

I N N O V A T I O N S

A SERIES OF ARTICLES WHICH EXPLORES SOME OF THE COMPLEXITIES OF EMERGING TECHNOLOGIES

THE EFFECT OF URBAN DEVELOPMENT ON RECEPTION OF TELEVISION AND RADIO SERVICES

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Increasingly, people find their reception of television and radio services is not as good now as it used to be. Or, in some cases, soon after buying a block of land and building their dream home, new owners move in and find they can't get good television or radio reception, or worse still, they can't pick up television or radio at all!

Why, in this day and age, is this so? What can be done about it? Who should fix the problem?

This article attempts to explain what is happening. If you can solve the problem, the author would be happy to receive comments.

AM RADIO SERVICES

There are many causes of interference. For AM radio, which has been around since the 1920s and is a well-developed technology, the problem is one of the urban sprawl with the accompanying, and increasing effect of 'electrical noise'. Unfortunately, the laws of physics don't help; the noise generated by industry and machines has its most significant detrimental effect on AM radio.

Electrical noise is caused by a host of things we now consider to be everyday common necessities, from fluorescent lights to fridge motors, ignition noise from cars and trucks with spark plugs, to electric razors, hair dryers, sewing machines, electric power drills and heating and air-conditioning systems in office buildings and in the home.

The ubiquitous home computer is a major source of electrical noise, not just affecting AM radio, but also television reception, as most of us have discovered. Take any portable radio, tune it

to AM and hold it close to your computer and note the effect on the radio. Move the radio away - it takes some distance to get away from the noise generated by the computer. You will often get a similar result with the noise generated from a television set too.

In the past, these sources of electrical noise were far fewer and their effect on AM radio was imperceptible. From about the 1950s, the average suburban home used more of these systems and tools, leading to increased generation of electrical noise. In some larger cities, the operation of electric trains, trams and buses increased the noise levels within those cities. Adding to these effects is urban sprawl. As homes are built further from the main broadcasting transmitters, the received signal is weaker and the effect of general electrical noise in the area more marked.

A lot has been done by television and radio receiver manufacturers and by the makers of equipment that uses electricity and generates electrical noise, to reduce, or suppress, the generation of man-made electrical noise. For instance, all cars sold for the past 35 or 40 years have had suppressors fitted as a standard item. This is mainly to remove interference to the car radio, but it also helps in homes close to busy streets. In industry, similar suppression is used on machinery. But there is a practical limit to reduction and suppression.

For the AM listener, about all you can do is make sure you have an adequate antenna (these are built-in these days). There is not much more you can practically do, except make



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sure your radio is not next to a source of interference.

From the AM broadcaster's point of view, there are a couple of options. One is to increase the transmitted power. Another is to install local translators, often low power FM. Both are quite expensive solutions to the problem, but are practically the only way to fix it.

With industry, the ABA is looking at ways of overcoming the problems caused by noise in cities and large towns.

One possible solution is to allow AM services to operate on higher power during the day, and lower power at night. This is called power switching. AM stations are limited in their range during daylight hours, but at night they can be heard over much greater distances. This is as a result of changes in atmospheric conditions which allow AM signals to bounce off the ionosphere at night. This enables a signal to be received at great distances from the transmitter, sometimes over a thousand kilometres away after two or more bounces. Planning for AM has to recognise, this so transmitted powers are

limited to minimise potential long range interference problems. However, this power reduction also affects the day time range of the AM station.

It is common to employ techniques which tailor the direction in which an AM radio signal is radiated to minimise interference to another distant station on the same frequency. Consideration is also being given to using a technique which changes the direction of the transmitting antenna system at night time. This is known as pattern switching. However, pattern switching is very expensive for broadcasters as it requires more land and more complex multiple towers for the AM transmitting antenna system.

These are well known techniques which have been tried in North America and, briefly, in Australia in the past. While the results are good in theory, the techniques have not always proven to be so in practice. But, in some circumstances power or pattern switching may prove to be acceptable, hence the ABA, with industry co-operation, is reconsidering use of these techniques.

TELEVISION AND FM RADIO

Because VHF television and FM radio signals use similar frequency bands, they share the same transmission characteristics and are susceptible to the same types of interference. Therefore, you should be able to fix problems with FM reception using the same techniques as I am about to suggest to assist you to fix your television problems.

ELECTRICAL NOISE

The effect of electrical noise on FM radio and television is not always as dramatic as it is with AM radio. The lower VHF television channels, typically channels 0 through to 2 and, in some places VHF channel 3 (where it is still used for television), may suffer from the effects of electrical noise. The interference is seen as white flecks and streaks on the screen. Sometimes in fringe areas, where the television signal is weak, interference is so bad it appears as snow and the television is un-



watchable.

Generally, this problem can be overcome by using a good quality receiving antenna and, if necessary, using a piece of equipment called a mast head amplifier. Special attention should be paid to the location of the receiving antenna.

Care needs to be taken when choosing a mast head amplifier to make sure it is not susceptible to other signals in the area, such as local FM radio transmitters or two-way radio systems used by the local council or emergency services. Unwanted signals can usually be removed by filtering the input to the mast head amplifier or by using a mast head amplifier which is not sensitive to unwanted signals.

URBAN DEVELOPMENT

An increasingly more common interference problem is deterioration of television reception due to urban development. This is most common in urban areas where high rise development is taking place. A large building between your home and the television transmitters may be the cause of your television reception problems. The new development can actually be shielding you from the television signals you want to receive.

The effect of high rise development is most noticeable in capital and re-

gional cities. Apart from not allowing urban development, there are usually only two ways to fix the problem. One is to install translators that will relay the original television transmissions to affected receiving areas. The other is to capture a good signal from a point nearby and to provide that signal to the affected area by cable.

Both techniques are already used widely. The difficulty with using translators is that there are only a limited number of channels available, and when they are all used and re-used in an area, any further use will cause interference to others. Once that stage has been reached, the only alternative is install a cable distribution system.

The thorny question is, 'who pays?'

Generally, where a city or town has expanded and the lack of television or FM services is in newly developed areas, it would be reasonable to expect broadcasters to consider the benefits they would get from installing translators or cable systems. The benefits are twofold - the new community gains services and broadcasters gain access to the increased population. In most cases, existing television services were installed 30 or more years ago, so the need for translators under these cir-

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circumstances is a natural consequence of urban development, as long as frequencies can be found for them.

A more difficult problem arises where development leads to loss of quality in services. Who should pay in this case?

Already there have been cases where the developer has paid for facilities to restore lost reception. In other cases the local council has provided facilities to restore services and in other cases the affected community has provided and paid for the necessary facilities. There is no hard and fast rule; common sense prevails.

Usually, the area affected is quite small and it is practical to install a cable system, with the receiving antenna on a nearby high point. In cases where the effect is more general, due to large scale development, translators might be a better solution. Provision of, and payment for, those facilities might be agreed among all affected broadcasters, including the Government with respect to ABC and SBS services.

The ABA has tried, with assistance from local government and councils, to develop an acceptable procedure to ensure that viewers and listeners who lose their services because of urban development can have them restored. So far, no solution has been found which might be acceptable to all parties concerned.

In one or two local government areas, the local authorities considered applying a small levy on all property developers. This would create a fund from which to pay for the broadcasting facilities necessary to restore lost reception as a result of urban development. But the imposition of a general levy is seen by many as iniquitous because some developments do not spoil television and radio reception. It may be a single developer, responsible for just one large development, who causes the reception problems. Those that have not caused problems do not consider that they should have to pay for what they see as someone else's problem.

Local planning authorities are becoming quite concerned about the effect of urban and suburban development on reception of broadcasting serv-

ices. Only now are people beginning to think of their access to all of the broadcasting services in an area as part of their essential services. Clear television and radio reception is just like water, electricity, the telephone and gas, and kerbing and guttering. Broadcasting services form an essential part of everyone's lives and any lack of access to them is a matter of concern to those affected.

Developers of new residential suburbs, or planners of high rise developments should perhaps think about the impact of their projects on the lifestyles of those people whose reception of broadcasting services may be affected by the development.

The thorny question is, 'who pays?'

One way to do this is to consider whether adequate television and radio reception was available in an area before the development started, and what quality of reception is available after its completion. To do this, a developer would take measurements at representative receiving sites before the de-

velopment started and again, at those same sites, after the development was finished. If a problem has arisen, then developers should negotiate with the community, the council, and possibly the broadcasters, to see what can be done to fix the problem.

Before developing new suburbs it would seem logical for property developers to discuss with broadcasters the possibility of additional facilities to provide a service in the area. That way, property buyers could be advised about the availability of broadcasting services in that area.

THE ABA'S PLANNING PROCESS

As part of its planning for broadcasting services throughout Australia, the ABA is seeking to identify areas where reception is inadequate. It will then plan for the provision of facilities to improve reception where this is practical. This article might help you to focus on issues you think we need to know about when we do come to your area and ask, 'what do you think about the broadcasting services in your area?'

BOOKLET ON RADIO AND TELEVISION RECEPTION

A helpful booklet on radio and television reception was published by the Department of Transport and Communications in 1990, it is called, *Better Television and Radio Reception Your Self Help Guide* and is available from offices of the Spectrum Management Agency throughout Australia.



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Once the ABA has sought public input, it will draft a licence area plan (LAP). This will set out the number and characteristics of existing services and vacant channels in an area. The ABA will inform the Minister for Communications and the Arts of the expressed public demand for community and national services and the Minister may reserve channels for these purposes.

There are at least three unassigned Melbourne-wide FM radio frequencies

which are likely to be available for permanent licences after planning is completed.

If the Minister reserves a channel or channels for community radio and there are more aspirant groups than reserved channels, the ABA will conduct a public inquiry to select the service which would be best for the community. That decision will be taken on the basis of the application, the demand for the service and the manner in which the applicant has acted during its temporary broadcasts.

