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ARCIA Spectrum & Technical Committee
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The Manager
Spectrum Outlook and Review Section
Infrastructure Regulation Branch
Australian Communications and Media Authority
PO Box 78
Belconnen ACT 2616

Subject: Item proposed for Five Year Spectrum Outlook Plan –
Managing deployment of Bi-Directional Amplifiers

Our Association has some concerns with the growing use of Bi-Directional Amplifiers (BDA's) in Australia and the apparent lack of enforced policy or supply regulations with regard to the same. We note with concern the present enquiries being handled by the FCC and the general feeling that in the USA it may be a case of now 'trying to put the genie back in the bottle'.

Although BDA's have been permitted in Australia for quite some time in below ground applications via the LIPD class licence, there have been fairly restrictive covenants on the applications permitted above ground and the units were pretty much a channelised device (Class A in the FCC parlance) being licensed and registered as a base station or supplementary base in down link and considered as an RF control (non-coordinated) in uplink applications. The applicable ACMA document is LM6 (which only covers LMRS services in the frequency range 29 to 520MHz) and the no protection non-interference licence condition is at http://www.acma.gov.au/WEB/STANDARD/pc=PC_1276#bidirectional

It would now appear that with the advent of spectrum licencing and multi-channelled systems such as Tetra there could be applications wishing to use 'Broad-band devices' (Class B in the FCC Parlance). Whilst we can see obvious benefits to the users with the increased coverage gained from BDA's, especially in contained areas like tunnels or basement car park areas, we have serious concerns that any Class B type units that are utilised in open areas could potentially re-radiate other 'out of service' frequencies with potentially serious effects on adjacent services.

Some of these devices have filtering which limits their bandwidth to a block of spectrum but they still modify the noise floor, retransmit adjacent licensed services and have a high potential to generate inter-modulation. However their reduced performance compared to properly engineered alternatives means that they are also much less expensive making them attractive to uneducated suppliers wanting a quick solution. This especially applies to consultants or other similar operators who may be simply doing a 'cut and paste' from the FCC environment or building code specifications. The unregulated and increased use of such broadband devices would seem to be a particularly retrograde step when we are obviously on the cusp of realising a new generation of devices which deal with these applications without broadband noise and the inherent degradation.



Geographical considerations

We certainly recognise the valid case put for the permitted use of these Class B devices for systems such as Tetra networks at remote mine sites where there are few other services and interference problems can be mitigated through judicious frequency allocation and equipment positioning.

However, when the same equipment is employed in High Density (HD) areas or Medium Density (MD) areas then such approaches are not as readily available and so use of the BDA's could result in denial of service for legitimate licenced operators in that local area.

Spectrum licensed services. (Contiguous Spectrum)

At present there is a tendency for the cellular operators to place BDA's inside many large buildings in HD areas to provide sufficient 'in-building coverage' for their end users, which is quite legitimate for holders of spectrum licences operating within their contiguous spectrum and the terms of their licence.

This application, when implemented by the carriers, using suitably qualified and designed products which are warranted to prevent "out of band" radiation of adjacent services is, on the whole, well managed. However, as has been the case in the USA and other markets, the proliferation of BDA manufacturers, offering product which does not necessarily safeguard either the cellular or adjacent spectrum has led to an alarming number of interference reports in cellular, private and public safety networks. These devices, which are legal for sale but illegal in application (a similar situation to the environment we operate under in Australia) sees unregistered, unrecognised use of uncontrolled devices in an ever more congested spectrum environment.

The rights of the larger body of spectrum holders to the use of either single channels or bands of spectrum, whatever their licence terms may be, must come ahead of the rights of individuals seeking to provide enhanced coverage.

As more of this type of product comes to market the interests of all licensed spectrum holders (be they small network operators or users, or the carriers) is not being guarded, with regular events where these interfering devices must be located and disabled, at considerable cost and effort to the carriers. Further, even in-band devices, when used by one carrier have been known to commonly interfere with the rights of a second, adjacent carrier and as the "neutral hosting" model is likely to emerge as an even more important method of reticulation of two-way radio and cellular signals within buildings, this issue is likely to become even more exacerbated moving forward.

Apparatus licensed services.

As our Association is primarily concerned with the Land Mobile Radio (LMR) segments of the spectrum, it is more within those bands that we have concerns and these are mainly in two areas –

- Class B devices for multi-channel systems such as Tetra
- Applications in HD & MD coverage areas where the limited knowledge of the historical covenants is either not known or is being deliberately 'extended' beyond the initial intents to meet a supposed 'user need' and that the lack of clear regulations and enforcement is allowing this to continue.

1. The use of Class B devices.

With the expansion of many of the multi-channel radio systems such as Tetra and other of the digital systems (even localised Radio Common Carrier systems) especially in the United States of America, there has been a product development of Class B devices to provide an extension of network coverage footprints. In the USA this has become quite common with many of the building codes there requiring that radio coverage for the Emergency Service Organisations (ESO's) being mandated to in-building level with full coverage.

This 'Statutory' requirement has resulted in a range of BDA's at a lower price with reduced specifications to meet the market need, and has resulted in many instances of higher levels of interference in adjacent channel operations and even in poorly designed systems with RF feedback into the system required, potentially resulting in a degradation or denial of service at the very time when such services availability is paramount (i.e. during congested use of such services during a public safety incident), hence the FCC inquiry to look into the situation.

Our Association believes that here in Australia there are presently radio systems in some areas that are using the same devices to provide extended coverage for some of the Tetra radio systems in remote areas. This is a matter of some concern as we see this eventually leading to the same devices being employed in radio systems in MD and HD areas- if this has not already occurred

2. Applications in HD and MD areas.

Historically the guidelines for the use of BDA's in HD and MD areas were that they were not a preferred solution but could be used in situations where the re-radiation area was totally enclosed, such as an underground mine or basement car park. There are also limits to the power levels involved and the 'uplink' should replicate the power levels and radiation of a standard fixed control radio operating on the network and the radiation from the 'below ground' network must not be measurable outside the contained area.

Again, our Association believes that there are instances of an equipment supplier installing BDA's in 'above ground' applications on the basis of 'well, they are used in other systems so why not?' At this stage we would believe that most of these applications are most likely "FCC Class A" (channelised) devices, however, without better guidelines and regulations we are concerned that "FCC Class B" (broadband) devices will also become used in this manner.

3. Against the back-drop of usage patterns the reality is that the latest generation of channelised or "FCC Class A" devices are developing with significantly improved flexibility. It seems it will be only a short time before we will see such devices providing single or multiple channel pass characteristics to meet Tetra, P25 and other pass requirements without needing to open the door to the relatively crude "FCC Class B" (or broadband) style products which have been little more than high power amplifiers with customised filtering arrangements. At the precise time when such devices are about to be made redundant would seem to be the very worst time to allow such threatening devices to pervade into wider applications.

Our Association would respectfully submit that the usage of BDA's should be subject to some better enquiry from ACMA and that policy and guidelines be developed properly to cover the use of these devices in the Australian frequency environment. It is worth noting that LM6 which is the general guideline for these types of units, was commissioned in 1996 when the expansion of present cellular systems could not be foreseen and that changes in spectrum policy and usage are now dramatically different to that time. This alone should reinforce the need to re-consider this subject.



Given the present enquiry by the FCC there is a good body of information available and this would lead to policy development ahead of any serious problems becoming evident and lead to a better outcome for our spectrum in general. The FCC enquiry is known as Docket 10-4 and is an enquiry into the use of signal boosters and signal amplifiers; we would suggest that the submissions to that enquiry show the level of interest in that market and such a level of interest will eventually lead to availability of products in the Australian market.

We look forward to the inclusion of this matter in the Five Year Spectrum Outlook plans and subsequently working with the ACMA in this important area.

Yours sincerely,
Australian Radio Communications Industry Association,

A handwritten signature in black ink, reading 'Ian Miller'. The signature is written in a cursive style and is placed on a light pink rectangular background.

Ian Miller – Convenor – Spectrum & Technical Committee