

**RALI : FX 10**

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**Sequence Number : 105 (61)**

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**Radiocommunications Assignment and Licensing Instruction**

**MANAGEMENT OF THE SHORT RANGE  
POINT TO MULTIPOINT SERVICE**

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***SPECTRUM MANAGEMENT AGENCY***

**BUSINESS DIRECTIONS GROUP**

**CANBERRA**

# **RADIOCOMMUNICATIONS ASSIGNMENT AND LICENSING INSTRUCTIONS**

## **DISCLAIMER**

The Spectrum Management Agency (SMA) advises that these instructions reflect the current policies of the SMA.

Prospective applicants for licences should, however, on their own responsibility, take whatever steps necessary to ensure that they have access to appropriate technical or other specialist advice independently of the SMA concerning their applications, the operation of radiocommunications equipment and services, or any other matters relevant to the operation of transmitters and services under the licences in question.

The policies of the SMA, and the laws of the Commonwealth, may change from time to time, and prospective licensees should ensure that they have informed themselves of the current policies of the SMA and of any relevant legislation. Furthermore, prospective applicants for licences should not rely on statements made in these instructions about the policies that may be followed by other authorities, nor about the effect of legislation.

Radiocommunications Assignment and Licensing Instructions are subject to periodic review and are amended as necessary. To keep abreast of developments, it is important that users ensure that they are in possession of the latest edition.

No liability is or will be accepted by the Minister for Communications and the Arts, the SMA, the Commonwealth of Australia, or its officers, servants or agents for any loss suffered, whether arising directly or indirectly, due to reliance on the accuracy or contents of these instructions.

Suggestions for improvements to Radiocommunications Assignment and Licensing Instructions may be addressed to the SMA at PO Box 78, Belconnen, ACT, 2616. It would be appreciated if notification to the SMA of any inaccuracy or ambiguity found, be made without delay in order that the matter may be investigated and appropriate action taken.

# Management of the Short Range Point to Multipoint Service

## 1.0 Introduction

This RALI replaces FX 10, dated 31 January 1996, sequence number 61.

### 1.1 Purpose

The purpose of this RALI is to provide procedures for frequency assignment and licensing for systems operating in the short range point to multipoint service.

The information in this document reflects the Spectrum Management Agency's statement of policy in relation to the short range point to multipoint service. In making decisions, Spectrum Management Agency (SMA) officers should take all relevant factors into account and decide each case on its merits. If an issue related to this document appears to fall outside the enunciated policy, please consult the Manager, Compliance and Licensing Directions Team, Central Office.

## 2.0 Background

A plan for the management of the Fixed Point to Multipoint (PMP) service operating in the 400 MHz and 900 MHz bands was produced in 1989, and is detailed in *Spectrum Planning Report SP 4/89* [1]. PMP services are typically data services and are characterised by wide area coverage, with a notional service area defined by a circle of 30 km radius and a minimum co-channel control station separation distance of 100 km.

Equipment suppliers have more recently approached the SMA seeking provision for a short range point to multipoint (SR-PMP) data service at 900 MHz. Such a service would operate successfully with a much smaller separation distance between co-channel control stations, enabling many systems to operate independently on one channel within a city.

Since the purpose and technical characteristics of the SR-PMP service are similar to those of the PMP service, it is appropriate for the SR-PMP service at 900 MHz to operate within spectrum already allocated to the PMP service by the 900 MHz Band Plan. As a spectrum segment can be most efficiently utilised if it is occupied by homogeneous services (ie, services having the same technical characteristics), a dedicated 900 MHz segment (lying within that allocated to the PMP service) is defined within this RALI for operation of the SR-PMP service.

This RALI has been developed from more detailed technical and policy information on the SR-PMP service contained in *Spectrum Planning Report SPP 9/95* [2].

## 3.0 Service Description

The SR-PMP service is characterised by a fixed **control station** operating with low power/low antenna height and communicating with a number of fixed/relocatable **remote stations** that are usually located within a radius of 100 metres of the control station. The receivers have the ability to distinguish between wanted and unwanted co-channel signals, provided that an appropriate wanted to unwanted signal ratio is achieved. Examples of SR-PMP service

applications are in the control of robots in a warehouse or factory, and the scanning of transport details at a checkpoint.

Specifically, the SR-PMP service is characterised by the following attributes:

- a single fixed central low power control station at a low site (antenna height nominally 10 metres); communicating with
- two or more associated fixed remote stations within a radius of 100 metres from the control station; sometimes incorporating
- relocatable fixed remote stations; using
- full or half duplex digital two frequency operation; requiring
- mostly 12.5 kHz or 25 kHz channel widths but with a 50 kHz channel width also assignable when required; with
- the system being able to operate **efficiently** in a minimum average wanted to unwanted signal level environment, that is, able to differentiate wanted from unwanted co-channel signals without a significant loss of data throughput.

## 4.0 Service Model

Working from the above service characteristics, a service model has been developed from which frequency assignment, licensing and compliance arrangements for the SR-PMP service have been specified [2]. The aim of the model is to define a set of service characteristics which, if met, will result in a specified grade of service for SR-PMP systems operating under this RALI.

The service model has been designed to support co-channel operation at small separation distances with a limited potential for interference to occur between individual SR-PMP systems. Under this model, there is no need for individual frequency coordination. Instead, frequency assignment strategies (which describe the order in which compatible frequencies are assigned) are employed to assist in managing residual interference. These strategies are detailed at Section 5.0 in this RALI.

Features of the service model are:

- a target (minimum) grade-of-service (TGS) specified as 15 dB co-channel wanted to unwanted signal ratio at the receiver input for an output bit error rate (BER) of  $10^{-4}$ ;
- a notional service area that provides reliable communication within 100 metres of the control station (a pico cell);
- a specified service reliability, defined as achieving TGS for  $\geq 50\%$  locations anywhere within the notional service area when within line-of-sight of the control station;
- a planned maximum remote station speed of 2 km/hr;
- defined antenna characteristics:

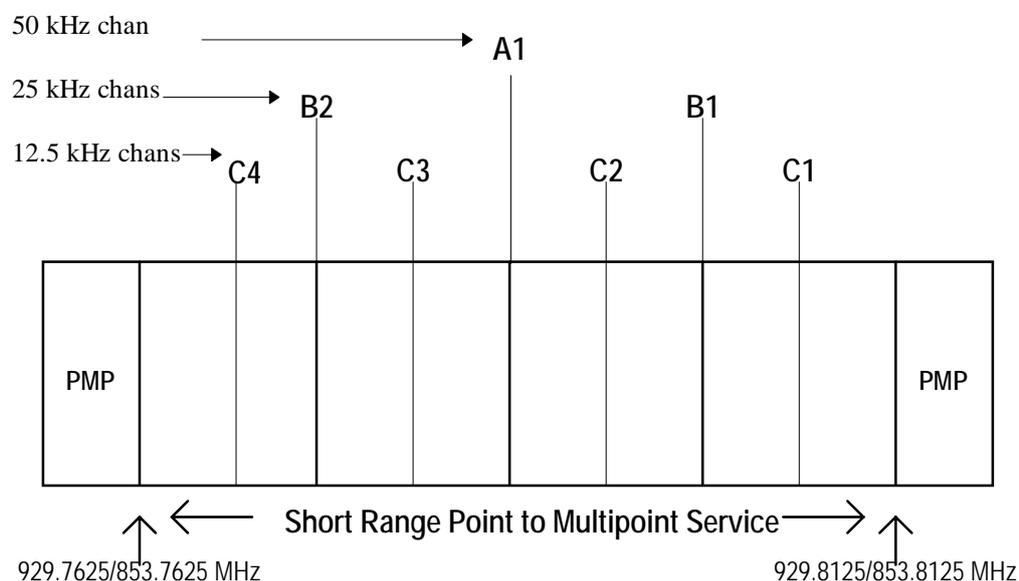
- control station: omnidirectional, height limited to 10 metres if required for interference settlement;
- remote station: nominal antenna height 1.5 metres;
- adjacent channel power requirements (which impose consequential limits on frequency stability);
- discrete spurious emission requirements;
- transmitter broadband noise requirements; and
- channel width / data rate requirements.

## 5.0 Frequency Assignment Requirements

### 5.1 Channelling Arrangements

The SR-PMP service operates within the PMP service allocation in the 900 MHz Band Plan [3]. Four contiguous 12.5 kHz channels within the PMP allocation are specified in this RALI for exclusive use by the SR-PMP service<sup>1</sup>, as shown in Figure 1. Channels may be amalgamated to provide for 25 kHz or 50 kHz operation; note that operation at these wider bandwidths may be subject to spectrum efficiency requirements. See Section 6.0 of this RALI. Channels are available for use (without further frequency coordination) subject to the assignment strategy detailed in section 5.2 of this RALI.

**Figure 1 - Channelling Arrangements for the Short Range Point to Multipoint Service**



<sup>1</sup> Note that PMP services are not to be assigned in the spectrum segment defined within this RALI for use by the SR-PMP service.

## 5.2 Assignment Strategy

Frequencies are to be assigned to the SR-PMP service from the list in Table 1, using the following strategy:

- **12.5 kHz services** - channel **C2** is to be assigned in the first instance. The remaining assignment options for 12.5 kHz services are, in order of priority, **C3**, **C4** and **C1**. These other channels are available if the applicant can provide supporting evidence, before assignment, that interference is likely or if, after assignment, interference does occur;
- **25 kHz services** - channel **B1** is to be assigned in the first instance. Channel **B2** is available if the applicant can provide supporting evidence, before assignment, that interference is likely or if, after assignment, interference does occur; and
- **50 kHz services** - there is only one 50 kHz channel (**A1**) so no assignment strategy is available for 50 kHz services.

**Table 1 - Frequencies and Order of Assignment for SR-PMP Services**

Channel width	Label	Order of Preference	Control Tx (MHz)	Remote Tx (MHz)
50 kHz	A1	first	929.7875	853.7875
25 kHz	B1	first	929.8	853.8
	B2	second	929.775	853.775
12.5 kHz	C2	first	929.79375	853.79375
	C3	second	929.78125	853.78125
	C4	third	929.76875	853.76875
	C1	fourth	929.80625	853.80625

## 6.0 Licensing Requirements

All transmitters in a particular SR-PMP system are to be licensed under one Fixed licence authorising a Point to Multipoint station. All of the technical details relating to the system's control station, including the location and transmit/receive frequencies, should be recorded in a spectrum access in RADCOM.

The maximum transmitter output power of the control station and remote stations must not exceed 100 mW.

## 6.1 Special Conditions

The following special conditions are to be included on **every** Fixed licence authorising an SR-PMP system:

- A4 *The control station covered by this apparatus licence must employ an antenna that radiates omnidirectionally in the horizontal plane.*
- F7 *The maximum transmitter output power for remote stations covered by this apparatus licence must not exceed 100 mW.*

Specific licence conditions are to be applied to Fixed licences authorising SR-PMP systems, in certain circumstances, as indicated below:

- for 25 kHz systems operating in High Spectrum Demand (HSD)<sup>2</sup> areas, Special Condition F5 is to apply. Special Condition F5 states:

*The transmission data rate is to be greater than or equal to 9600 bits per second.*

- for 50 kHz systems operating anywhere in Australia, Special Condition F6 is to apply. Special Condition F6 states:

*The transmission data rate is to be greater than or equal to 19,200 bits per second.*

## 6.2 Licence Conditions Determinations

Under paragraph 107(1)(f) of the Act, the SMA may determine, by written instrument, conditions relating to a particular type of apparatus licence. These conditions are known as Licence Condition Determinations (LCDs). LCDs contain the generic conditions particular to radiocommunications licence types and licensing options including detail of assigned frequencies, or frequency bands, and permitted power levels.

The arrangements for LCDs have not been completely finalised. However, the LCD for the Fixed licence authorising a SR-PMP service will be entitled *Radiocommunications Licence Conditions (Fixed Licence) Determination No. 1 of 1997*.

Further information about the Fixed LCD will be provided as it becomes available.

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<sup>2</sup> For the purpose of this RALI, HSD areas are taken to be those defined in the VHF High Band Frequency Band Plan (148 to 174 MHz) [4].

### 6.2.1 SR-PMP Conditions Contained in the Fixed LCD

Until the Fixed LCD is in place, the following condition is to be applied to every Fixed licence authorising SR-PMP systems by attaching Special Condition F3. For information, Special Condition F3 is as follows:

*Between 0 °C and 40 °C, adjacent channel power is to be less than -30 dBm measured within a 10 kHz bandwidth centred in the upper or lower 12.5 kHz channel adjoining the assigned channel limits. Any transmitter or receiver conducted spurious signal power is to be less than -45 dBm. Transmitter noise power is to be less than -60 dBm measured within a 10 kHz bandwidth at 300 kHz or greater offsets from the assigned frequency.*

Note that this licence condition concerns those aspects of the equipment model, for the transmitter and receiver, which contribute to spectrum pollution, ie unwanted emissions consisting of out-of-band emissions (adjacent channel power), spurious emissions, and transmitter broadband noise.

### 6.3 Other Licensing Requirements

Advisory note F8 should be included on every licence for an SR-PMP system. Advisory note F8 states:

*If unacceptable interference is caused by the station to which this licence applies, the station may be required to cease operation or operate under amended conditions, including that external antennas are to be located not more than 10 metres above ground level or that the frequency of operation may be required to change.*

In addition, compliance with the minimum data rate requirement for the assignment of 25 kHz and 50 kHz channels must be declared by the licence applicant in writing on the SMA's 'Additional Station Information' form (RF 57a). This form is to be submitted in conjunction with the 'Application for Apparatus Licence(s)' form (RF 57).

## 7.0 Bibliography

- [1] SP 4/89 - *A Rationale for the Guidelines for the Assignment of Frequencies in the Two-Frequency Point-to-Multipoint Fixed Service using a minimum of 12.5 kHz Channelling in the 400 MHz and 900 MHz Bands* - Spectrum Planning Report No. SP 4/89, March 1990.
- [2] SPP 9/95 - *Management Framework for the Short Range Point to Multipoint Service* - Spectrum Planning Report No. SPP 9/95, October 1995
- [3] 900 MHz Band Plan, Statutory Rules 1992, No. 47.
- [4] VHF High Band Frequency Band Plan (148 to 174 MHz), Statutory Rules 1991, No. 354.

## RALI Authorisation

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