubiquitous Class-licensed wideband services (predominantly WiFi network devices) operating in the 13 cm and 6 cm (5650-5850 MHz) amateur bands.

This pervasive interference serves as an impediment to weak-signal beyond line-of-sight communications that many amateurs seek to explore in the microwave spectrum. Over-the-horizon propagation modes that amateurs seek to explore on the microwave bands include tropospheric scatter, rain storm scatter, tropospheric refraction and ducting, scatter from high flying aircraft ('aircraft enhancement'), knife-edge diffraction and earth-moon-earth reflection (EME, or Moonbounce).

The above pursuits are explored predominantly by using narrowband technologies (hand-keyed Morse, SSB voice and digital). However, amateurs also seek to explore wideband technologies, including image transmission – Amateur Television (ATV), voice and data. To support the latter, a number of amateurs and groups of amateurs have constructed, installed and maintain repeaters. In recent years, some amateurs have begun to explore the use of digital video broadcasting (DVB).

The WIA's 9 cm bandplan, attached as **Appendix 1**, sets out the suggested divisions of amateur uses across the 3300-3600 MHz band. Preservation of amateur access across 3400-3600 MHz is important to both current and future use of the 9 cm band.

**Table 1** lists Amateur allocations in the 3300-3600 MHz band in a variety of countries across the three ITU regions. The Amateur Service is secondary in all these allocations. The WIA's 9 cm bandplan harmonises the use of 3400-3410 MHz for weak-signal and amateur satellite operations with bandplans in other countries having a 9 cm band allocation.

The WIA notes that, since March 2009, the International Amateur Radio Union (IARU) has maintained a policy to seek upgrading of the allocation status of 3400-3410 MHz to primary. The Institute is informed that the following footnote to CEPT radiofrequency allocations in Region 1 has been adopted:

**EU17:** In the sub-bands 3400-3410 MHz, 5660-5670 MHz, 10.36-10.37 GHz and 10.45-10.46 GHz, the amateur service operates on a secondary basis. In making assignments to other services, CEPT administrations are requested wherever possible to maintain these sub-bands in such a way as to facilitate the reception of amateur emissions with minimal power flux densities.

The IARU's stated objective is to achieve harmonisation of 3400-3410 MHz as an amateur allocation across ITU Regions 1, 2 and 3, for both earth-to-space and space-to-earth operation. The IARU notes that EU17 encourages CEPT administrations to afford some consideration to amateur weak-signal operations in the band.

**Table 1**

<b>Some Amateur Service allocations in ITU Region countries</b>	
<b>Region 3</b>	<b>Allocation</b>
India, Sri Lanka	3300-3400 MHz
Bangladesh, New Zealand	3300-3410 MHz
China, Indonesia, Malaysia, Singapore, Vietnam	3300-3500 MHz
Pakistan, Philippines, South Korea	3400-3500 MHz
Japan, Chinese Taipei	none
<b>Region 2</b>	
Argentina	3300-3400 MHz
IARU-R2; Canada, USA, Venezuela	3300-3500 MHz
<b>Region 1</b>	
Albania, Denmark, Estonia, Poland, UK (future)	3400-3410 MHz
Germany, Israel, UK (present)	3400-3475 MHz
Bulgaria	3400-3500 MHz

Amateurs using, or interested in using, the 9 cm band have to design, build, test and refine a complex communications system. The microwave bands attract highly motivated individuals skilled in a variety of disciplines, ranging over system design and development, computer-aided design, RF and electronics design and construction, mechanical and electromechanical equipment development and construction. Such people engage in significant self-development and technical experimentation, in keeping with the ITU definition of the Amateur Service and the objects of the *Radiocommunications Act 1992*.

The WIA notes that there are currently at least two Australian suppliers of high performance microwave system kits for the 9 cm band: Mini-Kits ([www.minikits.com.au](http://www.minikits.com.au)) and VK3XDK ([www.vk3xdk.net46.net/](http://www.vk3xdk.net46.net/)). The availability of kits for self-assembly serves to encourage the use of the 9 cm band, self-training and

technical investigation by amateurs, in keeping with the ITU definition of the Amateur Service and the objects of the *Radiocommunications Act 1992*.

## **About the WIA**

The WIA is the national organisation of Australian radio amateurs ([www.wia.org.au](http://www.wia.org.au)). It is the peak body representing the interests of the Australian radio amateur community nationally and internationally.

Founded in 1910, the WIA is acknowledged as being one of the first radio societies in the world, and is the world's oldest national amateur radio society.

The WIA represents the interests of the Australian radio amateur community through formal liaison with the ACMA, other government institutions and other organisations. A key role of the WIA is providing training and licence assessment services for people interested in obtaining their amateur licence, particularly young people.

WIA appointees participate in the work of spectrum management, consultative and standards bodies, including:

- Australian Radio Study Groups in preparatory work for World Radio Conferences (WRCs),
- Australian delegations to WRCs,
- Standards Australia's standards committees, and
- the Radiocommunications Consultative Council.

The WIA is a member of the International Amateur Radio Union (IARU, [www.iaru.org](http://www.iaru.org)), which represents the interests of the amateur and amateur satellite services internationally and is recognised by the International Telecommunications Union.

Membership of the IARU is comprised of the national societies of each separate country or territory. The WIA was one of the first 14 national societies to become a member of the IARU when it was formed in 1925.

The IARU is a Sector Member of the ITU Radiocommunications Sector and actively participates in many ITU meetings, including the WRCs. There is an IARU association in each of the three ITU regions across the world; the WIA is a founding member of the Region 3 association ([www.iaru-r3.org](http://www.iaru-r3.org)).

## **Conclusion**

The WIA appreciates the opportunity to provide this submission on possible future licensing arrangements in the 3.5 GHz band.

The WIA looks forward to the release of the ACMA's response to consultation and proposals for licensing options in the 3.5 GHz band review.

Yours sincerely



Phil Wait VK2ASD  
**President**

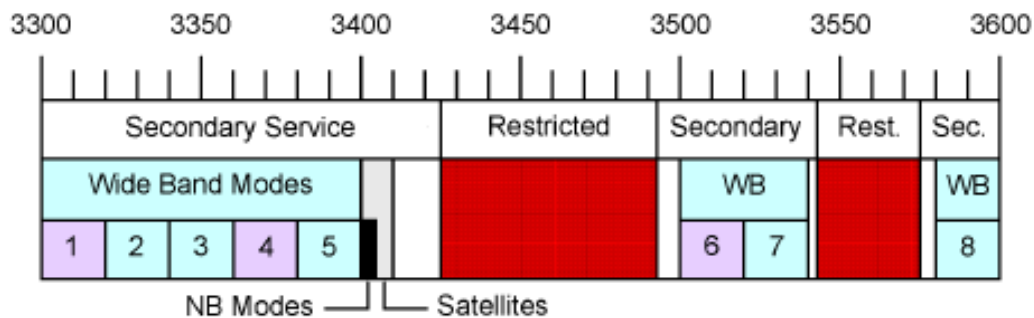
## APPENDIX 1

### 9 cm band – Advanced licensees only

#### Band Allocation

3300 - 3600 MHz	RADIOLOCATION	Primary Service
3300 - 3600 MHz	AMATEUR	Secondary Service
3400 - 3410 MHz	AMATEUR SATELLITE	Permitted on non-interference basis
3400 - 3600 MHz	FIXED SATELLITE (Space to Earth)	Secondary Service
3400 - 3600 MHz	FIXED, MOBILE	Secondary Service

**NOTE:** In the band segments 3425.0 - 3442.5 MHz and 3475.0 - 3492.5 MHz, operation is prohibited in and around most major population centres. In the segments 3442.5 - 3475.0 MHz and 3542.5 - 3575.0 MHz, operation is prohibited in most parts of Australia. For full details, please refer to the current ACMA Amateur Licence Conditions Determination.



3300.000 - 3400.000	WIDEBAND MODES	(Note 5)
3300.000 - 3320.000	Channel 1: ATV	
3320.000 - 3340.000	Channel 2: Voice or data	
3340.000 - 3360.000	Channel 3: Simplex, any mode	
3360.000 - 3380.000	Channel 4: ATV	
3380.000 - 3400.000	Channel 5: Simplex, any mode	
3400.000 - 3410.000	AMATEUR SATELLITES	(Note 3)
3400.000 - 3402.000	NARROW BAND MODES	(Note 1)
3400.000 - 3400.100	EME only	
3400.100 - 3400.400	CW / SSB	
3400.100	Calling frequency: national primary	
3400.200	Calling frequency: national secondary	
3400.220 - 3400.240	Digital DX modes	
3400.400 - 3400.600	Beacons	(Note 2)
3400.600 - 3402.000	Experimental	
3402.000 - 3404.000	FM SIMPLEX	(Note 4)
3410.000 - 3425.500	ALL MODES	
3425.000 - 3492.500	NO OPERATION	
3500.000 - 3600.000	WIDEBAND MODES	(Note 5)
3500.000 - 3520.000	Channel 6: ATV	
3520.000 - 3540.000	Channel 7: Voice or data	
3542.500 - 3575.000	NO OPERATION	
3580.000 - 3600.000	Channel 8: Any mode	

**Note 1: Narrow Band Modes**

This segment is reserved for modes such as CW, digital modes and SSB with bandwidths up to 4 kHz. Weak signal operation has absolute priority. Calling frequencies should be used only to make initial contact and then vacated as soon as possible. Please avoid any terrestrial operation within the EME segment. The "Digital DX modes" segment includes recommended spot frequencies for SSB-based digital modes, on the same pattern as in Note 1 of the 2 metre band plan. The Experimental segment is reserved for specialised experimental use, including possible future linear translators.

**Note 2: Beacons**

Beacon frequencies are allocated on a call area basis, e.g. VK1: 3400.410 - 3400.419, VK2: 3400.420 - 3400.429 etc. Beacon frequency spacing is 2 kHz. The beacon segment should be kept clear of other transmissions.

**Note 3: Amateur Satellites**

There are no amateur satellites currently operating or planned for this band.

**Note 4: FM Simplex**

Recommended channel spacing is 100 kHz. Channels reserved for special purposes should be kept clear of other operation.

**Note 5: Wideband Modes**

These segments are for wideband simplex operation or duplex links. Suggested uses are:

ATV (channels 1, 4 or 6):

FM or DVB Maximum bandwidth 20 MHz, centred on the channel midpoint

DVB Maximum bandwidth 10 MHz, centred 5 MHz above or below the channel midpoint

Recommended use for duplex links is channel 1 input and channel 6 output.

Data or Voice:

Recommended channel spacing is 100 kHz, or 1 MHz for high speed data, excluding upper and lower segment edges, with voice links at the lower end of the segment and data links at the upper end.