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AUSTRALASIAN RAILWAY ASSOCIATION SUBMISSION

To

The Australian Communications and
Media Authority

On

Class licensing updates: Supporting 5G
and other technology innovations



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The ARA

The Australasian Railway Association (**ARA**) is a not-for-profit member-based association that represents rail throughout Australia and New Zealand. Our members include rail operators, track owners and managers, manufacturers, construction companies and other firms contributing to the rail sector. We contribute to the development of industry and government policies in an effort to ensure Australia's passenger and freight transport systems are well represented and will continue to provide improved services for Australia's growing population.

The ARA thanks the Australian Communications and Media Authority (**ACMA**) for the opportunity to provide this submission to the *Class licensing updates: Supporting 5G and other technology innovations*.

For further information regarding this submission, please contact Maria Morozova, Senior Program Manager at ARA via mmorozova@ara.net.au or +61 499 919 496.

Use of the LIPD Class Licence in the Rail industry

The information contained in this submission is the result of contribution from the ARA

Telecommunications Committee which is comprised of Arc infrastructure, ARTC, Aurizon, Department of Planning, Transport and Infrastructure South Australia, Genesee & Wyoming Australia, Metro Trains Melbourne, Pacific National, Public Transport Authority of Western Australia, Public Transport Victoria, Queensland Rail, Sydney Trains, Transport for NSW, V/Line, VicTrack and 4Tel.

Members of the ARA Telecommunications Committee identified several types of technology considered important for future use by the Rail industry to be authorised under the LIPD Class Licence arrangements including:

- Ground Penetrating Radars,
- Radio Frequency Identification and
- Underground Rail Communication.

Ground Penetrating Radars (GPR)

The Rail industry plans to make use of the GPR systems in the future for assessing and monitoring the condition of rail track and underground cables and services as they are capable to provide valuable information to determine maintenance plans.

Recommendation:

Current LIPD does not cater for GPR application and the Rail industry welcomes the inclusion class licence arrangement for Ground Penetrating Radars (GPR).

Radio Frequency Identification (RFID)

The Rail industry plans to increase use of the Radio Frequency Identification (RFID) systems including Automatic Equipment Identification (AEI) tag readers. They are used to identify rolling stock assets and to associate them with track-side measurements such as brake temperature, dragging equipment detection, hot or failing bearings, car weights, swinging cargo doors and wheel flats.

Recommendation:

The Rail industry proposes that AEI tag readers that can operate within LIPD bands are permitted at higher power limits to allow use of unmodified North American and European product under a Class Licence.

Underground Rail Communication

The LIPD item 47 contains frequencies (i.e. RIO band) that are used for the rail operation radio systems in underground tunnels and tunnel environments.

Current condition of above ground spurious emissions does not afford adequate protection for licenced radio systems operating in underground rail tunnels.

Recommendation:

The Rail industry proposes inclusion of a condition that the underground rail operation radio systems frequency bands are not to be used where there are both underground and above ground licenced radio systems in operation to prevent undue mutual interference.

Additional matters for consideration

5G

In addition to above suggestions, the Rail industry acknowledges that as part of 5G evolution, the backhaul communications are also evolved to support the high capacity and low latency 5G traffic. Some of new microwave technologies are proposed as replacement or compliment to fibre transmission and replacement of traditional microwave solution to reduce the cost.

E band 71-76G + 81-86G

V band 57-64G

W band 92-114G

D band 130-175G

E band is currently available as self-coordinated spectrum, and V band has been included in the new update of LIPD. W band and D band equipment are still in development stage and require the ongoing standardization (CEPT, ITU-R), therefore, it is too early to be included in there.

Balises, Interrogators and ATP Transponders

The Rail industry plans to adopt and deploy rail safety and control communication systems that are developed principally in Europe and North America. These environments have different regulatory arrangements for device frequency bands, bandwidths and power limits.

The Rail industry is planning future infrastructure projects to increase utilisation of rail networks using in-cab signalling systems. These systems require a high position accuracy to reduce headway times between trains.

Typically, balises are being used to provide high position accuracy information for European Train Control Systems (ETCS) and Communications Based Train Control (CBTC) systems.

Balises are attached to track sleepers between rails. They either are programmed with fixed data such as a location, or they transmit variable data such as the status of upcoming signals via the signalling system. Balises are interrogated by rolling stock as they pass over the balise. ETCS Balises are called Eurobalises.

Balise Interrogator

When rolling stock - fitted with a balise interrogator - pass over a balise, an energising signal is transmitted to provide power to a balise which causes it to transmit data. Energising signals are constantly transmitted however the interrogators are generally located under the front of a locomotive and

are facing the track below the locomotive. ETCS balise interrogators are called the Balise Transmission Modules (BTM).

ETCS BTMs transmit at 27.095 MHz +/- 500 kHz at 42 dBuA/m measured at 10m – see Figure 1. This is about 835 uW. LIPD has a limit of 1 W for all transmitters within 26.957 to 27.283 MHz but conditional on emission bandwidth not exceeding 10 kHz. Based on EN 302 608 bandwidth, it is likely that ETCS BTMs fitted to rolling stock would need to be licenced under the current arrangement.

Field Strength [dBuA/m @ 10 m] v Frequency [MHz]

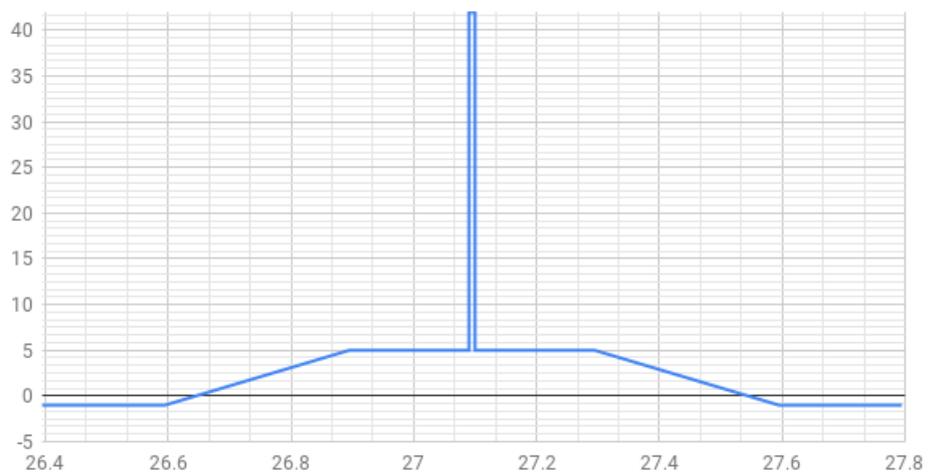


Figure 1 Interrogator transmitter mask based on EN 302 608

Balise Transmission

In Europe balises are permitted under ETSI EN 302 608 to operate under a transmitter mask centred on 4.234 MHz at 9 dBuA/m @ 10 m and with a bandwidth of 6.5 MHz (984 kHz to 7484 kHz) – see Figure 2.

This is equivalent to 3.7 uW, which is significantly higher than the Radiocommunications (Low Interference Potential Devices) Class Licence 2015 (LIPD) limit of 7.5 nW for all transmitters within 3.7 MHz and 3.95 MHz and within 4.438 MHz and 4.65 MHz.

However, this transmission is only turned on for a very short period of time whilst locomotive is above the balise. Also having the locomotive directly above the balise during the emission restricts the propagation of this signal.

Eurobalise uses frequency shift keying using two carriers at about 3.951 MHz and 4.513 MHz. The lower frequency is not within LIPD permitted frequency band.

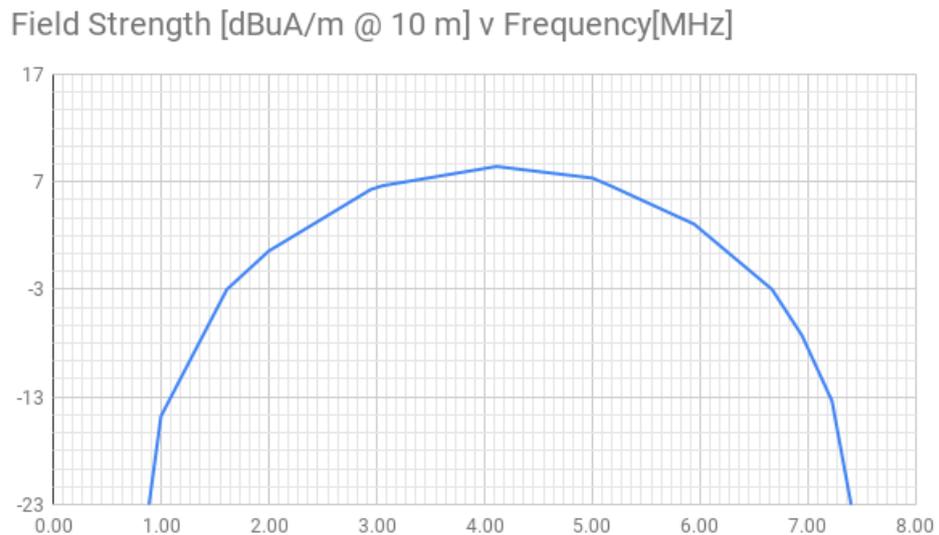


Figure 2 Balise transmitter mask based on EN 302 608

Note: Other types of balises and interrogators are in use overseas that perform a similar rail safety and control communications function that operate in different frequency bands, bandwidth and power levels. For example, GEMCO transponders operate at 327.68 kHz at 81.920 kbps. Transmit power level are currently unknown. Modulation is FSK therefore likely carrier frequencies are 327.68 kHz and 245.76 kHz or 409.6 kHz. All these are within LIPD frequency bands however modulation bandwidth is expected to exceed LIPD frequency limits.

Public Transport Authority of Western Australia plans to use Automatic Train Control (ATC) which is likely to be Communications-Based Train Control (CBTC) that use standard ERTMS Subset-036 Eurobalises.

The above analysis of balise and interrogator transmissions indicates that they do not necessarily comply with LIPD. Therefore, under the current arrangement, each Eurobalise and interrogator would need to be individually licensed.

In the preparation of this submission, ARA member companies have raised a number of issues in relation to Balises, Interrogators and ATP transponders for future projects that have required further clarification from the ACMA to identify how this type of technology falls under LIPD or other arrangements. As a result, the ARA is in the process of initiating a separate consultation process with the ACMA to discuss proposed amendments to current regulatory arrangements to

support use of such technology for Rail Safety and Control Communications. The ARA will update this submission to the ACMA following these additional consultations.

CONCLUSION

Further to this submission, the Rail industry confirms its commitment to collaborate with the ACMA through additional consultations and providing supplementary input in order to support technology innovations in rail.