Fixed Services in New Zealand – Response to Discussion Document of January 2015

Prepared by

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Context

Spectrum Engineering Australia is an active participant in the preparation and lodging of applications for microwave licence in New Zealand under the rules of PIB 38. We are also actively involved with similar work in Australia under RALI FX3. We are therefore able to observe and comment on the relative merits (and shortcomings) of both regimes and to bring to this review a perspective that might not otherwise be available.

Furthermore, whilst we do licensing work for several organisations in New Zealand, our comments are not intended to promote the interests or concerns of any of these organisations in particular. Essentially these observations are our own. They are intended as a contribution to the overall improvement of the New Zealand licensing regime, hopefully for the benefit of all users.

Spectrum Congestion

Much of the material of Section 2 (and other parts) of the Discussion Documents relates to a perception of congestion in some parts of the fixed service spectrum, or at least it seeks measures to mitigate possible future congestion. "Congestion" is a difficult concept to quantify – perhaps it is generally best assessed by the "ease" with which a licensing solution can be found within the technical parameters that are initially sought. It is our observation that by this measure "congestion" in New Zealand is not significantly different than in Australia. Noting the population differences between the major urban centres of the two countries, and the fact that more channels are available for fixed service in New Zealand this does suggest (if our perceptions are correct) that the may be some scope for improved spectrum productivity through changes to some aspects of the PIB 38 licensing rules.

Responses to Specific Questions for Discussion

The following paragraphs relate to the numbered questions summarised in Section 4 of the Discussion Document. We have restricted our comments to those aspects that are of direct interest to our New Zealand work and experience. For example we have not addressed any aspects of the regulation below 1 GHz where we are not active.

#2.2 Spectral Efficiency

Obviously better spectral efficiency of equipment will drive improvements in spectrum utility, but this is likely to occur naturally as newer equipment replaces old. Perhaps it is unnecessary to mandate improvements in this regard, whether for existing or future services.

#2.3 Metropolitan site congestion

The essential problem here is the over-reliance on one or two key sites in the various cities. We do not think that any of the proposed measures will be particularly effective in resolving this problem, although the mandatory upgrading of any "legacy" antennas to the DMA standard (or even to the higher ETSI Grade 4 standard) might help.

#2.4 Interference Evaluation Methods and Criteria

This is perhaps the area of most significant difference between the New Zealand and the Australian management regime and it is perhaps the area with the greatest potential to improve spectrum productivity in the microwave bands.

A detailed description and comparison of the two approaches (the "noise floor" criteria under PIB 38 and the C/I criteria under RALI FX 3) was included in a document that we prepared for RSM in 2010.

In summary, "noise floor" is simpler to apply, but (logically) requires the limiting of eirp. This imposes an absolute upper limit on the performance of the link. However the designer may be permitted to specify higher link performance objectives (if justified) by increasing eirp, but this would be at the expense of further spectrum productivity. But this calls for (subjective) regulatory intervention on a case-by-case basis.

On the other hand the "C/I" approach limits all users to a nominal link performance "standard". But this "worst case" limit will only be experienced in the presence of a maximum interferer. In other situations a fortuitous improvement in the link performance will be available. C/I eliminates the need to regulate eirp.

Our experience with New Zealand co-ordination work has been that the "noise floor" criteria results in considerably more co-ordination failures than does the C/I approach. When we encounter "noise floor" failures with respect to our New Zealand client's own services we usually find that the client is willing to accept a lesser level of protection rather than having no solution available. This does suggest that the noise floor criterion might be unnecessarily conservative.

The application of "noise floor" under the current PIB 38 is not rigorous in that is does not require power limiting in the bands above 10 GHz. This was done initially to simplify the licensing process, in the expectation (at that time) that congestion would not be a problem in the higher bands. If this assumption is no longer seen to be valid then eirp limiting might need to need applied in all bands, and indeed this might need to be done retrospectively – at least in DMAs or at key sites.

In the event that a decision is taken to adopt a C/I criterion we recommend that the mechanics of the process be re-defined, rather than adopting the methods of RALI FX3 (i.e. the "path length correction factor" curves). Although the underlying principles remain sound the implementation was developed more than two decades ago and could be implemented more efficiently today.

#2.5 Adjacent Channel Criteria

The "default" adjacent channel criteria in PIB 38 were values "generalised" from RALI FX3 in the absence of anything better at the time. (If nothing else they are simple to understand and apply.) And indeed a rigorous development now of "better" values might be a major undertaking. RALI FX 3 does contain some recently updated criteria designed to accommodate the multiplicity of channel off-sets associated with various bandwidth combinations, particularly after the introduction of wideband channels to many plans. But the technical basis of the revised criteria is uncertain and it difficult to know whether adoption of these (RALI FX3) criteria would lead to any significant change in spectrum productivity. Having said that, it is important that the adjacent channel criteria that are eventually adopted are at least adequate to ensure unacceptable adjacent channel interference will not occur. To the extent that adjacent channel protection is excessive there will be a potential loss of productivity.

#2.8 Information on Licence Records

With a couple of exceptions we believe licence details are adequately recorded. Of course we have no way of knowing whether systems are always deployed in accordance with the licence details.

One exception relates to site details where often there are several different site records that purport to be the same site. PIB 38 contains some "rules" about site record creation, but it might be useful to have a more comprehensive instruction and guidance on this matter (a standard). Ideally then there should be a systematic review of all site records to bring them up to that standard – perhaps as a mandatory requirement for licence renewal.

We also note that there are a few situations where antenna information is missing. This does tend to waste re-use opportunities, and we suggest that the upgrade of these details should be a condition of licence renewal.

#2.9 Management Rights

It is our observation that maximum spectrum utility (for point-point services) will be achieved by maximising the sharing of all bands. Generally speaking no single licensee will have the ability to fully utilise any band in all situations.

The practice of allocating certain bands to certain users does simplify the management of those bands for the users in question – but at the cost of reduced overall utility. This is an approach that is often used in under-developed management regimes where the central spectrum manager does not have the resources to manage sharing. But this is not the situation in New Zealand where there is a well-managed regime supported by a comprehensive central database of licences, together with a devolved regime for assignment work by external AREs/ARCs.

We suggest that if Management Rights are contemplated for the management of point-point spectrum, such a model should require the Manager to provide equitable access to any/all potential users. In that scenario the Manager would simply stand in the shoes of RSM as a "commercial" band manager.

The Australian experience of Spectrum Licensing of point-point bands (the equivalent of issuing Management Rights) was that two bands (28 GHz and 31 GHz) that were "Spectrum Licensed" in the late 1990's remained largely unused for 15 years. The licensee's commercial plans for the use of

those bands collapsed and there was no secondary trading or sub-leasing arrangements put in place to utilise the spectrum. These bands have recently been reclaimed by the ACMA for point-to-point services under conventional apparatus licensing arrangements.

#2.10 Channel widths

The various arrangements for channel widths simply reflect many years of ITU compromise between plans of various Regions. Realistically these things will be set by equipment vendors and legitimised via ITU Recommendations. The difficulty of course is that there are multiple ITU-R recommendations for most bands.

We understand the desire to "rationalise" channel bandwidths at the national level and a preference for the European arrangements (7/14/28/56 MHz) would seem appropriate. However this would result in some transition difficulties as discussed in #3 below.

Certainly we recommend a review of the concept of "main" and "interleaved" channelling. Interleaved plans were relevant to analogue FDMFM systems of varying capacities, but these are no longer required. A recent review of RALI FX3 has removed the interleaved plans. Removal of the interleaved band may pose a problem for the Z band where there is significant use of both plans – with different plans being predominant in particular regions. Perhaps it would be necessary to have the interleaved channels re-assigned, to facilitate better band productivity across the country in the longer term.

#2.11 Band renaming

We would certainly support the transition to more meaningful designators for the bands, as seems to be the trend now for the higher microwave bands. The traditional letter designators are confusing – at least initially until one becomes familiar with the system.

#3 Band Specific Proposals

We do not intend to comment in detail on the various band specific proposals but rather to make some general comments.

Transition to consistent channel widths

Transitioning to consistent channel width arrangements (e.g. the14/28/56 MHz arrangement) will result in spectrum inefficiencies in the transition period. Generally one new channel will overlap one or more existing channels (and vice versa) because of the differing centre frequencies and bandwidths, and the problem will be further exacerbated if the transition also requires a change of the "go-return" separation. Thus one existing licence could inhibit the use of several new channels in a particular co-ordination scenario. This situation will continue whilst ever services are permitted to remain licensed on the "old" channels. It is difficult to quantify the loss of productivity that might result in the transition period, but it could be significant. (We have experienced a similar phenomenon in re-channelling the land mobile services in the 400 MHz band in Australia – though admittedly the co-ordination criteria for the two service types are quite different.) The loss of spectrum productivity could be minimised by requiring "old" services to be relicensed over a short time period – but the cost and practicality of such a regulatory impost would need to be weighed up against the potential benefit.

Ultimately the question needs to be asked as to whether there is any real benefit in transitioning to a consistent channel raster (better/cheaper equipment options, or other benefits) or whether a consistent channel raster is merely a "nicety". Certainly if a consistent raster is seen to have real benefits there will probably be no better time to implement it than the present if we expect the total number of links on licence to continue to rise.

Wideband channels

Some wideband channels (typically 56 MHz) have been introduced to both the Australian and New Zealand channel plans in recent years, generally at the behest of licensees. We see this development as being appropriate generally, but we also suggest some caution is needed in the planning.

If the equipment cost differential between say a 28 MHz capable radio and a 56 MHz capable radio in not great, and if the licence fee cost differential is no great there is little disincentive for a licensee to take out a wideband channel where a narrowband channel might suffice. Indeed the wideband radio provides a low cost upgrade option, whether or not that upgrade will ever be required. The net effect could be a greater demand on the spectrum than might otherwise exist and this could lead to congestion in some situations. Moreover limiting the use of wideband channels to systems by setting minimum throughput requirements would not seem to be a practical control mechanism. How does one determine the actual throughput requirement of the situation, as opposed to the throughput capability of the equipment?

Without wanting to restrict unduly the availability of wideband channels, perhaps there need to be some rationalisation of the bands in which they are made available. Perhaps those bands with only a small total bandwidth should not accommodate wideband channels, but rather be retained for smaller capacity systems.

A further consideration in the planning for wideband channels is the reduced frequency separation that will exist across the mid-band gap, i.e. between the top edge of the top channel of the lower sub-band and the bottom edge of the bottom channel of the upper sub-band. This separation needs to be sufficient to support the co-sited use of both channels, because the co-ordination process will need to rely on that assumption.

Co-ordination with satellite services

Generally fixed terrestrial and fixed satellite services can co-exist efficiently within the same band – providing the parameters of the earth station that are needed for the inter-service coordination are adequately and reliably recorded in the database. The NZ records are generally quite good in this regard but inadequate records can result in the loss of considerable spectrum re-use opportunity.

The situation is a more problematic of course where the use of the band by ubiquitous uncoordinated VSATs is contemplated. In Australia only half the 18 GHz band has been made available for fixed services to date – the lower half having been "reserved" for future alternative (satellite) uses ever since the band was first opened up.

Single user or single purpose bands

For the reasons outlined in our comments above re “Management Rights” we generally do not support the retention of bands (or sub-bands) for use by single users or for specific purposes (e.g. “n+1” applications). Such arrangements may be formalised in the regulations or they may be informal arrangements that have persisted from earlier times to simplify coordination procedures prior to the availability of published licensing data and the greater opportunity for co-ordinated band sharing.

That said we see no disadvantage in retaining some “preferred” arrangements for major users, including equipment sub-band preferences for certain users in certain bands. However such arrangements should not confer rights but rather simply guide assignment priorities where options exist.

H Band (10.5 GHz)

This band came into use in Australia some 30 years ago principally to accommodate the product of an Australian radio manufacturer. But because the Australian band does not use the spectrum between 10.50 and 10.55 GHz the “go-return” separation of the Australian plan does not conform to Recommendation F.747.

The band was well used in Australia for many years but it seems to have been less used in recent times – though we have not actually sought licensing statistics to support this observation. In any event it would be wise to ascertain the current equipment supply situation before adopting the “non-standard” Australian plan. An alternative might be to retain the Recommendation F.747 raster and adopt a 7/14 MHz channel arrangement.