Radio Planning in Australia

In December 2001, the Australian Broadcasting Authority completed a radio planning exercise that commenced with its creation in 1992. With the objective of increasing the number and diversity of radio services available to Australians, the ABA engaged in a comprehensive program to re-plan radio broadcasting services throughout Australia. The ABA's response to public and industry demand has resulted in a massive expansion of the radio sector and also a greater choice of listening. Over the nine years, the ABA planned nearly fifteen hundred radio transmitters for new and existing services. This resulted in nearly one thousand new national, commercial, community and narrowcast services becoming available throughout Australia.

This document shows statistically the outputs of the planning process. However, it must be remembered that behind the numbers is an enviable quality and range of broadcasting services now offered to all levels of the community. The ABA considers that it has always been important to achieve a sustainable balance of types of services at each location. Nevertheless, the huge growth in the number of transmitters reflects the tremendous increase in coverage and availability of both new and existing services to Australians.

The planning exercise that began in 1992 did not end with the completion of the last prioritised group of licence area plans or ‘LAPs’ in December 2001. Even by that date, the ABA had already varied many plans: adding to, or changing the specifications for radio services. Radio planning is ongoing, as the ABA responds to the shifting demands of Australia’s changing and evolving communities, the business needs of broadcasters and new initiatives to improve the availability of services.

The possibilities for digital radio in Australia remain on the horizon. Despite its long gestation and the fact that Australia has not yet chosen a system for digital radio, the growth of digital radio technologies elsewhere in the world suggests that the planning of spectrum for digital radio services is not too far away. However, the ABA assumes that AM and FM services will remain the most important media for radio services for some time to come. Once digital radio is introduced, it will take an extended period for digital receivers to reach comparable penetration rates to that of the analog services and for digital radio transmission facilities to provide a comprehensive coverage throughout the country.

The ABA’s radio planning is now focussed on consolidating its work to date, addressing some unresolved service issues and evaluating its planning methods. This will enable the ABA to better assess the future demand for even more services across all types of radio broadcasting.

The Federal Government’s three year Commercial Radio Blackspots program, commenced in 2002, has allocated $5 million for funding improvements for commercial radio services in 142 identified ‘blackspot’ areas of poor reception. The ABA continues to plan transmitters for the roll-out of ABC and SBS services and work with AM broadcasters to improve day-time coverage, as required.

With the majority of primary service planning completed, the ABA continues to licence on a merit basis the most recently planned new community services. Despite the considerable growth in licensed community radio services through the planning process, the ABA continues to receive requests from aspirants for temporary licenses both in areas where the planned allocations have been licensed to other groups and from communities where no licence was originally planned.

During 2002, the ABA re-commenced the auction of planned high and medium power narrowcast services. The ABA has also continued to auction the remaining identified metropolitan commercial licences, where these had previously been allocated in the LAP.
The Planning Process

The *Broadcasting Services Act 1992*, which commenced on 5 October 1992 and created the ABA, introduced a new way of planning, licensing and regulating broadcasting services in Australia.

The changes in the new Act were designed to promote the economic and efficient use of the spectrum and to better target the use of spectrum for new broadcasting services. The changes were part of a move towards lighter touch regulation, aligned to a notional capacity of a broadcasting service's degree of influence.

The Act identifies six generic categories of broadcasting such that all services, including new services and potential new technological formats, can be accommodated within the licence categories as per below:

| Taxpayer Funded | Wide Appeal | National services |
| Advertiser Supported | | Commercial services |
| Non-profit | | Community services |
| Subscriber supported | | Subscription broadcasting services |

**Fig 1. Relationship of licence categories**

Part 3 of the Act identifies a three-stage process for planning new broadcasting services, with wide public consultation required at each stage:

- Determination of Planning Priorities. This was completed in September 1993. The ABA determined the planning priorities, grouping all licence areas into 23 radio zones (and 22 television zones) within five priority groups.
- Preparation of a Frequency Allotment Plan (FAP). This stock-take of known and anticipated future services in each of the areas was completed in August 1994; and
- Preparation of Licence Area Plans (LAPs) for each area. This was completed for radio in December 2001.

Taking account of the existing licensed services, the four categories of non-subscription services planned in the LAPs are:

- National broadcasting services: free-to-air ABC or SBS services.
- Commercial broadcasting services: privately owned free-to-air services operated for profit.
- Community broadcasting services: free-to-air services provided for community purposes by non-profit groups.
- Open narrowcasting services: free-to-air services whose reception is limited in some way, such as by targeting programs to a specific audience or by signal coverage area.

Central to the planning processes has been the specification of new social and economic planning criteria, the requirement for 'wide public consultation' and the determination of technical specifications under new Technical Planning Guidelines. As a result, planning for the designated broadcasting services bands spectrum has been more open and responsive to its users and the public.

Each LAP determines the number and characteristics of broadcasting services to be made available within a particular area. The characteristics of each service include the service’s licence area, category, carrier frequencies, transmitter sites and technical conditions, including the maximum effective radiated power in each direction from each transmitter site.

In drafting LAPs, the ABA first has regard to the Minister’s notification for reservation of capacity for national broadcasters under section 31 of the Act. The importance of this is that the ABA is required to reserve spectrum

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1 Source: *Broadcasting reform - a new approach to regulation* (Department of Transport and Communications, January 1993), p.5
The ABA designates licence areas for the commercial and community services identified in the LAPs. The determination of the number and characteristics of both community and commercial services arises out of the planning process for each licence area. In weighing up the merits of different categories of radio broadcasting services, the ABA has considered community and commercial radio services to be mutually exclusive options in relation to frequency allocation, as a community radio broadcasting licence must be operated by a non-profit organisation.

Subject to suitable spectrum availability, the ABA also has regard to requests for high and medium power open narrowcast or ‘HPON’ services from organisations that would provide such a service. HPON operators use spectrum that is not being used by either national, commercial or community broadcasters in a licence area and may operate on a commercial basis. In certain circumstances, the ABA may determine that spectrum is available (or ‘dropped through’) for narrowcasting or a range of other purposes. Potential narrowcasting channels are

2 On 26 September 2002, the Minister wrote to the ABA indicating his preparedness to reserve capacity for 65 new ABC services across Australia. When LAPs are being varied, the ABA will notionally allocate spectrum for national services identified.
Radio planning in Australia

only identified once the requirements for national, commercial and community broadcasters have been addressed.

Out of the new provisions of the Act, two types of radio narrowcasting evolved, HPONs and low powered open narrowcasting services (LPONs). Because of the potential coverage area of the signal, directly linked to the specified power, the channels for HPONs are allocated in the LAPs. LPONs, however, operate on a maximum of 1 watt (or 10 watts in non-residential areas) with no guarantee of protection from interference.

The general planning parameters used have allowed over 1700 LPON licenses to be issued since 1992 without the need for formal planning. These services usually operate in a narrow sub-band of the VHF FM band (87.5– 88 MHz) and are managed by the Australian Communications Authority (ACA) on behalf of the ABA. The purpose of LPONs has been to allow for the provision of programming of limited appeal, such as tourist and racing information, ethnic and religious programming and niche music services.

This third stage, licence area planning, has taken much longer than initially hoped for, or anticipated. The first LAPs were determined in July 1995 for the Mildura/Sunraysia region and the last of the prioritised ‘Group 5’ radio zones were completed in December 2001. Nevertheless, over the six-year period the ABA determined a total of 120 radio LAPs and LAP variations covering every area in Australia. 3

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3 Only 65 LPONs are licensed to operate above 88.0 MHz. These were allocated by the ABA prior to the allocation of the FM sub-band for LPON use and the delegation of authority to the ACA to issue LPON licences.

4 Information booklets, discussion papers, and draft and final LAPs for each area of Australia are available at the ABA’s website - www.aba.gov.au/radio
The unforeseen length of time to determine LAPs was due primarily to the complexity of applying the specific criteria outlined in the Act and the extensive consultation required with the radio industry and the public at each stage of the process.

One response to this was an amendment to the Act in 1997 that enabled aspirant community radio broadcasters to broadcast, where possible, full-time ahead of the more permanent licence allocation process. Previously these aspirant groups had access to only 90 days of transmission time each year.

The ABA’s planning continues with a comprehensive program of variations to completed LAPs. This is in response to requests from the general public, government and the radio industry for new services and to effect necessary changes to existing services. Over the next few years this work will include the extension of ABC radio services, planning for identified commercial radio black spots in regional and remote areas and potential improvements to the delivery of AM services via increases in day-time power through the ABA’s day/night switching policy. It is also likely to involve finding suitable spectrum for new community services.

This management of radio planning for the broadcasting services bands also includes ‘dropping through’ spectrum for other purposes such as re-transmissions, special events and test transmissions. The ABA approves a few hundred of these for radio and television every year. The ABA also receives and approves applications that will result in the targeted reception of broadcasting services outside their planned licence area. While this last process mainly addresses the need to enable householders in areas of poor reception to receive free-to-air satellite television services, the ABA also periodically approves the transmission of radio services to otherwise unserved communities.

The ABA undertakes planning on the basis of identified demand, rather than, necessarily, until all available spectrum is exhausted. However, the identified demand for services generally outstrips known supply, with diminishing returns on searches for suitable spectrum. Thus, the ABA may need to investigate new spectrum planning strategies and reconsider its planning paradigms while still maintaining their alignment with international approaches.

The successful introduction of the ABA’s new planning tools (from which the coverage maps in this publication are generated) and a renewed focus on field tests and service audits will enhance the ABA’s efficient management of broadcasting spectrum.
Growth of Australian Radio Services 1992-2002

In October 1992, with the establishment of the ABA, there were 908 AM and FM transmitters planned to operate across Australia. There were also about a hundred remote Indigenous community radio services or ‘BRACS’. By December 2001, there were over four thousand transmitters potentially available to deliver radio services to Australians.

In the intervening nine years, the ABA planned a total of 1,468 new radio transmitters, or nearly two-thirds of all planned radio transmitters. An equivalent number of LPON services were also made available. Even taking into account that many of the planned transmitters were translators for existing and new services and that a number of planned services and LPONs were not operating, the growth of the radio sector has been considerable.

Radio audiences in regional and remote Australia have benefited most from the growth in the number of available radio services. Between October 1992 and December 2001, the ABA increased the number of radio transmitters serving Australian communities by 162 percent, mainly in regional and rural areas. The number of radio transmitters in regional and remote areas increased by 226.5 percent and 120.5 percent, respectively, compared with 83.3 percent in metropolitan areas.

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Between October 1992 and December 2001, the ABA planned 448 national radio broadcasting transmitters, 428 commercial radio broadcasting transmitters, 330 community radio broadcasting transmitters for both new and existing services and also 262 transmitters for narrowcasting. The ABA also issued 712 licences for special events and 2158 temporary licences for aspirant community broadcasters and over 1700 low power narrowcasting licences were made available by the ABA and the ACA.
In terms of new services available, in addition to the 448 transmitters for new national services across Australia, the ABA planned 95 new commercial services, 175 new community services and 262 wide and medium coverage open narrowcasting services.

Aside from the massive growth of the sector, particularly in regional and underserved areas, the other significant trend has been the growth of FM radio. While AM only grew from 237 to 313 planned transmitters,
FM grew from 671 to 2063. In 1992 in the commercial sector, there were 122 AM transmitters and 106 FM transmitters planned, by the end of 2001 there were only 10 more AM transmitters planned compared to 418 new FM transmitters.

When the ABA started planning in 1992, there were only a handful of commercial FM radio services in Australia outside of the metropolitan markets. Now, the ABA has planned at least one commercial FM radio service all radio markets, except for some remote areas and in Launceston, where there has been a lack of suitable FM frequencies. With four further metropolitan commercial licences still scheduled for auction, there are now 272 commercial radio licences served by over 650 transmitters.

Of the new commercial services identified, 60 were made available under section 39 of the Act, and 35 were planned for release by price-based allocation. Section 39 of the Act provides for the allocation of an additional commercial radio licence to the licensee of a radio service where it holds the only commercial radio licence in force.

Community radio has shown exceptional growth. The number of transmitters has grown from 202 servicing 129 stations in 1992 to 532 transmitters planned for 304 stations, with one third of these in New South Wales and the ACT, and 80 BRACS. Most communities that want their own community radio station now have one or have plans to provide one. Even outside the metropolitan areas, there are many specialised community services in addition to stations providing a general range of programming. This appears to reflect the public’s increasing interest and involvement in the many radio formats available.

As an example, back in 1992 the Cairns radio market, which serves 150,000 people, had eight radio transmitters. The ABA planned 15 new transmitters for the Cairns market, comprising five new national radio transmitters, six new commercial radio transmitters (for three new commercial services), two new community radio services and two new open narrowcasting radio services. Other markets have seen major improvements in diversity. Mildura before 1992, had three national, a commercial and a community service, whereas there are now four national, three commercial and one narrowcast service and eight transmitters for its three community services.

During 2002, the ABA completed ten LAP variations and has over forty known LAP variations still to address. Some variations will be relatively minor, but a number will involve significant engineering and consultation, including those national radio extensions where spectrum capacity needs to be identified. Where spectrum availability permits, the ABA will also continue to meet demand for re-transmissions, special events and test transmissions.

5 In November 2002 the ABC closed down its Channel 3 VHF television service facility at Mount Barrow serving north-east Tasmania. The cessation of this service using the frequency range 85-92 MHz effectively frees up spectrum in the region for FM radio services in that part of the broadcasting services band.
Engineering for Radio Services

One of the primary functions of the ABA is to plan the availability of the broadcasting services bands that have been referred to it by the Minister. These bands are:

- 526.5 - 1606.5 kHz (inclusive) - The MF AM radio band
- 87.5 - 108 MHz (inclusive) - The VHF FM radio band

The ABA plans the availability of segments of the bands on an area basis, to provide an appropriate signal level to overcome the local radio noise environment in a licence/coverage area. Frequencies (also known as channels) are selected so that reception of radio services is without harmful interference from other broadcasting and radio communication services.

In order to plan for new services the ABA requires broad details of the proposed transmitting arrangements: site, antenna height, estimated effective radiated power radiation pattern proposed and the area to be serviced by the transmitter.

Once this detail is provided, ABA engineers determine a suitable frequency based on co-ordination requirements with existing and planned services, having regard to the national channel allotment plan which is reflected in the Frequency Allotment Plan (FAP) tables.

The planning conducted by the ABA is based on internationally agreed technical planning parameters. The engineering process for planning can sometimes be extensive, often requiring many passes of computer-modelling path profiling to establish the optimum transmitting site given the extent of the coverage requirement for a service and the nature of the surrounding terrain.

Planning of a broadcasting service involves:

1. estimation of the required coverage and radiation pattern;
2. approval or determination of a suitable antenna radiation pattern to provide coverage to an area;
3. determination of a suitable transmitting frequency and transmission power. This process takes into consideration the propagation characteristics of the chosen frequency with respect to the attenuation of the signal as it travels through the air as well as the nature of the surrounding terrain (flat, hilly, obstacles etc).
4. verification of the compatibility of the proposed service with other radio communication services

Since finalising the first LAP, the ABA has found it increasingly difficult to meet the demand for spectrum for new services and additional transmitters or increases in transmission power for existing services. Except in more remote locations, the ABA is reaching the point of spectrum ‘exhaustion’, where the possibility of interference both to and from potential new services is a serious issue. This is particularly the case for the spectrum-
congested metropolitan markets, where even the robustness of the signals of existing AM services is affected by the increase in man-made electrical noise.

The ABA continues to look at options for maximising spectrum productivity without compromising the quality of each radio signal in its licence area. One recent solution has been the introduction of a policy of considering applications from broadcasters for the day/night switching of transmission power of their AM services. Broadcasters will be allowed to increase the daytime power of their services to offset the ‘noise’ of electrical machinery but required to return to the nominal power at night, when atmospheric conditions mean the higher signal strengths would interfere with other services in Australia and neighbouring countries.

4BC Brisbane commenced 18-month day/night transmission switching trials in November 2001, with an increase in daytime power. If successful, the changes will require a LAP variation to become permanent. Such requests for increase in power will most often be to serve highly urbanized areas. However, with increasing land values and urban encroachment, the ABA is mindful of health and safety issues arising from electromagnetic radiation and electromagnetic compatibility requirements that might affect such power increases.

In late 2002, to ensure good spectrum productivity, the ABA commenced a review of its planning parameters and practices, aided by new planning tools and census data. One of the identified tasks is a review of the ABA’s Technical Planning Guidelines, as developed under section 33 of the Act. The Guidelines originally came into force on 10 August 1995. The technical specifications in the LAP and Guidelines are applied under the Radiocommunications Act 1992 as conditions of a transmitter licence issued to commercial and community broadcasting licensees by the ACA.

The spectrum management strategy also includes a renewed focus on field tests and service audits, supported by the fit-out of a new vehicle for field testing. The ABA also expects to look at: receiver performance and overloading; LPON management; compliance with electromagnetic radiation (EMR) standards; and a range of changes to the planning parameters that might yield more spectrum. Some of this work will be hypothetical and might also include: ‘what if?’ spectrum rationalisation scenarios; using closer channel spacing (400 kHz, 600 kHz); and applying cross-polarised planning for FM services. Depending on the nature of the findings, the ABA will consult widely on any proposed spectrum reforms.

ABA Planning Tools

In late 2002, the ABA finalised the transition to a new broadcast planning system with the decommissioning of the Arc/Info planning system.

The new system, supplied by the German company LS telcom AG, replaces planning tools originally developed in the early 1980’s and subsequently re-developed in the mid 1990’s. The new planning system provides the ABA with a state-of-the-art tool for planning digital television and future digital radio services, in addition to analog television and radio services, in compliance with international practice.