# 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:

* Generally, a maximum radiate mean power of 68 dBm/5 MHz EIRP per cell/sector;
* 25 dBm/5 MHz per cell/sector for a restricted use block in the upper 5 MHz of a spectrum licence that is adjacent to another spectrum licence.

Note that adjacent band spectrum licensees can come to agreement to allow higher in-band emissions within the 5 MHz restricted use block, up to a maximum of 68 dBm/5 MHz EIRP

Unwanted emission limits:

Note that adjacent band spectrum licensees can 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**.**

The limits proposed are based largely on current the 3.4 GHz spectrum licence limits with the following exceptions:

* The frequency range that the limits in Table 1 apply has been expanded;
* The upper limit frequency limit for emissions in Tables 2 and 3 is set at 19 GHz. This represents the fifth harmonic of the frequency 3.8 GHz.

The limits proposed assume either synchronised operation or an expectation that licensees work together to manage interference for unsynchronised or semi-synchronised services.

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

|  |  |  |
| --- | --- | --- |
| **Frequency Range (foffset)Note 1** | **Radiated Mean Power (dBm EIRP)** | **Measurement Bandwidth** |
| 0 kHz ≤ foffset ≤ 5 MHz | 10 – (7/5).foffset(MHz) | 100 kHz |
| 5 MHz≤ foffset ≤ 10 MHz | 3 | 100 kHz |
| foffset ≥ 10 MHz | 2 | 1 MHz |

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

|  |  |  |
| --- | --- | --- |
| **Frequency Range (f)** | **Radiated Mean Power (dBm EIRP)** | **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 3380-3720 MHz frequency band – registered devices.

|  |  |  |
| --- | --- | --- |
| **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 |

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 3.4/3.6 GHz band with a maximum EIRP of less than or equal to 25 dBm per occupied bandwidth;
  2. a transmitter that operates in the 3.4/3.6 GHz band where:
     1. the maximum EIRP is always less than or equal to 44 dBm per occupied bandwidth; and
     2. the phase centre of the antenna is less than or equal to 10 metres above ground level; and
     3. the antenna has a front-to-back ratio greater than or equal to 20 dB

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 are based largely on current 3.4 GHz limits with the following exceptions:

* The frequency range that the limits in Table 4 apply has been expanded;
* The upper limit frequency limit for emissions in Tables 5 and 6 is set at 19 GHz. This represents the fifth harmonic of the frequency 3.8 GHz.

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** | **Radiated Mean Power (dBm EIRP)** | **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.

|  |  |  |
| --- | --- | --- |
| **Frequency Range**  **(f)** | **Radiated Mean Power (dBm EIRP)** | **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:

* Maintain all conditions currently on 3.4 GHz band spectrum licences
* Update band definition to include 3.6 GHz
* 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

## 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
* Include a note guiding AP’s on how to treat systems with beam-forming capabilities.
* No other changes are proposed

## 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 separate it into two clauses: One discussing the additional out-of-band emission limits requirement for devices operating under a spectrum licence, and the other 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).

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.
* Schedule 3 – Minor change to the additional unwanted emission limits that apply to registered devices when managing adjacent band interference to (and from) apparatus (specifically PTS and point-to-multipoint) and spectrum licensed services operating in the 3400-3700 MHz. These additional limits are defined in the table below.

1. Additional transmitter unwanted emission limits within the 3400-3700 MHz frequency band, if required, to manage adjacent band interference – registered devices.

|  |  |  |
| --- | --- | --- |
| **Frequency Range**  **(foffset)** | **Radiated Mean Power (dBm EIRP) per cell/sector** | **Measurement Bandwidth** |
| 0 kHz ≤ foffset ≤ 5 MHz | 10 – (7/5).foffset(MHz) | 100 kHz |
| 5 MHz≤ foffset ≤ 10 MHz | 3 | 100 kHz |
| foffset ≥ 5 MHz | -25 | 1 MHz |