

**Australian National 4WD Radio Network Inc.**



Australian Communications Authority

**The Management of Interference from  
Broadband over Power Line Applications**

Submission from the  
**Australian National 4WD Radio Network Inc.**  
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All Gifts of \$2.00 or more to the Network are allowable tax deductions to the donor under  
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## Introduction

The Australian National 4WD Radio Network Inc. welcomes the opportunity to contribute to the Australian Communication Authority's inquiry into the Management of Interference from Broadband over Power Line Applications.

As one of the largest users of HF in Australia (in excess of 5,500 mobile users) the Australian National 4WD Radio Network Inc. is very mindful that Broadband over Power Line (BPL) technology has the potential to cause major disruption to the existing 24 hours a day, 7 days a week Emergency Communication Services that the Australian National 4WD Radio Network Inc. provides to many thousands of travellers in the Outback, on our highways as well as to many vessels at sea and aircraft that regularly use the Network's services.

The Australian National 4WD Radio Network Inc., through its operating division the VKS-737 Radio Network, operates a Land Mobile Service under the callsign of VKS-737 with ten Transmit / Receive Base Stations and several Receive Only Base Stations around Australia. These Base Stations are located in many cases close to built up areas, and in most cases supplied with electricity from the power grid.

These sites were chosen to give good operational distances from the areas that we are servicing, and in all cases were chosen to give the lowest possible background noise level while still being cost effective in terms of site and telephone rentals etc (as a Public Benevolent Institution with no government funding it is essential that the Network maintains its operating costs below the amount of income we receive in the form of donations from the members of the public each year).

A major concern of the Australian National 4WD Radio Network Inc. is that under ACA's guidelines for BPL trials the organisation running the trial must prior to the trial contact all HF users located within 1km of the test site (as determined from the ACA Register of Radiocommunications Licences), unfortunately the ACA Register only lists the 10 sites that we have radio transmitters and receivers located, not the sites that we have remote receivers only.

This situation is not unique to the VKS-737 Radio Network, many other emergency bodies such as the Royal Flying Doctor Service, Police, SES etc also remotely locate their receivers not only to give lower noise reception or provide for diversity reception, but also to ensure that transmitters on one frequency do not cause breakthrough / de-sensing / cross-modulation etc to receivers on other frequencies.

It is therefore essential that the BPL operators be required to contact HF users over a much greater distance than the present requirement of 1km; in fact where a network provides national coverage as in the case of the Australian National 4WD Radio Network, the BPL operators should be made to contact the HF users regardless of the distance.

Signals received at the base stations vary considerably in strength, in many cases they are only a few decibels above the System Noise Floor, on many occasions variations in received signal strengths during a conversation quite often result in parts of the conversation being lost requiring information to be retransmitted by the mobile user, or the information has to be relayed by another mobile user.

Any significant increase in the System Noise Floor due to the implementation of BPL may mean that these weak signals will become unreadable with the potential loss of life should communication be lost between the base station and mobile users in an emergency situation.

Trials monitored by the Office of Communications in the United Kingdom (which uses a power distribution system very similar to Australia with long unbalanced runs with the neutral grounded at each establishment and power distribution pole) have shown that the levels of interference from BPL is up to 40db above the System Noise Floor at a distance of 100 metres and even if a 20db notch was introduced on frequencies used by VKS-737 the increase in the System Noise Floor would still result in the loss of the majority of signals being received if a base station was located nearby to a BPL site.

The “real world” situation would be worse than the “trial” situation as a working system would have multiple repeaters each injecting carriers into the cable, a base station could easily be within range of many repeater injection points.

Notching of the frequencies used by the Australian National 4WD Radio Network Inc. would help reduce the problem, but if the BPL operators had to notch out all of the frequencies currently in use within Australia it would leave very little bandwidth for the BPL system to operate on, and since the speed and capacity of a BPL system relies on very wide bandwidth then the viability of the system would be greatly jeopardised.

Signals received by mobile users in the outback are usually of a similar strength to those received at base stations, however due to a lower System Noise Floor in remote areas it is generally easier for mobile users to receive signals than base stations. Should BPL be implemented it is to be expected that the System Noise Floor will be increased in remote areas due to propagation through the atmosphere (a fact that has been noticeably overlooked in most BPL trials where the “*proof*” is that there is little increase in System Noise Floor at distances greater than 1km from a single point source of BPL injection).

Power lines are a very inefficient medium for the transmission of HF radio signals, their high level of loss means that repeaters will be required at distances of around every 500 metres, each of these repeater injection points will result in radiation into the atmosphere and propagation into remote areas. The cumulative effect of each of these injection points will be a noticeable increase in the System Noise Floor in areas remote from the BPL services.

It should be noted that many VKS-737 Network members are using low power radios (i.e. Codan 6924's running around 20 watts pep, Q-Mac HF 90's being used as man-packs with the power reduced down to as low as 10 watts) yet they are capable of providing reliable communications over distances of 2000km to 3000km. Therefore one can only surmise that signals from multiple BPL injection points will travel equally as well over similar distances.

If the increase in System Noise Floor results in an Emergency Signal being lost resulting in the loss of life, who will be held responsible?

How would a Coroner's Inquiry view such a serious matter of this nature and where, and upon whom, would the blame be placed, particularly in view that Section 194 of the Radiocommunications Act No. 174 of 1992 clearly indicates that it is an offence to interfere with, or cause disruption to communication which is likely to endanger the safety of another person or to cause another person to suffer or incur substantial loss or damage?

Similarly if emergency communications are disrupted in the case of a bushfire, an earthquake, a cyclone or a tsunami resulting in loss of property how would this be treated in a Coroner's Inquiry? How many times in recent history has HF been the only workable form of communications in a disaster?

Another aspect that seems to have been largely overlooked by the BPL providers is that power lines make very "efficient" antennas resulting in the radiation of signals which cause interference to users of HF radio systems. In doing so they also make very good receive antennas i.e. they also pick up HF radio signals from nearby radio transmitters which can cause major disruption to the data being transmitted along the cables.

Trials overseas have shown that HF signals as low as 4 watts (pX) can disable a BPL signal. The Australian National 4WD Radio Network Inc. has around 5,500 licensed mobile users, the majority using 100 watt (pX) radios.

During the peak of the travelling season the Australian National 4WD Radio Network Inc. Base Stations handle around 450 calls per day, there are also many hundreds of vehicle to vehicle calls each day, many of these calls are from mobiles who are travelling in built up areas adjacent to power lines, or travelling along regional roads adjacent to power lines.

With such a large number of users the potential for disruption to BPL services is very high and as such how are BPL providers going to explain the loss of services to their customers from legally licensed users operating their radios within the conditions of their licences.

A similar situation will probably apply with Amateur Radio Operators; again we believe that there are around 16,000 such operators in Australia many of who are operating at the legal limit of 400 watts (pX) and a greater number operating commercial type 100 watt (pX) radios.

What will be the situation if BPL providers find their services disrupted by the legal operation of HF services?

- Will they complain to ACA and request that the licensed users be made to stop their operations?
- Will ACA move (by amendment to the Radiocommunications Act) to place restrictions on existing and new HF user licences?
- Will the ACA be forced to amend the Radiocommunications Act and issue radiocommunication licences to the BPL service providers and give them protection from other users by allocating them Primary status, and downgrade HF users to secondary status on their allocated frequencies?

How will the BPL suppliers handle complaints from their customers when customers find out that the suppliers were aware that they probably would suffer disruptions from licensed HF users? Would BPL customers be able to take action against the BPL suppliers under Section 71 and Section 74A of the Trade Practices Act 1974 which states that goods and services supplied by a corporation must be of merchantable quality? Surely knowing that a service is very likely to suffer disruption from HF radio signals would make it of non-merchantable quality.

### **Standards & Regulations:**

It is the opinion of the Australian National 4WD Radio Network Inc. that the introduction of BPL technology into Australia should be allowed however it is essential that regulatory safeguards be put into place to ensure that users of other services are not disadvantaged by the new technology. Australia relies very heavily on HF communications for commercial services, emergency services, remote area broadcasting etc. and any interference which degrades the reception of HF signals needs to be considered very seriously especially in emergency situations.

The cost of the interference on the community needs to be very closely looked at, on page 19 of the ACA Discussion Paper on the introduction of BPL the comment is made "***The cost of interference will vary depending on where the BPL system is located and what other communications services are in the area. For example, if BPL affected a television channel or a defence security system then the cost to the community of the interference could be significant. If it affected one household cordless telephone or one amateur radio operator then the cost to the community might be small.***"

This comment shows the blinkered view of authorities when it comes to looking at community needs, upsetting a TV channel could have a serious impact (many voters may show their objection to losing television reception by voting against the government at the next election, or alternatively the owner of the TV station, or one or more commercial advertisers might stop giving financial donations to the government of the day), similarly disrupting a defence installation could have major implications particularly at times of war or political unrest whether it be in Australia or overseas.

But what about the owner of that “**one cordless telephone**”; the owner may well be a bed-ridden pensioner whose only means of communication in the case of an emergency or life threatening illness is by that telephone. If that person should die due to the lack of service caused by BPL the impact to the government would only be small, but what about the impact on that person’s family etc?

How would a Coroner’s Inquiry view the situation should it be proved that the death occurred due to that person being unable to call for assistance because their cordless telephone was being interfered with by a nearby BPL service?

As for that “**one amateur radio operator**”; how many times have there been emergencies in this country and overseas where the only means of communication was by amateur radio operators using HF.

The Australian Government was totally oblivious to the fact that Cyclone Tracy destroyed Darwin in 1974 until amateur radio operators set up emergency communications. After the event the Australian Government was totally ill-equipped to quickly replace the communications equipment that had been lost, and for a very long time the only communication services were provided, on a no cost voluntary basis, by amateur radio operators.

Again the recent tsunami in the Indian Ocean proved that HF communications by amateur radio operators was the only form of viable communications after the disaster occurred.

What would have happened if the amateur radio operators could not pass the information about these disasters because of BPL interference? Next time there is another emergency needing the assistance of amateur radio operators will the operators of the BPL systems switch off their services for as long as is needed to allow normal communications to be re-established in the disaster area?

It is essential that the governments do not try and classify some spectrum users as being less important than others (it should also be remembered that the “less important” users still pay the same licence fees as the “more important” users); the rights of all spectrum users must be respected and protected from harmful interference.

Having investigated the methods used overseas in the setting of conditions for the implementation of BPL it is our opinion that the approach by the FCC in the USA would be detrimental to all users of HF in Australia (to the point that many HF services would become unusable) whereas methods used in the European Parliament appear to give the best protection for radio spectrum users.

European Parliament Directive 2004/108/EC gives very detailed conditions to prevent interference from BPL including:

*(2) Member States are responsible for ensuring that radio-communications, including radio broadcast reception and the amateur radio service operating in accordance with International Telecommunications Union (ITU), electrical supply networks and telecommunications networks, as well as equipment connected thereto, are protected against electromagnetic disturbance.*

*(Annex I)*

*Protection requirements*

*Equipment shall be designed and manufactured, having regards to the state of the art, as to ensure that:*

- (a) the electromagnetic disturbance generated does not exceed the level above which radio and telecommunications equipment or other equipment cannot operate as intended;*
- (b) it has a level of immunity to the electromagnetic disturbance to be expected in its intended use which allows it to operate without unacceptable degradation of its intended use.*

At the present time the European Parliament has still to formalise its emission standards but it is interesting to note that many European countries are in favour of adopting the German NB 30 Standard which sets emission levels at approximately 40 dB below the existing FCC Part 15 levels, Norway however is recommending a level of nearly 20dB below the NB30 Standard (60dB below FCC Part 15) and both NATO and the BBC are proposing a standard nearly 80dB below FCC Part 15. It would appear that Austria has decided to terminate BPL trials due to unresolvable interference problems.

Should Australia adopt the emission standards set down in FCC Part 15 then one would assume that HF interference would be a very major problem, should we adopt a standards such as NB30 (or better still the standards proposed by NATO and the BBC) then the problem would still exist but, would be at significantly lower level.

The National Telecommunications and Information Administration (an agency of the U.S. Department of Commerce) has recently conducted a study of the FCC approval of BPL into the United States and looks at the impact that has already occurred on communications in that country, the report shows many problems which were not addressed by the FCC including the fact that BPL does travel by sky waves and that emission from multiple BPL injection points and adjacent multiple BPL services may aggregate via both ground and sky wave to increase the interference level both locally and at long distances from the BPL services.

While it is essential that Australia adopts Standards for BPL emissions it is essential that these standards are backed by Regulations to ensure that the BPL Service Providers comply with the standards, and where the Standards are not met there be provision to terminate the operation of any non-complying service.

There also needs to be provision that should interference be found to be occurring to a licensed Radiocommunications service then the BPL Service be terminated until the problem can be rectified. Practical cases in the US have found that the recipients of interference (primarily amateur radio operators) have had major problems dealing with the BPL Service Providers who are reluctant to reduce their service levels to eliminate the interference problem.

Should interference be found to be occurring to an emergency service it is not desirable for the problem to take weeks or probably months to resolve, the safety and welfare of the users of the Radiocommunications service need to take priority over the financial needs of the BPL Service Providers.

As we have stated earlier, Australia is fairly unique in that due to its geographic size it relies very heavily on HF communications and while some services could be possibly replaced by satellite telephone technology one has to look at the cost factors and social implications associated with this form of technology. HF provides the ability to deal with a base station operator who knows the area where travellers are located and the resources available in that area, HF also allows direct communications with other users who may be in a specific location who may be able to provide assistance in an emergency.

On the other hand Broadband Internet does not rely on only one medium for delivery to customers, advancing technology has seen the introduction many new mediums such as WiFi and WiMax which are far more efficient and suitable than using powerlines, without the problems of interference to other services and without the problems than can occur to the service from external sources of interference such as HF radio transmissions, unsuppressed electric motors in power tools & home appliances, arc welding equipment etc.

It is the opinion of the Australian National 4WD Radio Network Inc. that the introduction of BPL technology into Australia should be allowed however it is essential that regulatory safeguards be put into place to ensure that users of other services are not disadvantaged by the new technology.

Signed for and on behalf of the  
Committee of Management of the Australian National 4WD Radio Network Inc.



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