30 November 2018

Radio Spectrum Management Policy and Planning
Ministry of Business, Innovation and Employment
PO Box 2847
WELLINGTON 6140

By email to Radio.Spectrum@mbie.govt.nz

Dear RSM,

Proposed rules for IoT testbed

Thank you for the opportunity to comment on the proposed rules for the IoT testbed.

4RF is pleased to see that this broadly similar initiative to the managed park concept of our submission to the RSM consultation 'Options for 174 – 230 MHz' in May 2016 has been favourable considered.

We see the application here in New Zealand for re-purposed Band III spectrum as much more for long range Industrial IoT and SCADA rather than consumer IoT. The low power IoT market is already well served by at least one commercial network operator with Spark's Internet of Things, a New Zealand wide offering.

For those wishing to avoid the network operator option, use can be made of the short-range devices (SRDs) spectrum in the 400 and 900 MHz bands under the General User Radio Licence (GURL) provisions.

4RF manufacturers a range of licensed and unlicensed data radio equipment used for SCADA and field area networks (FAN) applications in the VHF, 220, UHF, 700, and 900 MHz bands. With bandwidths of 12.5 to 100 kHz, our products offer data rates to 432 kbps and are approved by a number of regulatory agencies including ETSI, FCC, ANATEL, ACMA, RSM, and many others.

We supply to more than 140 countries around the world and have gained considerable insight into the needs of utility, oil & gas, transport, agriculture, government, and other providers critical to today's economy.

We reinvented SCADA radio with the introduction of QAM technology which has become the go to modulation for revitalizing utility and critical infrastructure licensed narrow band radio LAN systems. Major US utilities are upgrading legacy SCADA radio or replacing leased line with new QAM private radio in the bands below 1 GHz despite the ready availability of LTE for reasons of flexibility and resilience.

We believe that the proposed rules for the IoT testbed are sound in all but one area, specifically that of EIRP.

The primary utility and value of the 220 MHz band is in its distance capability. Radio frequency bands are not equal in terms of propagation and antenna effectiveness, with the lower bands favouring the longer and more obstructed paths. We believe that this band will be ideal for use in the often chaotic topography of New Zealand as it combines a good distance capability, similar to that of VHF but with more practical antennas sizes.

A secondary consideration is the relative lack of wideband (50 and 100 kHz) data channels at UHF. Properly dimensioned, this IoT testbed initiative provides overflow spectrum for SCADA users faced with the difficulties of finding suitable UHF channels in the same way as the lower portion of Band III has offered relief to VHF land mobile users as a result of the '174 to 184 MHz: LMR technical consultation'.

Two years ago, RSM was kind enough to permit 4RF to conduct tests within Band III and these confirm our view of the propagation value. It would be a pity to waste that value but not allowing adequate system gain.

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The proposed rules set a maximum power of up to -7dBW (200 milliwatts) EIRP. 4RF strongly recommend that this be increased by 20 dB to at least +13 dBW (20W) EIRP. The key reasons for this increased power are:

- Improve system gain, particularly important for high speed operation
- Deliver adequate power to overcome the obstructions common in NZ terrain
- Encourage use of directional antennas to improve frequency re-use
- Direction antennas are required to reduce multipath common in this band
- More power is needed to overcome noise and increase protection ratios
- To provide a viable overflow band for SCADA users of the crowded UHF bands

In a point-to-multipoint system remote units will generally employ directional antennas ranging from 6 dBi (two element Yagi) up to perhaps 12 dBi. The use of directional antennas is to be encouraged for reasons of better spectrum efficiency through re-use, to reduce multi-path propagation effects, and to improve system gain. Even at master sites antennas gains of up to 10 dBi are not uncommon in US deployments.

In the US, equipment available in this band for data use is typically at least 2W at the transmitter output. Such equipment immediately exceeds the proposed limit of -7 dBW EIRP and when combined with the directional antennas described will be more easily accommodated within the limit proposed by 4RF.

Since the rules set out a fixed term licensing arrangement, the EIRP limit can be reduced should it not be required but initial use of the band should not be discouraged by a small EIRP limit.

Of course, for effective planning the power the service is capable of should be stated on the licence, in point-to-multipoint applications the maximum EIRP of deployed remotes should be given. This will give RSM additional feedback on the use being made of the band.

Unless the EIRP limit is raised the economic benefit from the good range capability of the repurposed Band III spectrum will not be realised. Options for localised coverage already exist by means of the SRD GURL and commercial IoT offerings. Application in New Zealand for a distance capable IIoT band include electricity, water, geophysical and hydrological measurements in support of climate change initiatives, farming, and other general remote monitoring.

We hope that you will consider the proposed increase in EIRP favourably to ensure testbed success and to adequately gauge the demand for a permanent service allocation.

Yours faithfully

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