Digital Audio Broadcasting

Ministry for Culture and Heritage
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DIGITAL AUDIO BROADCASTING

Purpose

1. The purpose of this paper is to examine some of the key issues concerning the development of digital radio, or digital audio broadcasting (DAB), in New Zealand. The paper does not make recommendations, but does seek to identify the main developing strands of DAB technology internationally, their relation to the current New Zealand broadcasting environment and associated issues for the future development of digital radio services, which could be the subject of further more detailed work.

2. The paper begins with a summary of existing decisions and consultation already undertaken. The next section of the paper identifies general issues relating to the introduction of DAB services in New Zealand. The remainder of the paper introduces the key technological elements of DAB, and identifies the key issues concerning platforms, standards, spectrum use, and reception technology.

Background

3. In its 2002 election manifesto government undertook to develop, in close consultation with the broadcasting industry, a policy and regulatory framework that aims to give all New Zealanders access to the benefits of digital technology. Recently the government took a series of decisions intended to foster the development of digital television services by assisting public broadcasters to plan, supporting industry efforts to develop viable economic models for digital television, and facilitating timely investment in digital technology by ensuring suitable spectrum and networks are available. Similar decisions have yet to be considered on analogous issues in relation to DAB, although some preliminary consultation and planning has been undertaken.

4. The Radio Spectrum Management group within the Ministry of Economic Development (MED) established some preliminary spectrum related policies in 2001. These were based in part on consultation and submissions following the release on 5 December 2000 of an engineering consideration document called *A Draft Band Plan for Digital Audio Broadcasting*. This document called for submissions on the issues concerning DAB, including:

- *Is the 1.4 GHz band the appropriate band for the development of DAB services in New Zealand?*
  A majority of submitters affirmed the L-Band or 1.4 Ghz band as appropriate for DAB services in New Zealand.

- *Should DAB be planned for delivery by terrestrial or satellite means, or both?*
  A majority of respondents considered DAB should be delivered by both terrestrial and satellite platforms.

- *What is the desired timing for the possible introduction of DAB services?*
  Mixed responses were received, with some keen to introduce digital services immediately and others giving different time periods ranging from 5 to 10 years. The cost of digital receivers was considered a crucial factor for

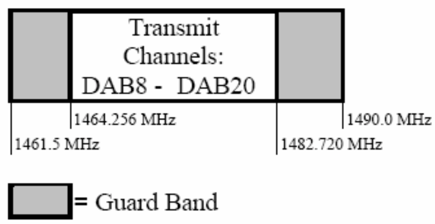
successful introduction, and the development of DAB services would be contingent on the accessibility of this technology.

- *What are the appropriate technical standards, if any, that New Zealand should adopt?*
  There was unequivocal support for the Eureka 147 standard (see section on standards, below).

5. As a result of this consultation, MED planned the 1461.50 – 1490.00 MHz band (1.4 GHz) for DAB services in New Zealand. Presently a moratorium has been placed over allocation of new radio licences in this area of spectrum, limiting use of spectrum to the demonstration of new technology. (Assuming the use of the Eureka 147 standard on a terrestrial platform, this area of spectrum holds 13 channels, each capable of supporting 5 stereophonic programmes – i.e. 65 programmes in total).

<u>NZ Channel Plan for DAB Services</u>

Structure:



Power (EIRP): 40 dBW
Channel Spacing: 1.744 MHz
Specification: Eureka-147 (digital system A), otherwise referenced as ETS 300 401.

Channel	Tx Centre Frequency (MHz)
DAB7	Guard Band
DAB8	1465.024
DAB9	1466.768
DAB10	1468.512
DAB11	1470.256
DAB12	1472.000
DAB13	1473.744
DAB14	1475.488
DAB15	1477.232
DAB16	1478.976
DAB17	1480.720
DAB18	1482.464
DAB19	1484.208
DAB20	1485.952
DAB21	Guard Band
DAB22	Guard Band

6. Further consultation is considered appropriate prior to government making further decisions in relation to the development of DAB in New Zealand. In order for the New Zealand broadcasting sector to take full advantage of the potential benefits of digital radio these preliminary policies need to be considered in light of the developments in DAB technology and the requirements of the wider broadcasting sector.

General Issues

Sound Quality

7. When audio content is digitised, complex information is broken down into a coded format allowing it to be reconstituted later with a high degree of fidelity to the original material. In DAB, digitised audio material is transmitted in a format configured for reception by specifically adapted digital receivers that reformat the code for audio playback with minimal loss of quality. It has been suggested that the potential exists for DAB in the AM band to deliver content at FM analogue broadcast sound quality, and for DAB in the FM band to deliver content at CD sound quality more reliably than analogue services.

Enhanced Content

8. In addition to its higher audio fidelity, DAB has the potential to enhance broadcasting services through its capacity to carry significantly greater quantities of data to be transmitted than analogue formats within the same bandwidth. This allows a greater number of programme streams to be broadcast and offers the possibility of augmenting audio content with other kinds of information, for example, station and song identification, stock market and weather reports and global positioning services. Digitisation also creates the potential for enhanced content by enabling the broadcast of several forms of information simultaneously - digital TV, telephone and text services illustrate this potential – facilitating the convergence of previously distinct media. The use of the internet to further develop the potential of interactive radio to support terrestrial or satellite digital broadcasts could be a key synergy, as illustrated by the BBC.

Conditions for Success

9. The success of DAB is likely to be strongly linked to investment in programming, transmission, promotion and will ultimately depend on the attractiveness of new services to the wider listening public. The development of DAB in New Zealand is unlikely to proceed, and would be unlikely to be successful, unless and until there is a satisfactory business case for investment and sufficient audience demand. The value of additional programme streams and the utility of additional information services need to be balanced against the value of the existing analogue provision and the cost of introduction.

Sector Cooperation

10. The development of DAB in other countries indicates that public and private interests working together can facilitate an effective and efficient roll out of DAB services. In view of the multiple strands of DAB technology, and the variety of public and private interests in the provision of DAB services, key relationships for the creation of a stable digital radio market include those between government agencies, broadcasters, and providers of DAB platforms, standards, and digital receivers. In recognition of the importance of this kind of co-operation, the government has already taken decisions in relation to digital television which include an invitation to public and private television broadcasters to form a group to look into key issues. The development of an industry DAB group incorporating key public and private interests in the radio sector may also be desirable (including, for example, public and private

radio broadcasters and broadcasting organisations, public broadcasting agencies, consumer groups, and platform and technology providers).

Audience Demand

11. In addition to industry cooperation, the success of DAB services will ultimately depend upon their audience appeal. Although there is significant utilisation of internet audio services by those with appropriate technology, there is little current evidence of public demand for the introduction of DAB broadcasts in New Zealand. There has, however, been significant interest in such services in other countries, such as the UK (where additional forms of data rather than sound quality have been the greatest selling point). This interest is in the context of significantly fewer pre-existing analogue services because, unlike New Zealand, the UK government has generally prevented privately owned radio networks from having nationwide reach. Given the existing variety of radio services in New Zealand, which is unusual by international standards, the increase in the sheer number of services which DAB makes possible is unlikely in itself to be of strong appeal, although the possibility of new kinds of services may be an attraction. Unless DAB is perceived as necessary or sufficiently desirable, people may be reluctant to enter into additional commitments and costs (e.g. the selection and purchase of new receivers, subscriptions, etc) in order to access services of an essentially similar kind to those already provided. International research indicates that audience demand may be influenced by factors such as the number and variety of services available, the cost and functionality of receivers, the cost of services (e.g. free-to-air or subscription), and analogue switch-off dates (as an audience motivator).

Private/Commercial Broadcasting

12. Private broadcasters in New Zealand now operate in a deregulated and intensely competitive market and would like to see any move towards digital technology reflect the needs of this market. Key concerns include the financial impact of introducing a new technology, and the impact of digital technology on the viability of existing analogue broadcasting. The radio broadcasting sector (private and public) has put considerable investment into the development of FM, and the addition of a new technology could undermine that investment. Until and unless there is a clear business case for moving to DAB, private commercial broadcasters are unlikely to make this transition.

Public Broadcasting

13. DAB can potentially assist in realising the objectives for broadcast content that the government formulated in July 2000, and its wider objectives for the broadcasting sector, through increased quality, carrying capacity and enhanced content. At the same time, DAB provides opportunities for public radio broadcasters, such as RNZ, RNZI, and NiuFM, as well as presenting them with new challenges in maintaining and enhancing their value as public broadcasters. The BBC provides good examples of the kinds of services that a public radio broadcaster might seek to provide in the digital environment, with multiple services available to cater for a diversity of demographic, ethnic, regional and special interest audiences, enhanced content, interactivity, and convergent use of communications technologies[1]. Although RNZ

[1] These include: Radio1, 1Xtra, Radio 2, Radio 3, Radio 4, Radio 5 Live, 5 Live Sports Xtra, 6 Music, BBC7, Asian Network, World Service, each available via terrestrial DAB (incorporating dynamic text

currently transmits in analogue formats (except for its simulcasts on the SKY satellite platform), the majority of its studio equipment is digital. The main costs faced by a broadcaster in this position relate to the transfer to a digital transmission platform, or lie in the resources required to develop new types and additional quantities of broadcast content. It may be advisable that RNZ and other public broadcasters investigate whether there is an appropriate business case for developing DAB services, and develop their planning to maintain and enhance the value of their services in a digital environment.

Mix of Services

14. The capacity of other parts of the radio broadcasting sector to take advantage of DAB technology also presents significant issues. For example, many iwi and community/access broadcasters may find the investment required to go digital daunting. The possibility of being left in an analogue ghetto may threaten the survival of such services and the delivery of key elements of the government's broadcasting objectives. At the same time, the additional capacity offered by DAB transmission technology presents new opportunities to this part of the sector, provided broadcasters are in a position to take advantage of them. Spectrum allocation policies in the transition to a digital environment would present some opportunity to further address the balance of services across the sector as a whole, for example by ensuring that there is adequate provision for access to spectrum by community, iwi, and other broadcasters.

Public Funding and Advertising Revenue

15. A transition from analogue to DAB would potentially place pressure on public funding and advertising as revenue sources in both the public and the private sectors. likely bring new pressures to bear upon public funding. This may bring into question the level of support available to public, non-commercial/access and iwi broadcasters via NZ On Air and Te Māngai Pāho, at least during any transitional period. The commercial private sector may also face new pressures as advertising revenues are stretched over a great variety of services, some of which may be more expensive to provide, in an already saturated radio market. The likelihood of the sustainability of subscription DAB services is unclear, and, at least to the extent that public resources may be involved, raises questions of fairness and the universal availability of services. (In the context of digital television, government has agreed that as a matter of principle publicly funded content should be available free-to-air.)

Implications for Creative Industries

16. The majority of music recordings are already in digital formats. Nevertheless, as for digital television, DAB presents both opportunities and challenges for New Zealand's creative industries. The possibility of an expanded demand for content provides opportunities, but also demands that, to compete in the international environment, both quality and technology are consistently maintained at the highest levels. There may also be increased demand within the industry for high levels of professional training in new technologies, with implications for current provisions for industry training.

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information), via digital television, and on the internet. Secondary services are also offered, and individual programmes can be delivered on demand via the internet.

Regulation for Content Standards

17. DAB broadcasts would be subject to the same legislation and regulatory arrangements as analogue radio transmissions. Issues arise, however, in the context of internet digital audio services, and convergent technologies. In those cases, the relevant legislation and regulation will vary depending upon the nature of the services – some of these may, for example not count as broadcasts under the terms of the Broadcasting Act 1989, and hence would not fall within the jurisdiction of the BSA or ASA, or qualify for funding via NZ On Air or Te Māngai Pāho. It may therefore be desirable to review relevant aspects of the current legislation, funding and regulatory regimes.

Platforms, Standards, and Spectrum Use

18. Although there is potential for multiple platforms and standards to run simultaneously within a single radio market or regulatory regime, the long term stability of such co-existence is uncertain. For example, in the United Kingdom, digital terrestrial radio is broadcast on the Eureka 147 standard, digital satellite radio is broadcast via Worldspace Digital Radio Services, and broadcasters like the BBC use the internet to support their terrestrial transmissions by streaming audio content and providing a back catalogue of programmes and events. Currently, reception of all these digital audio services requires UK listeners to have access to several kinds of reception equipment. In the longer term market-dominant technologies may emerge. In a small country such as New Zealand, the pressures on competing systems would likely be significant and may increase the need for sector-wide cooperation or coordination on these issues. In considering the options it will be necessary to think strategically about the benefits and costs of each platform and standard in relation to the diverse needs of all radio broadcasters as well as the listening public. The desirable level and nature of intervention, if any, required to ensure the sustainability of DAB services is unclear and requires close consideration by both government and industry. These issues are discussed in more detail below.

Technological Issues – Platforms, Standards, Spectrum Use, and Reception Technology

Platforms

19. Digital audio content may be transmitted on a variety of platforms: via terrestrial transmitters, satellite, across the internet, or via mixed platforms.

Digital Terrestrial Transmission

20. This form of transmission is currently used in Europe and the United Kingdom (notably by the BBC), and in the United States of America (by HD Radio), and is growing in popularity. A key advantage is that it is essentially an augmentation of the current platform for analogue radio broadcasting, involving the installation of digital transmitters on pre-existing transmission sites and associated infrastructure. The installation and maintenance of new transmitters nevertheless present significant costs. Manufacturers are looking at ways of working with existing transmitter technology to ensure the cost effectiveness of moving to digital broadcasts.

Digital Satellite Transmission

21. Satellite transmission is already in operation across a number of continents and regions around the world[2] and is considered by many to be serious competition to terrestrial transmission. It has also been touted as a replacement for short wave radio as it is able to broadcast over large distances more efficiently and with greater clarity. Reception of these services does not require a satellite dish and can be received in moving vehicles. Another form of digital satellite radio currently exists in New Zealand via Sky's digital satellite platforms broadcast in Digital Video Broadcast (DVB) format offering seven radio channels with the basic Sky Digital package: National Radio, Concert FM, NiuFM, George FM, Channel Z, Tahu FM Calvary Chapel Radio and APNA FM. Sky subscribers can also select Sky Digital Music, a package of 12 music channels as an additional service. Reception requires a satellite dish and rental of a Sky television set-top box or access to other suitable generic reception equipment.

Digital Radio on the Internet

22. The internet operates differently from the terrestrial and satellite platforms, as it is predominantly transmitted via existing wired infrastructure rather than the radio frequency spectrum. Notwithstanding this difference the Internet appears to have some of the highest concentrations of digital audio service providers. A considerable amount of material broadcast via terrestrial and satellite based digital audio platforms, as well as many analogue radio stations, is also available (either simulcast live-streaming, or delayed streaming) via the internet either free or for a subscription fee. Many of the stations broadcast on the Sky digital satellite platform in New Zealand are also available free on the internet. In addition to streaming live audio content, additional services can be provided, such as access to a back catalogue of programmes and radio events, allowing the audience to select what it listens to when it likes. Although these kinds of features are technically possible via other transmission platforms (on some standards), the internet is currently the only digital radio platform offering this type of service in New Zealand. Because this form of audio content is transmitted on demand, it is not strictly a broadcast (in terms of the definition in the Broadcasting Act), and notably a different set of laws relating to censorship, labelling, and content standards governs its transmission.

Key Issues

Viability

23. New Zealand's geographical isolation, topography and small but widely distributed population may place some limitations on the viability of transmission platforms. Although there is demonstrated potential for multiple platforms and standards to run simultaneously in some radio markets or regulatory regimes, the long term stability of such co-existence is uncertain. Nevertheless, there is an argument that the peculiarities of New Zealand geography and population distribution may render a mixed platform most appropriate, with terrestrial transmission used where

[2] Worldspace emerged in the late 1990s as a satellite-based digital radio service covering Asia, Africa, the Middle East, most of Europe, Latin America, the Caribbean and Northern Australia. It offers over 40 audio channels depending on which satellite is delivering the signal. In the United States, XM and Sirius each offer over 100 radio channels across a variety of genres, and additional data services such as station and item identification.

viable and satellite 'mopping up' remaining areas[3]. But in the New Zealand context, more so than the main overseas DAB markets, the risk and cost associated with establishing a broadcasting service operating on an independent platform would be beyond acceptable levels for most digital radio broadcasters. A coordinated industry-wide approach and information sharing between government agencies, DAB platform providers, and DAB service providers, could assist in the creation of a stable digital radio market.

Local Content

24. Terrestrial digital platforms, like their analogue counterparts, cater for local and regional content. Satellite services, on the other hand, can and do extend to audiences outside the country or region of origin, and the corresponding trend towards catering for the larger audience makes locally-based content less desirable to service providers (and therefore less likely to be broadcast) as it is only relevant to a small percentage of the potential audience. While Sky has been able to maintain local content by digitally simulcasting analogue broadcasts, some of the major subscription-based satellite broadcasters in Africa, Asia, the Americas and parts of Europe have not taken this approach[4].

Regulation

25. In addition, concerns about local content, the fact that most commercial satellites are owned by trans-national corporations means that governments may find it difficult to effectively regulate and foster an industry reliant on the operation of property located in space and owned by a company located offshore. Digital terrestrial platforms would involve transmissions covered by domestic statutes and regulation. Internet radio services, depending upon their nature, may come within the terms of a number of different statutes and regulations (Broadcasting Act, Radiocommuniactions Act, Telecommunications Act, standards regimes for broadcasting, film, and/or publications, etc), but when originating overseas can present government with regulatory obstacles in terms of both jurisdiction and practicality. As noted earlier, most content received via the internet, including digital audio content is not broadcast, under the current definition of 'broadcasting' in the Broadcasting Act, but is narrow-cast - i.e. it must first be requested by the user. Internet streaming can create rights issues, both in respect of music performance copyright fees and geographic rights for specific programmes.

Cost of Access

26. Satellite availability is limited, and the commercial nature of this kind of platform means that satellite DAB services are unlikely to be broadcast free-to-air. Internationally access to satellite DAB currently tends to be provided on a subscription basis, and reception also requires access to specialised equipment. The internet is the most expensive option, in terms of set-up costs, for reception of digital audio content due to the requirement for high cost technology and a subscription with an internet service provider.

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[3] MF and HF distribution of audio content using Digital Radio Mondiale (see section on standards, below) technology can also reach sparsely distributed populations.

[4] Localized news and talk shows are offered by some service providers but these providers tend to be focused on topics of national interest (e.g. XM and Sirius for the continental United States).

Quality

27. The quality of radio service via internet platforms is linked to the quality of the transmission, the sophistication of the user's computer hardware and software, and the throughput capacity of their internet connection. It is unclear whether the quality of this form of digital transmission is consistently as good as other platforms.

Standards

28. A variety of digital broadcast technical standards have also been developed, some of which can be utilised across multiple platforms. Development in DAB standards has to date been driven by several key organisations. Europe-based World DAB's Eureka 147 standard, and American-based Ibiquity's IBOC standards appear likely to emerge as competing standards in the market, while the DRM system is likely to emerge as an alternative to short-wave services. New and improved digital multimedia applications for DAB platforms and standards are being developed and implemented on a regular basis.

Eureka 147

29. Eureka 147 is the first digital radio broadcast standard to be endorsed by the International Telecommunications Union (ITU) and has been rolled out in a number of countries, principally in Europe. Arguably the most advanced digital radio standard available, Eureka 147 transmissions can combine several different radio services into a single stream of digital data. Pictures, text and other types of data can also be transmitted using this standard. This is the most popular standard in the world to date with a number of countries already having adopted it and more committed to investigating its application. The Ministry of Economic Development's initial work on DAB showed strong support for the Eureka 147 standard and, as noted in paragraph 5 above, spectrum at 1.4 GHz has been reserved by government.

IBOC Standards

30. The IBOC standard offers an integrated analogue/digital broadcasting system that enables broadcasters to operate a digital frequency on either side of the analogue frequency in AM or FM bands. IBOC would allow the current radio spectrum rights holders to largely operate as they currently do, while allowing them to add digital broadcasts to their existing transmissions in the same spectrum. A major limitation of the IBOC standard as currently implemented is that there is as yet no ability to provide multi-programming streams, and there is a concern that digital would maintain the position of existing incumbents while offering no real advantage over analogue. It is possible to use the digital frequencies to enhance current analogue services by broadcasting additional readable data along with the audible information. IBOC is yet to be commercially or technically rolled out in any market. The RBA has shown initial support for the IBOC standard, which it considers would allow private radio broadcasters to adopt digital radio services as capability develops.

DRM Standards

31. The Swiss-based Digital Radio Mondiale (DRM) standard has been developed for operation in the AM Band. This standard is able to broadcast over extremely long distances without the use of satellites by bouncing signals off the stratosphere. DRM may become the first DAB standard used in New Zealand through Radio NZ, which is considering broadcasting Radio New Zealand International as a replacement for its short-wave transmitter. The main consideration for Radio NZ is that DRM receivers

are available at a reasonable cost, and recent developments are promising in this respect. DRM could also be used to replace wide-coverage AM services such as National Radio.

Other DAB Standards

32. The ISDB-Tn or Integrated Services Digital Broadcasting – Terrestrial (narrowband) standard is based on the Japanese ISDB-T wide band digital television system, and designed to operate alongside digital television broadcast transmissions This system is still under development but it has been suggested that it might offer substantially more programmes per channel than the Eureka 147 standard.

33. Worldspace has also developed a hybrid (satellite/ terrestrial) variant of its standard, known as Digital System DH. This hybrid platform improves reception quality for the Worldspace service.

Key Issues

Spectrum use and coverage

34. The Eureka 147 standard is designed to operate in frequency bands at either 200 MHz or 1.4 GHz. The United Kingdom uses the 200 MHz band, but the 1.4 GHz band would be used in New Zealand and other countries where the 200 MHz band is used for VHF television. The use of 1.4 GHz band is likely to require more transmitter sites than are used for analogue radio broadcasts to achieve comparable coverage - similar in number to that required for basic mobile phone coverage.

Digitally enhanced analogue services

35. New Zealand has a relatively large number of analogue radio services and a relatively small market. Further spectrum is available for allocation in the upper FM band for additional services at both high and lower powers. Closer channel spacing, if technically feasible, could allow additional services to be added within the lower FM band and AM and FM analogue receivers are universally available at very low cost. Digital enhancements of analogue broadcasting may limit the value proposition for DAB. RDS is a digital information stream included with the analogue signal which, among other things, allows some radios (generally those designed for use in Europe) to display the station name and to automatically tune to the strongest signal of that station or even automatically divert the radio to road safety reports. Some broadcasters, including Radio NZ are beginning to use RDS in New Zealand.

Efficiency

36. Although IBOC's theoretical ability to offer additional programming and/or information streams in the AM and FM band without interfering with existing broadcasts does appear to offer a benefit in the New Zealand context, tests conducted by the Australian Broadcasting Authority illustrate that there are difficulties in operating the standard without unacceptable levels of interference to adjacent broadcast frequencies. The Ministry of Economic Development's present view is that the IBOC standard would need further technical development before it could be used here.

Licencing

37. It is unlikely that IBOC transmissions could commence within the AM or FM bands without requiring the replacement or alteration of existing analogue licences.

This undermines one of its key perceived advantages over Eureka 147, which would require licencing either in currently unused sections of the spectrum or else the replacement of existing analogue licences.

Regulation

41. Satellite transmissions are co-ordinated internationally and downlink frequencies are not required to be licenced. This reduces the scope for regulation of broadcasts at a national level. Nevertheless, satellite services may need to secure frequency licences if they wish to protect their transmissions from interference. In contrast, terrestrial digital transmission would be within the radio frequency bands covered by the Radiocommunications Act and would be subject to the regulation under the terms of that Act.

Value

42. Another point of concern for all broadcasters is the impact of DAB on the analogue radio market, particularly in terms of recent investment in infrastructure and the value of radio licences which come up for renewal in 2011. The impact of the introduction of digital services on the value of existing AM and FM licences, and on the value of spectrum as such, is unclear. Nevertheless, as the value of a superseding technology increases so the value of the preceding technology decreases. This has certainly been the case with the AM Band in response to the expansion of the FM Band. Recently many broadcasters have committed substantial financial resources to move to the FM Band. The development of DAB may impact on the value of that investment, and as private radio broadcasters come to renew their licences they will be keen to ensure the investment they make in those licences has a continuing value. In the long term, the development of DAB is likely to have an effect on the demand for and value of those licences.

Allocation

43. Despite the existence of mechanisms to balance the diverse needs of the sector, the transition from AM to FM illustrates that the commercially-led allocation of scarce spectrum resources has left many public, non-commercial, Maori and minority broadcasters without the benefit of advances in technology. Recent expansion of the FM spectrum from 88.8 – 100 MHz to 88.8 – 108 MHz has provided greater capacity to develop radio broadcasting services in both the commercial and non-commercial sectors. The development of DAB, especially in view of the potential for greater data capacity, has the potential to assist the achievement of government's goals in respect of spectrum utilisation and market mix.

Reception Technology

44. The potential benefits of DAB must be balanced with the fact that reception of DAB services requires access to receiving equipment designed specifically for this purpose that is currently relatively expensive. The kind of equipment required will vary depending upon the encoding format in which the content has been digitised (for example, whether it has been encrypted), the nature of the transmission platform and standard used, and the part of the spectrum within which the transmission is broadcast. DAB receivers designed solely for the United Kingdom market (utilising the Eureka 147 standard) would not be able to be used in New Zealand, although receivers designed for the 1.4 GHz band (as used in other countries in Europe) would be suitable for New Zealand conditions.

Next Steps

45. Although there is little current evidence of demand for DAB services, international developments indicate that it may be timely to take a closer look at the key issues concerning the implementation of DAB services in New Zealand, and to build on existing consultation and planning. More detailed advice on the key technical, regulatory, and policy issues outlined in the paper can be provided by the Ministry of Economic Development, the Ministry for Culture and Heritage, and Te Puni Kōkiri. As noted above, the development of an industry DAB group incorporating key public and private players in the radio sector may also be desirable.