Radiocommunications Assignment and Licensing Instruction

# PAGING SERVICES

# Amendment History

| Date | Comments |
|---|---|
| August 1992 | Previous RALI |
| June 2016 | Consultation draft proposing raising the status of regional paging-exterior channels and increasing the number of primary paging-interior channels. |
| August 2016 | Finalised RALI following consultation (IFC 17/2016) |

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# PAGING SERVICES

## 1 Purpose

The purpose of this Radiocommunications Assignment and Licensing Instruction (RALI) is to provide information on frequency coordination and licensing arrangements for exterior and interior paging services.

The information in this document reflects the ACMA's statement of current policy in relation to paging services including:

- Low frequency inductive loop systems operating in the band 24-39 kHz;
- Interior paging systems operating on channels 27.64, 27.67 MHz;
- Interior paging systems including talkback channels 40.68, 40.75 MHz; and 153.8 MHz;
- Interior paging systems operating in the VHF paging band 148.0-149.25 MHz;
- Exterior paging systems operating in the VHF paging band 148.0-149.25 MHz; and
- Interior paging systems operating on UHF channels 450.325 and 450.375 MHz.

In making decisions, accredited frequency assigners and the ACMA's officers should take all relevant factors into account and decide each case on its merits. Issues relating to this document that appear to fall outside the enunciated policy should be referred to the Manager, Spectrum Engineering Section, PO Box 78, Belconnen, ACT, 2616, or by e-mail to freqplan@acma.gov.au.

## 2 Scope

This RALI sets out the coordination and licensing arrangements for both exterior and interior paging services and in part represents a summaries consolidation of information available in other documents. Additional information can be found on the ACMA website under Land Mobile Licences – Guidelines – Paging systems[1], in Part 2 of the Radiocommunications Licence Conditions (Land Mobile Licence) Determination 2015[2] and in the Radiocommunications (Paging Service Equipment) Standard 2014[3].

Coordination is only required for exterior paging services on the 50 channels in the VHF paging band 148.00 MHz-149.25 MHz (Segment A of Figure 2 and Table 2 of the Frequency plan for the VHF bands[4]).

Coordination is not required for interior paging services operating in a number of other bands. Information on these systems is provide in Appendix B. These systems include:

- Low frequency inductive loop paging systems in the 24-39 kHz band that may be operated under the Radiocommunications (Low Interference Potential Devices) Class Licence 2015[5];
- Low power interior paging services on the high frequency (HF) channels 27.64 MHz and

[1] See http://www.acma.gov.au/theACMA/land-mobile-licences-guidelines

[2] See https://www.legislation.gov.au/Series/F2015L00831

[3] See http://www.acma.gov.au/Industry/Spectrum/Radiocomms-licensing/Class-licences/lipd-class-licence-spectrum-acma

[4] See http://www.acma.gov.au/Industry/Spectrum/Spectrum-planning/About-spectrum-planning/band-plans-spectrum-planning-acma

[5] See http://www.acma.gov.au/Industry/Spectrum/Radiocomms-licensing/Class-licences/lipd-class-licence-spectrum-acma

27.67 MHz;

- Low power interior paging services on the VHF channels 40.68 MHz and 40.75 MHz including pager talkback;
- Interior paging services operating in the VHF paging band 148.00 MHz-149.25 MHz;
- The low power interior paging talkback systems operating on a frequency of 153.8 MHz; and
- Low power interior paging on UHF channels 450.325 MHz and 450.375 MHz.

While paging-interior service transmitters operating in the VHF paging band 148.00 MHz-149.25 MHz are not coordinated, this RALI also provides advice on good engineering practices that should be considered when assigning frequencies for these services.

# 3 Equipment requirements

The mandatory equipment standard for Apparatus licenced land mobile paging service equipment in Australia is the Radiocommunications (Paging Service Equipment) Standard 2014[6]. This standard picks up the technical requirements of AS/NZS 4769.1 and AS/NZS 4769.2. Copies of these industry standards are available from SAI Global[7].

The Radiocommunications Licence Conditions (Land Mobile) Determination 2015 also sets out certain emissions limits and siting requirements for paging system transmitters. Electro-magnetic exposure (EME) conditions apply[8] as a condition in the Radiocommunications Licence Conditions (Apparatus Licence) Determination 2015. Low power interior talkback transmitters are of sufficiently low power to be excluded from additional EME restrictions.

# 4 VHF paging band channel arrangements

Channel arrangements for paging services in the VHF paging band 148.00-149.25 MHz are specified in RALI MS 42 Frequency Plan for the VHF Bands 70-87.5 MHz and 148-174 MHz. These arrangements are summarised in Table 1.

| Channel Centre frequency | Channel Bandwidth | Remarks |
|---|---|---|
| 147.9875 + (n x (0.025)) MHz<br>Where 'n' is 1 to 50 | 25 kHz | Paging services-exterior are allocated on a primary basis on all channels except on channels 148.1625 MHz, 148.3375 MHz, 149.1125 MHz, 149.1875 MHz where exterior paging services are allocated on a secondary basis and paging-interior services are allocated as primary. |

Table 1 VHF channel arrangements

[6] See http://www.acma.gov.au/Industry/Spectrum/Radiocomms-licensing/Class-licences/lipd-class-licence-spectrum-acma

[7] See http://infostore.saiglobal.com/store/

[8] See http://www.acma.gov.au/Industry/Suppliers/Regulatory-arrangements/EME-hub/transmitter-licence-conditions

### 4.1 Channel arrangements nationwide paging-exterior services

Existing channels identified for nationwide paging services are: 148.0875 MHz, 148.5625 MHz and 148.6375 MHz. All existing nationwide paging services will continue to be supported including the weather information service channel 148.0875 MHz. New applications to provide nationwide exterior paging services are subject to the following rules that:

- Applicants must have or apply for a licence covering existing or proposed transmission sites in at least the five mainland capital cities;
- Once the channel has been assigned it will be available elsewhere, subject to normal assignment constraints; however
- The only method of ensuring future availability at a particular site is to apply for a licence;
- Operation of transmitters at all locations must be covered by the licence.

### 4.2 Channel arrangements paging-interior services

Paging interior services typically operate as secondary services and there are no channel selection requirements and no frequency coordination is typically undertaken. However services operating on a secondary basis and may be asked to change frequency to avoid interference to primary services.

Paging-interior services requiring primary service status must utilise one of the four designated channels 148.1625 MHz, 148.3375 MHz, 149.1125 MHz or 149.1875 MHz.

## 5 Coordination of paging-exterior services in the VHF paging band

The coordination requirement are based on the assignment model set out in Appendix A of this RALI.

### 5.1 Coordination Procedure

Paging-exterior service main transmitter assignments must:

- Not use a channel in use by an existing nationwide service unless a part of that service, within 100 km of the capital cities;
- Not use the channel designed for weather information services unless a part of that service;
- Not use a channel immediately adjacent to an existing nationwide service within 100 km of the capital cities;
- Not use a channel designated as having primary status for paging-interior services within 40 km of a paging-interior service transmitter operating on that frequency unless operated by the same licensee;
- Be given secondary status via a licence condition if operating on a channel designated as having primary status for interior paging services;
- Meet a minimum frequency reuse distance of 100 km to another paging-exterior transmitter operated by another licensee;
- Not cause receiver intermodulation interference to any registered receiver within 5 km of the proposed site;
- Not cause interference to co-sited registered receivers from third or fifth order transmitter intermodulation products produced in conjunction with other transmitters at the site; and
- Not cause interference to co-sited registered receivers from transmitter harmonics.

***Intermodulation product interference***

The limits and methods of Section 6.5 Intermodulation Checks of RALI LM08 should be used to determine if the above requirements are met.

***Additional requirements for operated as part of the Weather information service***

Licensees operating on 148.0875 MHz, the nationwide weather information service channel must also hold a marine rescue station licence and operate the service in conjunction with the station covered by that licence.

## 5.2 Coordination with adjacent band services

Coordination with services operating beyond the band edges in the register of radiocommunications licences is required for paging-exterior services.

### 5.2.1 Maximum EIRP greater 83 watts

For paging-exterior transmitters with an EIRP of greater than 83 W use the minimum separation distances in the table below to coordinate with adjacent band services.

| Frequency Offset from proposed paging transmitter | Minimum separation distance |
|---|---|
| < 6.25 kHz | D = 160 km |
| 6.25 to 2000 kHz | D = (1 / $f_{MHz}$) – 0.5 km |
| > 2000 kHz | D = 0 |

### 5.2.2 Maximum EIRP 83 watts

For transmitters with a maximum EIRP up to 83 W use the minimum separation distances in the appropriate table of Section C2 (Frequency-Distance Constraints for Single Frequency LMRS in the VHF Mid and High Bands) of RALI LM08 to coordinate adjacent band services.

# 6 Assignment of paging-interior services

While new paging-interior service transmitters can be assigned without coordination on a secondary basis as mentioned above, it is good engineering practice:

- to avoid the band edge channel frequencies;
- to check that the proposed frequency is not in use within 200 m by another paging-interior service transmitter; and
- to check there is not a paging-exterior service transmitter operating by another licensee on the proposed frequency within 40 km of the proposed site.

New paging-interior service transmitters assigned to the four channels where the paging-interior service has primary status must meet these requirements.

# 7 Licensing

Information on conditions, fees and other licensing requirements can be found in the apparatus licence information papers on the ACMA website. For paging service stations see the mobile

information paper[9] and for the fixed receive station see the mobile receive information paper[10].

# 8 RALI Authorisation

Approved 18 August 2016

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Australian Communications and Media Authority

[9] Fixed apparatus licence information paper http://www.acma.gov.au/theACMA/radiofrequency-spectrum-fixed-licences.
[10] Fixed receive apparatus information paper at http://www.acma.gov.au/theACMA/fixed-receive-licences-guidelines.

# Appendix A - Assignment model

***Grade of service***

The target grade of service of a bit error rate of $10^{-3}$ achieved 99% of the time in any 1 hour period.

***Service reliability***

The target service reliability is that the target grade of service should be achieved at 90% of locations in the total service area.

***Protection ratio***

A signal protection ratio of 6 dB above receiver noise level is required to achieve the target grade of service.

***Adjacent channel isolation***

The available adjacent channel isolation (ACI) is 50 dB.

***Transmitter Unwanted emissions limits***

The assumed maximum level of discrete spurious emissions is -30 dBm.
The assumed maximum level of transmitter noise at offsets greater than 300 kHz from the assigned frequency is -47 dBm.

These levels are assumed for existing paging-exterior transmitters however actual levels may be lower due to equipment standards requirements. At communal sites it may be necessary to fit additional cavity filtering to meet site requirements.

**Paging-exterior service transmitters-Main transmitter**

A maximum station EIRP of up to 1000 W is permitted for base station transmitters in systems with baud rates greater than 1200 operated outside high density areas. Existing base stations with 1000 W EIRP may continue in high density areas. The 1000 W EIRP limit is no longer authorised inside high density areas for new assignments because of the potential impact on use of sites and adjacent services. A maximum EIRP of up to 500 W is permitted for all other base station transmitters.

The service area of a paging service-exterior transmitter is the area within 40 km of the main transmitter site.

**Paging-exterior service transmitters-Supplementary transmitters**

All new supplementary transmitters must be located inside the service area around the main transmitter and must not be used to extend the coverage area beyond the service area of the main station. Supplementary transmitters are limited to a maximum EIRP of 83 W. A supplementary transmitter must be associated with a paging-exterior service main transmitter.

**Paging-interior service transmitters**

Interior paging system base stations operate with a maximum EIRP of up to 8.3 W EIRP. If the antenna of a paging-interior service transmitter is located outside of a building then a maximum antenna height of 10 m applies. Interior paging systems may also utilise leaky feeder antenna. In the case of leaky feeder antenna the maximum transmitter output power

conducted into the antenna is 50 W.

The service area of a paging-interior service is the area confined within the property boundaries of the licensee's premises or similar restricted area.

# Appendix B – Summary of paging spectrum arrangements

## Interior paging utilising inductive loop systems in the 24-39 kHz band

The operation of these low power inductive loop systems is authorised under the Radiocommunications (Low Interference Potential Devices) Class Licence 2015[4], see item 3 All Transmitters 20.05-48 kHz. There is no coordination required and no protection provided by the class licence.

## Interior paging on HF frequencies 27.64 MHz and 27.67 MHz

The operation of these low power systems is currently authorised under an apparatus licence land mobile paging systems-interior. The indoor use of these low power systems means that no coordination is required beyond the site provided the conditions of the apparatus licence for land mobile paging system-interior are met. This is because of the low power levels used, interior use and because the frequency adjacent channels are used by uncoordinated stations in the 27 MHz Handphone service[1].

## Interior paging on frequencies 40.68 MHz and 40.75 MHz including talkback

The operation of these low power systems is currently authorised under the apparatus licence land mobile paging systems-interior. The interior use of these low power systems means that no coordination is required beyond the site provided the conditions of the apparatus licence for land mobile paging system-interior are met. This is because of the low power levels used, interior use and because the channels are over-laid by uncoordinated devices operated under the Radiocommunications (Low Interference Potential Devices) Class Licence 2015[4], Schedule 1 item 15 All transmitters 40.66-41 MHz maximum EIRP of 1W that also covers operation of low power interior paging talkback transmitters on these channels.

## Exterior paging on VHF frequencies 149.7875, 149.8375 and 149.8875 MHz

The operation of these systems is currently authorised under the Apparatus licence land mobile paging systems-exterior. However no new assignments on these channels is allowed as they are outside the VHF paging band. Existing licensees may continue to operate using existing assignments only. The 25 kHz channel bandwidth of the existing assignments may continue to be used despite the 12.5 kHz channelling requirement for land mobile services in segment C of the VHF High-Band. (See Figure 2, Table 2, and Note 2 to Table 2 in the Frequency Plan for the VHF Bands).

## Interior paging in the VHF paging band 148.00 - 149.25 MHz

The operation of these systems is authorised under the apparatus licence land mobile paging systems-interior. Coordination between low power interior systems that comply with the conditions of the apparatus licence land mobile paging systems-interior is not required. However coordination is required between these interior paging systems and exterior paging systems in the band where the interior paging system is proposed to be located in the service area of an existing exterior paging system and adjacent apparatus licenced land mobile and amateur services. See section 6.

[1] See https://www.comlaw.gov.au/Details/F2015L01441

## Exterior paging in the VHF paging band 148.00 - 149.25 MHz

The operation of these systems is authorised under the apparatus licence land mobile paging systems-exterior. Coordination is required between exterior paging systems and interior paging systems and between external paging systems operating on channels in the band. Coordination is also required between exterior paging services in this band and adjacent Apparatus licenced land mobile and amateur services.

## Interior paging talkback systems on 153.8 MHz

The operation of these systems is authorised under the apparatus licence land mobile paging interior as mobile stations. While the low power interior use of these systems means that coordination is typically not required beyond the site, the channel lies within a broader single frequency land mobile service band and so assignments must be recorded with a no interference no protection licence condition. The channel is located in segment G identified for single frequency services in the VHF High band (See Figure 2, Table 2 and Note 4 to Table 2 of the Frequency plan for the VHF bands). Paging-interior talkback transmitters operating on 153.8 MHz are limited to maximum transmitter power of 250 mW.

## Interior paging on UHF frequencies 450.325 MHz and 450.375 MHz

The operation of these is authorised under the apparatus licence land mobile interior-paging. While the low power indoor use of these systems means that coordination is not required, the channel however lies within a general land mobile service segment (P) of the 400 MHz Plan[2] intended to support single frequency low power applications (see Note 1 of Table1) and identified as principally for the use of the Rail industry so assignments must be recorded with a no interference no protection licence condition.

[2] See http://www.acma.gov.au/Industry/Spectrum/Spectrum-planning/About-spectrum-planning/band-plans-spectrum-planning-acma