# Summary of proposed 3.6 GHz spectrum licence band technical framework

## Standard Trading Unit (STU) and Minimum Contiguous Bandwidth (MCB)

* STU: no change (Frequency component = 1 Hz, Area component: HCIS level 1)
* MCB: 10 MHz

## Conditions on the spectrum licence

In-band emission limit:

* TRP of 47 dBm/5 MHz per cell/sector.

Unwanted emission limits:

The limits proposed assume either a negotiated outcome or synchronised operation to manage interference when it occurs.

Adjacent band spectrum licensees can also come to agreement to employ different unwanted emission levels within their respective spectrum licence space.

**Note 1**: foffset is the frequency offset from the upper or lower frequency limits of the licence. The closest -3dB point of the measurement bandwidth to the upper or lower frequency limits of the licence is placed at foffset**.**

1. Transmitter unwanted emission limits within the 3380-3720 MHz frequency band – registered devices.

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| --- | --- | --- |
| **Frequency Range (foffset)Note 1** | **Total Radiated Power (dBm) per cell/sector** | **Measurement Bandwidth** |
| 0 kHz ≤ foffset ≤ 5 MHz | 2 – (7/5).foffset(MHz) | 100 kHz |
| 5 MHz≤ foffset ≤ 10 MHz | -5 | 100 kHz |
| foffset ≥ 10 MHz | -6 | 1 MHz |

1. Transmitter unwanted emission limits outside the 3380-3720 MHz frequency band – registered devices.

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| --- | --- | --- |
| **Frequency Range (f)** | **Total Radiated Power (dBm) per cell/sector** | **Measurement Bandwidth** |
| 9 kHz ≤ f ≤ 150 kHz | -36 | 1 kHz |
| 150 kHz ≤ f ≤ 30 MHz | -36 | 10 kHz |
| 30 MHz ≤ f ≤ 1 GHz | -36 | 100 kHz |
| 1 GHz ≤ f ≤ 3.1 GHz | -30 | 1 MHz |
| 3.1 GHz ≤ f ≤ 4.2 GHz | -47 | 1 MHz |
| 4.2 GHz ≤ f ≤ 19 GHz | -30 | 1 MHz |

1. Receiver unwanted emission limits outside the 3380-3720 MHz frequency band – registered devices.

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| --- | --- | --- |
| **Frequency Range (f)** | **Total Radiated Power (dBm) per cell/sector** | **Measurement Bandwidth** |
| 30 MHz ≤ f ≤ 1 GHz | -57 | 100 kHz |
| 1 GHz ≤ f ≤ 19 GHz | -47 | 1 MHz |

Transmitters exempt from registration:

It is proposed that the following kinds of radiocommunications transmitters be exempt from registration:

1. a transmitter that operates in the 3.4 GHz band with a total radiated power of less than or equal to 25 dBm per occupied bandwidth

In addition to this a condition will be placed on the licence stating that devices exempt from registration must not cause harmful interference (such a condition is already on current 3.4 GHz band spectrum licences)

The proposed unwanted emission limits proposed follow:

1. Transmitter unwanted emission limits in the 3295-3805 MHz frequency band – devices exempt from registration.

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| **Frequency Range (foffset)Note 1** | **Total Radiated Power (dBm) per device** | **Measurement Bandwidth** |
| 0 kHz ≤ foffset ≤ 1 MHz | -15 | 30 kHz |
| 1 MHz≤ foffset ≤ 5 MHz | -10 | 1 MHz |
| 5 MHz≤ foffset ≤ 100 MHz | -13 | 1 MHz |
| foffset ≥ 100 MHz | -25 | 1 MHz |

1. Transmitter unwanted emission limits outside the 3295-3805 MHz frequency band – devices exempt from registration.

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| --- | --- | --- |
| **Frequency Range**  **(f)** | **Total Radiated Power (dBm) per device** | **Measurement Bandwidth** |
| 9 kHz ≤ f ≤ 150 kHz | -36 | 1 kHz |
| 150 kHz ≤ f ≤ 30 MHz | -36 | 10 kHz |
| 30 MHz ≤ f ≤ 1 GHz | -36 | 100 kHz |
| 1 GHz ≤ f ≤ 19 GHz | -30 | 1 MHz |

1. Receiver unwanted emission limits outside the 3295-3805 MHz frequency band – devices exempt from registration

|  |  |  |
| --- | --- | --- |
| **Frequency Range**  **(f)** | **Radiated Mean Power (dBm EIRP)** | **Measurement Bandwidth** |
| 30 MHz ≤ f ≤ 1 GHz | -57 | 100 kHz |
| 1 GHz ≤ f ≤ 19 GHz | -47 | 1 MHz |

All other conditions on the licence:

* Update band definition to include 3.6 GHz
* Include a synchronisation requirement as a fall back measure to manage cross-border and adjacent channel interference
* Include a condition to take reasonable measures to manage interference caused by spurious emissions
* Update the devices exempt from registration as indicated previously
* Include a condition to protect the east and west coast earth station protection zones.
* Include a condition not to cause interference to earth stations operated by Lockheed Martin near Uralla
* Maintain all other conditions currently on 3.4 GHz band spectrum licences

The proposed new conditions are shown below:

**Synchronisation Requirement**

1. In the event one or more other spectrum licensees in the 3.4 GHz band indicate they are experiencing interference from devices operated under this licence and no agreement can be reached on how to manage this interference, the licensee is required to synchronise devices operated under this licence with other affected licensees. This includes:

1. Implementing an uplink-to-downlink ratio of 30:70
2. Aligning the timing of uplink and downlink operations including the timing of frame start points with other affected licensees; and
3. Employing a sub-frame duration of 1 ms and a guard period of 33.2 μs.

**Definition**

1. ***managing interference*** includes but is not limited to:

1. investigating the possible causes of the interference;
2. taking all steps reasonably necessary to resolve disputes about interference;
3. taking steps (or requiring persons authorised to operate radiocommunications devices under this licence to take steps) reasonably likely to reduce interference to acceptable levels; and
4. negotiating with other persons to reduce interference to acceptable levels.

**Managing interference caused by spurious emissions**

2. If:

(a) interference occurs between a radiocommunications device:

(i) operated under this licence; and

(ii) operated under another licence (the ***other licence***);

and the interference is due to spurious emissions at frequencies below 3100 MHz and above 4200 MHz from a radiocommunications device operating under this licence; and

(b) that interference is not the result of operation of a radiocommunications device in a manner that does not comply with the conditions of the relevant licence; and

(c) either the licensee or the holder (or authorised third party) of the other licence wishes to resolve the interference;

the licensee must ***manage interference*** with:

(d) the holder of the other licence; or

(e) if a site manager is responsible for managing interference at that location, that site manager.

**Exemption from registration requirements**

1. The following kinds of radiocommunications transmitters are exempt from the registration requirement in Statutory Condition 3:

(a) a transmitter that operates in the [3.4/3.6] GHz band with a total radiated power of less than or equal to 25 dBm per occupied bandwidth

**Managing interference with Uralla Earth station facility**

1. The licensee must not cause unacceptable levels of interference to Earth stations operated within HCIS identifier NU7K4 in accordance with the criteria specified in *RALI[ESPZ]*

**Coordination with Earth station protection zones**

1. Before seeking to register a radiocommunications transmitter, the licensee must follow the procedures set out in *RALI[ESPZ]* for the protection of the defined Earth station protection zones.

## Unacceptable levels of interference (s.145 determination)

Update current 3.4 GHz s.145 determination as follows:

* Change band definition to include 3.6 GHz
* Make the following changes to the DBC:
  + Change LOP from -111 dBm/MHz to -98 dBm/MHz;
  + Decrease the notional Rx height from 5m to 2m;
  + Increase the resolution of calculations from 500m increments to 250m increments.
* Exempt spectrum licensees from having to meet the device boundary criteria around the areas excised for consideration as earth station protection zones and the earth s station facility operating at Uralla;
* Include a note guiding AP’s on how to treat systems with beam-forming capabilities.

**Note submissions to the TLG related to the RAGs are still being reviewed. An update to the TLG paper and summary paper will be released in the coming days**

## Radiocommunications Advisory Guidelines

Interference from spectrum licence transmitters (RAG Tx):

Update current 3.4 GHz RAG Tx as follows:

* 1.4(1) - Include 3.6 GHz into the frequency ranges covered by the Rag Tx;
* 2.3 & 3.1 – indicate fixed links operate ‘in and adjacent to the 3.4 GHz band’;
* 4.3 – Update to include co-channel coordination with Fixed Satellite Service (FSS) earth stations as well as a requirement to notify affected earth station licensees of any new systems to ensure they have suitable RF filters installed.;
* 5.2(2) – This clause discusses protection requirements for P-MP licences. It is proposed to put in a clause stating that the licensees who is second-in-time is responsible for bearing any costs to facilitate coexistence. There is also an update to the note so it covers the 3400-3700 MHz frequency band;
* 7.1(1) – update frequency range to encompass 3400-3700 MHz frequency band;
* A new section providing guidance on how to manage interference with the east and west coast earth station protection zones (ESPZs); and
* A new section dealing with how to coordinate with the earth station facility operated by Lockheed Martin near Uralla (NSW).
* Remove references to Schedule 3 of the Rag Rx (i.e. the additional unwanted emission limit)

New or updated RALIs incorporated by reference into the RAG Tx:

* RALI FX19: Updates to define interference management requirements from devices deployed under a spectrum licence with apparatus licence P-MP service operating in the 3.6 GHz band; and
* RALI[ESPZ]: Proposed new RALI managing interference to ESPZs an earth stations operating at the Lockheed Martin facility near Uralla, NSW.

Interference to spectrum licence receivers (Rag Rx):

Update current 3.4 GHz RAG Rx as follows:

* 1.4(1) - Include 3.6 GHz into the frequency ranges covered by the Rag Rx. Also include a definition for unwanted emissions.
* Replace ‘out-of-band emission’ with ‘unwanted emission’ thought out the document
* 3.1 – Update clauses to include how in-band interference from apparatus licences is managed in the 3575-3700 MHz band.
* Delete schedule 3 and relevant references in RAG Rx. If a synchronisation requirement is adopted this section is no longer required.