RADIO SPECTRUM MANAGEMENT

IoT VHF Testbed Rules

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MINISTRY OF BUSINESS, INNOVATION & EMPLOYMENT
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New Zealand Government

Purpose

This document describes the fixed term radio licensing arrangement for the use of Internet of Things (IoT) devices in the VHF band 210 – 220 MHz. Radio licences for using this band for IoT deployment are available by applying through Approved Persons[1], similar to other radio licence types.

Background

Ministerial decisions were undertaken in 2016 about reusing the former analogue television VHF band III band (174 – 230 MHz) for new usages. It was provisionally agreed that 10 MHz of spectrum between 210 and 220 MHz be set aside for use as an IoT test bed. The aim of this IoT test bed is to provide an additional block of spectrum for IoT use, particularly to facilitate trials of non-standardised IoT ecosystem.

IoT networks by their nature have a broad definition. However they generally have one or more of the following characteristics:

- Operate in a Point to Multi-Point or mesh network configuration
- Low duty cycle
- Narrow bandwidth
- Use shared spectrum resource

Although a General User Radio Licence (GURL) would provide a very simple licensing option, being able to track the use of the band would not be easy. RSM has therefore decided to institute a radio licensing regime that is based on the shared (general use) land mobile simplex service. This allows licences to be issued for RSM to track usage in the band. Similar to general use land mobile simplex operation, devices operating on a particular channel must accept transmissions from other users of that channel.

Types of technology permitted

RSM will not be mandating any specific technology or standard. However during the licensing process, the equipment that is to be deployed by the licence must be stated in the equipment section on the licence.

As the channel is likely to be shared with other users in the same geographic area, equipment has to accept transmissions from other IoT equipment operating in the same channel. RSM does not intend to impose duty cycle limits at this stage. However continuous transmission of services such as broadcasting and continuous voice communications is not permitted.

Users are permitted to frequency hop between channels. However transmissions may only take place on one channel at a time.

[1] Approved Radio Certifiers and Approved Radio Engineers.

Security of Tenure

As this band is for testing purposes, each licence will be issued for one year.

Additional licences may be granted for up to two subsequent years, allowing a total tenure of up to three years. RSM anticipates reviewing this testbed in 2022, to decide the future use of the band.

Channel Plan

RSM has considered existing IoT technologies and standards, as well as the FCC part 90.259 land mobile radio devices that are permitted to operate in the band 217 – 220 MHz. Most IoT services (operating in sub-1 GHz band) reviewed have an emission bandwidth that is less than 200 kHz.

Therefore having 200 kHz channelling would allow for a significant number of current popular IoT protocols to be transposed into this band if desired. Table one outlines a channel plan for the band.

Table One – IoT testbed channel plan

Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
IOT1	210.100	IOT14	212.700	IOT27	215.300	IOT40	217.900
IOT2	210.300	IOT15	212.900	IOT28	215.500	IOT41	218.100
IOT3	210.500	IOT16	213.100	IOT29	215.700	IOT42	218.300
IOT4	210.700	IOT17	213.300	IOT30	215.900	IOT43	218.500
IOT5	210.900	IOT18	213.500	IOT31	216.100	IOT44	218.700
IOT6	211.100	IOT19	213.700	IOT32	216.300	IOT45	218.900
IOT7	211.300	IOT20	213.900	IOT33	216.500	IOT46	219.100
IOT8	211.500	IOT21	214.100	IOT34	216.700	IOT47	219.300
IOT9	211.700	IOT22	214.300	IOT35	216.900	IOT48	219.500
IOT10	211.900	IOT23	214.500	IOT36	217.100	IOT49	219.700
IOT11	212.100	IOT24	214.700	IOT37	217.300	IOT50	219.900
IOT12	212.300	IOT25	214.900	IOT38	217.500		
IOT13	212.500	IOT26	215.100	IOT39	217.700		

Licensing arrangements

Shared Service

Licences will be assigned on a first come first served basis. The band will be licensed in a similar fashion to those in the land mobile radio simplex system.

Power

Maximum power of up to -7dBW (200 milliwatts) e.i.r.p. is permitted. This is a balance between the power limits that are available to IoT networks and that equipment that is certified for the US land mobile band (2 watts). The EIRP that the device is capable of must be stated on the licence (up to the maximum power as permitted).

Permitted Emissions

As part of the licensing process, emission bandwidth must be specified as per the ITU emission designator codes. Each potential emission that would be used by the licensee must be specified on the licence.

The emissions in table two are pre-populated on a planned IoT spectrum record to provide a template for applicants. However the Approved Person shall modify the emission designators on the licence as appropriate to recognise all potential emissions that would be used by the licensee on that specific licence (up to 200 kHz). Approved Persons shall also remove any superfluous emissions designators.

Table Two – Prepopulated emissions for spectrum records in the IoT test bed

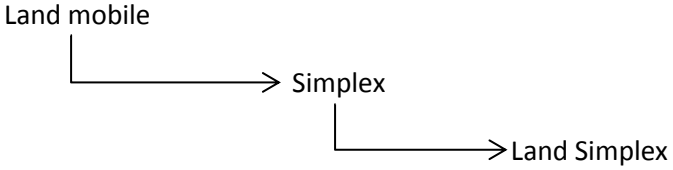
Protocol	Designator
Sigfox	192KD2D
NB-IoT	180KW7D
Zigbee	40K0GXW
LoRa	125KX1D
FCC part 90	44K5G1D

Licensing services in the IoT band

As outlined in the background section, licensing services in this IoT band will be similar to the licensing process that is undertaken for a land mobile radio simplex service.

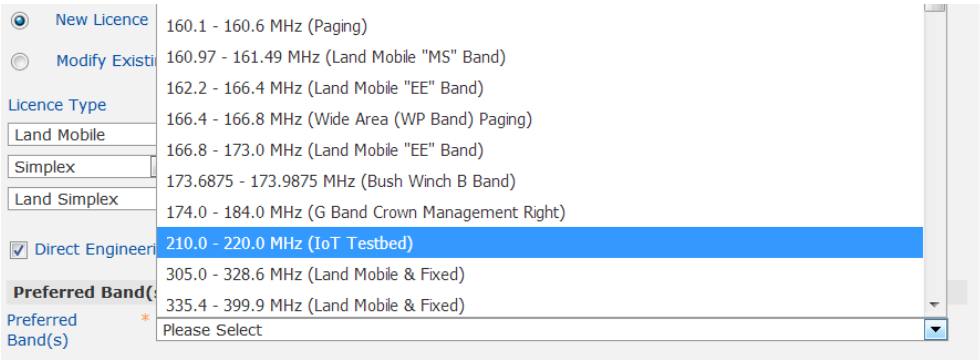
Approved Persons should undertake licensing in the following way:

Select the following licence type in a new application:



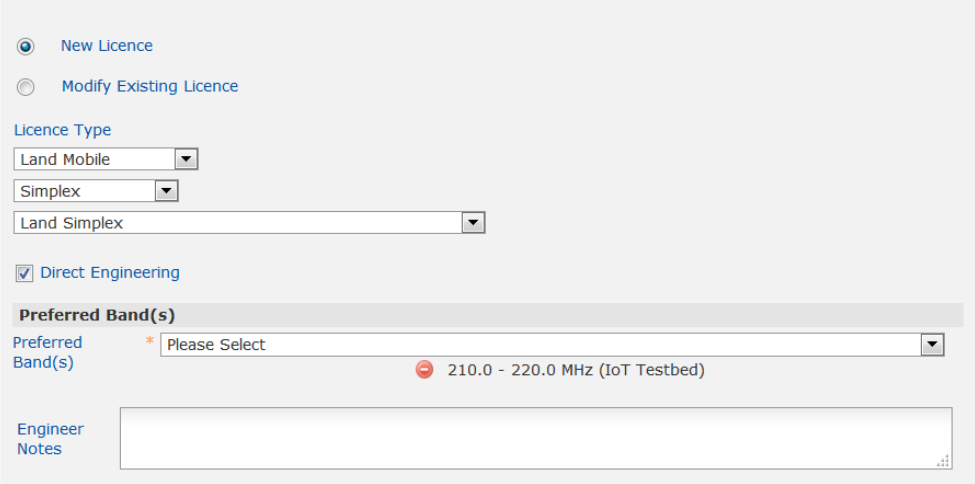
Select the Direct Engineering checkbox then select the spectrum band record, as shown below in figure one:

Figure One – IoT Testbed spectrum record



When the appropriate IoT spectrum record has been selected, the application will be shown as in figure two.

Figure Two – Licence application with direct engineering and band selected



Complete the remainder of the application as usual.

In the licence, the location must be set as a defined area for a Territorial Local Authority (TLA). Only one TLA must be specified on a licence.

The radio equipment make and model must be detailed on the licence.

In addition, the licence must include the number of sets on the licence's basic details. This is to enable RSM to track usage of the band.

The following conditions must be added to the IoT testbed licences:

- Licences operate on a shared basis; interference related to sharing must be tolerated.
- Continuous transmission is not permitted.
- If multiple channels are specified on the licence, then transmissions may only take place on one channel at a time.