THE DIGITAL DIVIDEND IN NEW ZEALAND

INTRODUCTION

Scope

This paper provides a background to major changes in radio frequency usage being planned following the switch-over to fully digital television services. The date for the Digital Switch-Over (DSO) in New Zealand is not yet finalised but is expected to occur in the 2012 to 2015 period.

The "digital dividend" is the spectrum made available by the implementation of digital television broadcasting using a technically efficient band plan, and ceasing all analogue television broadcasting. The greater technical efficiency of individual digital licences and frequency planning parameters allows a greater number of programmes using less radio frequency spectrum.

This paper identifies the background to the process, current and future work being undertaken by the Ministry and the time frames for decisions to be made. The paper also documents a number of current working assumptions used in preparation of this paper. These may be modified following further information provided by stakeholders, and decisions made by spectrum rightholders and Government.

Overall objectives

The overall objectives of the DSO related projects are broadly:

- To facilitate conversion of present commercial television services to digital technology using a technically efficient band plan (including determination of appropriate policies relating to regional broadcasting in the digital environment); and

- To plan and allocate the spectrum released from adoption of digital television technology for a variety of new services to maximise the benefit to New Zealand.

Background

Government policies to facilitate the DSO process were decided in 2006 - 2008, with digital terrestrial television commencing in 2008. An earlier consultancy study identified a number of issues which were eventually the subject of decisions by either Government or other involved parties.

The DSO process envisages all television services using the more efficient digital technology, and existing analogue licences being cancelled or returned to the Crown in due course. Implementation of a fully digital frequency plan effectively releases spectrum for allocation to new services. The overall process is complex; however it will result in both VHF and UHF spectrum

being available for allocation to new services. The preferred mix of services, and the technical planning to accommodate this needs input from stakeholders and will be the subject of a formal discussion document later in 2009. This paper is intended to identify the current position and overall process that is being followed. Comments and views from stakeholders on this paper will assist the Ministry to develop a better informed discussion document.

CURRENT POSITION

Management Rights and analogue licences

VHF bands

There are analogue television licences in the VHF bands (44 – 51 MHz, 54 – 68 MHz and 174 – 230 MHz) which are largely used for the TV1, 2, 3 and C4 programmes. All licences in these bands expire in August 2015, however the Ministry has agreements that the licences will be transferred back to the Ministry, or cancelled, at the DSO date. The relevant management rights (No 47, 48, and 49) will expire in August 2015. Decisions about the recording and allocation of future management rights would normally be made in 2010, being 5 years before expiry. Such decisions would also need to take into account other decisions on the digital dividend.

UHF bands

The band allocated for television use is from 518 to 806 MHz. Television licences have a channel width of 8 MHz giving a total of 36 potential RF channels. This frequency range is managed as follows:

- 518 – 582 MHz – Management Right No 1, mix of analogue and digital licences, expiry March 2010;
- 582 – 614 MHz – Management Right No 195, owned by Maori Television Service, expiry November 2013;
- 614 – 646 MHz –Radio licences for non-commercial allocation, together with some digital licences and amateur TV repeater licences (Ch 39);
- 646 – 806 MHz – Management Right No 2, mix of analogue and digital licences, expiry March 2010.

In addition to television there is usage by radio microphones on a low power basis under a General user licence in Management Rights 1 and 2. This use was previously limited to part of Management Right 2.

There is also adjacent unallocated spectrum between 502 and 518 MHz, which is in turn adjacent to planned usage by mobile services in the 494 to 502 MHz band.

Management right No 212 and 213 are registered with commencement from March 2010 to allow the continuation of current television licences, where appropriate, under existing policies. Management right 211 covers the range

518 – 582 MHz and right No 213 covers the range 614 to 806 MHz. These future rights expire in March 2020.

The Ministry has renewal contracts with various present UHF analogue licence holders which are due for settlement on or before September 2009. The corresponding current licence must be in use before settlement can occur. These contracted licences expire in 2020, but it is expected that DSO will occur before expiry. Instead of renewal until 2020, licence holders can opt to extend the present analogue licence on a year by year basis until DSO at a negotiated price but without a future conversion to digital use.

Current digital licences

Three sets of digital licences (18 licences per set) covering approximately 75% of the population have been created and allocated for the transition of existing television services having near national coverage. While primarily for transition of existing programmes through simulcasting, they are also able to (and required to in some cases) accommodate new programmes. The technology also facilitates high definition transmissions, although high definition uses significant capacity and is not possible or expected for all programmes.

Licences for geographic expansion of digital television have been planned, but the commercial viability of further expansion is a matter for the present licence holders to decide. The current digital licences, and any further geographic extension, are subject to contractual arrangements with the licence holders (Kordia, Mediaworks, and TVNZ).

Further licences to increase digital programme capacity have also been planned in most geographic area. Government policies on whether and how these might be allocated are still to be decided.

The Ministry has also published policies to allow holders of UHF analogue licences to effectively convert the licences to allow digital technology to be deployed. These policies also place implementation requirements on the digital licence concerned and require all the analogue licences of the particular licensee to cease and be cancelled at DSO. The Ministry will retain the ability to effect future changes of frequency of any digital licences issued, to enable implementation of an efficient all-digital frequency plan in the UHF bands.

PLANNING FOR THE DIGITAL DIVIDEND

VHF spectrum issues

The spectrum available in the VHF bands is relatively obvious, as the entire bands will have all existing broadcasting licences cancelled at DSO. There are however some issues in the lower portion (Band I) that need to be addressed at this time.

The present use of Footnotes in Band I:

The band 44 – 47 MHz has been used for broadcasting under Footnote 5.162 in the ITU Table of Frequency Allocations in the Radio Regulations. When broadcast use ceases, it would be desirable to ensure any new use was consistent with the world – wide allocations to Fixed and Mobile services. In due course the footnote could then be considered for deletion.

The band 50 – 51 MHz has been used for broadcasting under footnote 5.166 in the ITU Radio Regulations, and it may be appropriate to consider a new use aligned to the Table of Frequency allocations (i.e. a Primary allocation to Amateur services). There are also other uses under the New Zealand specific Footnotes in the adjacent 51 – 54 MHz band which could be reviewed, but this is beyond the strict scope of the spectrum released by the DSO process.

> *The current working assumption is that future use of VHF spectrum released by the DSO process would be in accordance with the ITU Table of Frequency Allocations for Region 3 and not rely on New Zealand footnotes to the Table.*

Potential future services

The bands 54 – 68 MHz and 174 – 230 MHz (Band III) are allocated to Fixed, Mobile and Broadcasting services in Region 3[1] countries, and offer favourable propagation for such use. Equipment is available for Fixed and Mobile uses, although the longstanding usage by television in most world markets has limited the equipment supply internationally. However the United Kingdom has allocated significant parts of this spectrum for civil mobile uses since their older (405 line) VHF television service was turned off some decades ago.

A relatively new use of the 174 – 230 MHz band is for digital audio broadcasting (DAB). The technology enables a significant number of programmes to be broadcast in a relatively small amount of spectrum. For example, and depending on the coding adopted, a stereo programme can use as little as 128 kBit/s and a single licence can support a bit stream of around 1.5 MBit/s, giving potentially 10 – 12 programmes per licence.

A further potential use of the VHF digital dividend could be DMB[2] type services. This technology effectively competes with both the DBV-H type technology for mobile video services and the DAB technology for the lower data rates required for sound broadcasting.

There are currently no government policies in place for either allocation of spectrum for additional sound broadcasting services or for potential transition and cessation of existing AM and/or FM services. DAB services have been deployed in several overseas countries with mixed success from a market perspective.

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[1] The ITU Frequency table has 3 Regions, R1 - Europe and Africa, R2 - Americas, and R3 - Asia and the Pacific.

[2] DMB (Digital Multimedia Broadcasting) can operate as a terrestrial service in the VHF Band III or as a satellite service in the UHF bands at 1.5 GHz. It can provide a mix of audio, video and data services. It has been extensively deployed in South Korea.

The current working assumption is that the 54 – 68 MHz and 174 – 230 MHz bands will continue to be managed under the management right regime and appropriate new allocations made for new services. It is further assumed that any re-allocation will coincide with or occur after the UHF re-allocation.

The Ministry has no firm view on the balance between the needs for various potential services and seeks information from stakeholders on their future needs and timing of such needs.

UHF spectrum issues

The band 470 to 890 MHz is allocated to Fixed, Mobile and Broadcasting services in Region 3 countries[3]. It is national matter to determine which parts of this frequency range should be used for particular services and New Zealand has already implemented or planned services below 502 MHz and above 806 MHz which has been excluded from consideration in this paper. Of the remaining spectrum between 502 and 806 MHz no decisions have yet been taken on either the bandwidth that should be made available for a digital dividend, or the location of the dividend spectrum within this frequency range. There are several issues yet to be determined that will influence decisions on these parameters.

Settlement of commercial licences – The settlement of renewal contracts requires the current licence to be in use. A number of licences will therefore not be settled and the spectrum will revert to the Crown in March 2010. In addition, some commercial licensees may decide to make other arrangements for digital transmission and either not settle the renewal contract or simply seek to extend their use until DSO without digital conversion rights.

Maori Television Service – The current management right of 32 MHz was dimensioned so that a near nationwide analogue network, as well as a potential set of digital licences could be accommodated. The current right expires in 2013. At this time, there is little actual usage as MTS have contracted with Sky to provide analogue transmission and with Kordia for capacity on the transition digital licences. In accordance with the statutory provisions, the current Management Right expires in 2013. The current spectrum is little used, and the spectrum that may be needed by the MTS in an all-digital environment is not yet clear to the Ministry.

The MTS Act is currently under review and the result of that review, and any consequent Government decisions are not yet known.

The current working assumption is that any discrete spectrum provided to MTS for digital television would be based on expected usage and would not exceed 2 RF channels nationwide.

[3] There are also additional or alternative allocations in some portions of this range in some countries.

Regional and non-commercial licences – There are several licences allocated and in use for analogue broadcasting in the 614 – 646 MHz range (Channel 39 – 42). In addition, there are a number of licences on Channel 39 used for Amateur television repeaters.

These regional non-commercial licences expire in 2010, and it is anticipated that the relevant licence holders will wish to continue present services until closer to the DSO date. The Ministry for Culture and Heritage are reviewing policies for regional digital television services, to recognise both the cost of digital services and the practicality[4] of digital television services operating outside of areas where other mainstream digital services are to be deployed.

> *The working assumption is that the equivalent of any existing non-commercially allocated analogue licences within the present DTT coverage area will in due course be available for the Crown to allocate as digital licences to support a variety of DTT programmes.*

The current radio licences for Amateur television repeaters will expire in 2010 as a management right has been created for this spectrum[5]. The ongoing intentions of the licensee, NZART, in regard to these analogue transmissions, are unknown. However, in a digital environment it is difficult to see how multiplexed repeater transmissions might occur. Policies will be required to determine if digital licences will be required or available for Amateur purposes, and whether these should be in the VHF, UHF, or other suitable spectrum.

> *The current working assumption is that current Amateur UHF analogue television licences will be discontinued at DSO. Any further requirements might be considered in the VHF bands.*

EXTENT AND PLACEMENT OF THE DIVIDEND IN THE UHF BANDS

Bandwidth of UHF spectrum to be re-allocated

Because of the issues that are not yet finalised, it is necessary to plan on the basis of some assumptions. The Ministry has therefore assumed the minimum bandwidth necessary to accommodate digital television[6] licences with the remaining spectrum being available for re-allocation decisions by Government.

Auckland currently has the "digital equivalent" of 22 RF channels in use by:

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[4] In some areas of New Zealand it is expected that digital switch-over will rely on satellite based transmissions, with no terrestrial services being provided. In these areas it would be unrealistic to anticipate that a significant number of households would purchase a terrestrial set top box simply to receive a single locally made broadcast programme.

[5] Any licences beyond 2010 will need to be created as spectrum licences.

[6] Planning has been scoped in the Auckland region on the basis as this area has the highest analogue use and will therefore have the greatest digital use. Christchurch has more main coverage licences in use (10 ATT and 3 DTT) but only a few infill licences (4 ATT and 3 DTT planned but unused) giving a total of potentially 20 RF channels. Wellington has 20 RF channels in use (excluding several ATT licences for TVNZ and TV3 infill which will be cancelled at DSO).

- 9 ATT main stations (Sky x 5 inc PayTV x 3, MTS lease and Prime), NZRB, Kordia x 2, and Triangle).
- 7 ATT infill coverage licences[7]
- 3 DTT transition licences
- 3 DTT infill transition licences

While decisions by commercial licensees, and policies for non-commercial use, are yet to be finalised, it has been assumed that all of these 22 RF channels (including a pair currently used under a non-commercial allocation) will be used for digital services. It has also been assumed that 2 RF channels will be available to MTS, and a further channel might be denied by licences in adjacent areas. The total digital television use could therefore require 25 RF channels in the Auckland area.

There are a total of 36 channels used/allocated at present between 518 and 806 MHz, plus a further 2 channels potentially available in the 494 – 518 MHz range. Therefore, from a total of 38 channels, some 25 channels should be treated as being re-planned for digital television with 13 channels or 104 MHz being potentially available as a digital dividend for a further allocation process. If further capacity expansion of the digital transition licences is agreed, then the available spectrum for other services would be reduced accordingly.

> *The current working assumption is therefore that the nationwide UHF digital dividend, including any further capacity that might be required for DTT capacity expansion, would be 104 MHz.*

Frequency limits of UHF spectrum to be re-allocated - nationwide

The current frequency plan in the UHF bands is essentially based on planning parameters for analogue licences, and the minimum changes necessary to accommodate the transition to digital licences. If the present analogue licences are "converted" to digital use on the existing frequencies, the spectrum released would be spread throughout the overall band and vary in each geographic area.

The Ministry will include conditions on all digital licences created which will allow cancellation and re-issue on a different frequency in order to achieve a technically efficient frequency plan that would maximise the nationwide digital dividend. While it is desirable to minimise actual changes of any licensed service, some changes are expected to be necessary. Changes will be minimised by offering digital licences on frequencies which are consistent with a fully digital frequency plan whenever possible.

The development of a fully digital frequency plan can be designed to place the frequency limits of the unused digital dividend spectrum in any particular desired part of the UHF frequency band. The frequency limits should ideally

[7] Each infill ATT coverage uses 2 RF channels, but in the digital environment the use of SFN technology needs only one RF channel. The two Kordia main stations in Auckland have no ATT infill coverage licences and therefore no DTT equivalent has been included.

be consistent with, or a sub-set off, the limits widely used by overseas administrations. However, at present there are no common frequency limits proposed for either several regions or a large number of countries.

The United States has recently re-allocated the 698 to 806 MHz band for new uses, including some bandwidth for public safety mobile services. This is the so-called 700 MHz band.

Europe has not yet finalised the specific spectrum to be re-allocated, or any preferred uses or allocation procedures. However, the spectrum currently used for television broadcasting in Europe has a higher limit, typically up to 854 MHz or 862 MHz, and the portion between 798 and 862 MHz is generally expected to be included as a minimum in the European digital dividend. The Commission's Radio Spectrum Policy Group[8] anticipated a report back in May/June 2009.

The United Kingdom had earlier considered a two part digital dividend (a lower band between 566 and 630 MHz and an upper part from 806 to 854 MHz) comprising 14 RF channels in total, but are now expected to harmonise its planning with the wider European perspective.

New Zealand and a group of 8 other countries in Region 3 have agreed on a footnote (5.313A) in the ITU Radio Regulations to identify a band for future IMT type services. The frequency range is 698 to 790 MHz although not all of this range may be needed or allocated to IMT type services. The overall bandwidth of 92 MHz is similar with the 104 MHz assumed to be available in New Zealand as the nationwide digital dividend.

> *The current working assumption by the Ministry is that the nationwide digital dividend in the UHF band will have an upper limit of 806 MHz and a lower limit of around 700[9] MHz.*

Additional UHF spectrum available in some geographic areas

The usage of the UHF bands by television services is currently not uniform throughout New Zealand. Present ATT use is typically up to around 80% of the population per network, although some specific networks may have slightly more or less coverage. Use of non-commercially allocated licences is generally only in the main centres.

The licences for DTT transition currently cover 75% of the population utilising an equivalent of 3 RF channels for main station coverage and three RF channels for infill coverage. Ideally, this requires a maximum of 6 RF channels nationwide although at present they are not allocated in such a uniform manner and use a wide range of actual RF channels.

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[8] Refer http://rspg.ec.europa.eu/

[9] If 104 MHz was released, the exact limit would be 702 MHz. A further channel being released would give a limit of 694 MHz which would fully encompass the US digital dividend frequency range.

The potential for an additional digital dividend in some geographic areas needs to consider both current DTT licences, and licences which can be sought through the conversion of existing analogue licences after 2010. These are outlined in Table 1[10].

Area	DTT main	DTT Infill	Potential conversions	Total equivalent RF channels
Upper Northland	0	0	1	1
Lower Northland	0	0	6 + 7	13
Auckland	3	3	19	25
Waikato/BoP	3	3	7	13
East Coast			4	4
Rotorua	3 (unused)	0	8 +7	18
Taupo	0	0	7	7
Taranaki	3 (unused)	0	6	9
Hawkes Bay	3	3	7	13
Manawatu	3	3	8 + 6	20
Wairarapa	0	0	6	6
Wellington	3	3	7 + 7	20
Nelson	0	0	6	6
West Coast	0	0	0	0
Canterbury	3	3 (unused)	10 + 4	20
Dunedin	3	3 (unused)	8	14
Queenstown	0	0	4	4
Southland	3 (unused)	0	7	10

TABLE 1: ESTIMTED GEOGRAPHIC SPECTRUM REQUIREMENTS

There are therefore some quite large geographic areas including much of Northland, East Coast, the Central Plateau, Taranaki, Nelson, the West Coast, Southland and Central Otago which could have a significantly greater bandwidth of digital dividend spectrum available than in the remainder of the country.

These areas are less populous, and therefore the costs of providing cable based services such as broadband may be more expensive than in other areas. Radio spectrum allocations to support broadband services may therefore be advantageous. The DVB standards support DVB IP protocols, although return channels would need to be implemented in some way, possibly over telephone circuits at lower data rates. There are also

[10] The potential for additional geographic coverage of transition licences has been planned by the Ministry and potential licences to extend to 80% are noted as unused in the table.

technologies that could provide a two way broadband service using the radio frequency spectrum if this was available in the relevant area.

If decisions were being considered to re-allocate a greater amount of spectrum in some geographic areas, it would be necessary to consider whether a minimum amount should be held by the Crown against the eventuality that some DTT usage may still be required in the longer term.

> *The current working assumption is that DTT coverage will not extend beyond 80% population coverage and that spectrum not required to meet that objective could be considered for re-allocation.*

ALLOCATION OF THE DIGITAL DIVIDEND

Final decisions will need to be made by Ministers after a consultation process. At this stage it is intended to seek information that would enable a soundly based consultation document to be prepared by the Ministry.

UHF spectrum

Major radio spectrum planning processes have traditionally been based around exclusivity of allocation and use, with relatively limited allocations for general shared usage. There are emerging technologies that utilise so-called "white space" in the radio frequency spectrum. This technology is able to use a variety of different frequencies and selects an appropriately unused part of the spectrum in the particular geographic area of operation.

In addition, some existing uses have requirements that favour use of shared use on a non-exclusive basis. For example some radio microphone usage has reasonably frequency agile equipment in order to operate reasonably separated sub-bands to avoid intermodulation issues. As such there may be no real purpose served by considering a narrower exclusive allocation. However, this can best be ascertained and determined as a part of the planning process.

New Zealand is an importer of technology and therefore must align its spectrum usage and allocations with as wide a range of technology standards and suppliers as possible. This means following overseas trends in major markets such as the US, Europe and our main trading partners.

The US has already finalised and allocated its "digital dividend" with its ASO to be completed in the next few months. The new allocations are in two broad groups, so-called the Lower and Upper 700 MHz blocks as detailed at the end of this paper. These blocks cover from 696 to 806 MHz which is very close to the spectrum identified in the Ministry's current working assumptions.

Europe has yet to determine its views on the digital dividend, although several countries have started work nationally, and joint work continues in various forums of both the EU and ITU. However, Europe has an ITU frequency exclusive allocation for Broadcasting up to 790 MHz and a shared allocation for Broadcasting, Fixed and Mobile services from 790 to 862 MHz.

Discussions to date suggest that the 790 to 862 MHz range would be the main portion of the digital dividend in Europe. If this occurs, there would be little harmonisation between the US and European technologies.

Australia uses both VHF and UHF for analogue and digital television and is still in the preliminary stages of considering a digital dividend. Further announcements are anticipated by mid-2009.

Potential uses of the UHF digital dividend

It has been assumed that all current uses in the digital dividend spectrum will be discontinued. This would include present broadcast and radio microphone uses.

Potential future uses include:

- Broadcasting, to add capacity for DTT (or technically similar) services;
- Mobile, digital "cellular like" services for voice and data;
- Broadband access services to generally fixed locations;
- Short range devices such as radio microphones.

The majority of the potential uses identified above are expected to be implemented by private parties using spectrum commercially acquired from the Crown. There may be some usage proposed by Crown agencies (for example Defence and other public safety uses). These will also need to be considered in the re-planning process, and if appropriate, decisions made by Government on any spectrum withheld from the general allocation process.

Broadcasting (and broadcast like) uses
The technology adopted by industry for terrestrial television provides for approximately 24 Mb/s of capacity per RF channel. This can support around 8 - 10 SD programmes or 2-3 HD programmes or a mix of both, depending on the bit rate assigned to each programme and technology utilised. If a significant number of programmes require HD transmission, the capacity of the present three transition licences will be exceeded, requiring additional licences or capacity to be acquired.

There may also be requirements for new transmission formats, such as the "3D"- format being experimented with, in some overseas countries. Any requirement for such formats and the transmission capacity required are not known to the Ministry at this time.

A further service being deployed with DVB technology is DVB-H or similar. This provides for a relatively low bit rate[11] service to handheld receivers, typically integrated into cellphone handsets. It is understood that this type of service can be provided together with conventional programmes over a DTT network such as the one deployed in New Zealand, but satisfactory mobile

[11] A SD television programme using MPEG-4 encoding may require 2-3 MB/s while a DVB-H type service may utilise a few hundred kB/s, for example 384 kB/s as used in 3G standards.

reception quality in areas of moderate and lower field strengths may require more extensive use of infill transmitters.

The spectrum assumed to be available for digital television (up to 25 RF channels) nationwide can support a large number of programmes. For example, assuming 12 main and 12 infill uses, one mix could be 12 HD programmes and around 60 SD programmes. Most of the licences will be owned on a commercial basis and therefore parties seeking access will need to negotiate with the relevant owners.

Government will need to determine the extent that further licences should be provided in a technical form suitable for television services as a part of its digital dividend decisions.

Mobile services

A number of countries are likely to use the digital dividend spectrum for future cellular services, providing a greater range of voice, data and video services. Apart from the US markets, the specific frequency plans likely to be adopted are not known with any certainty at this time. However, the probable use of FDD type technologies appears likely, requiring two sub-bands of frequencies.

Some technologies or implementations may provide for a mix of mobile and fixed location types of usage.

Fixed services

One potential use is for point to multi-point broadband access type services although the demand and technology deployment is not clear to the Ministry. It may be technically similar to digital cellular services.

Little demand is anticipated for conventional fixed point to point services.

Other uses

There are existing radio microphone services operating in the UHF bands and provision for these short range types of systems will be required in the future. Some usage may be practical in the portion of the band utilised for digital television, depending upon the packing density of the television licences. If guard bands are to be provided in the revised bandplan, these may be able to be used by short range devices under a General Licence.

Potential band plan for future uses

Further information on the expected requirements for all the above services will assist the Ministry in identifying a suitable technical plan for the digital dividend spectrum. This plan will need to consider the various technologies anticipated in order to determine appropriate boundary conditions and/or guard bands between different uses. The Ministry may need to discuss such boundaries with interested parties as a part of preparing a broader discussion paper.

Allocation and allocation timing of the released spectrum

The allocation method(s) and timing of the digital dividend spectrum are matters for Government to eventually determine. An integral part of such decisions is the extent of spectrum that may be reserved for use by the Crown in meeting any specific objectives it may have.

Some overseas administrations have (or plan to) allocated the digital dividend spectrum in the period between the final DSO date being set and that date being reached, set 1-2 years in advance of the DSO date. This allows future users to plan with certainty, even though the spectrum is not immediately available.

A DSO date for New Zealand has not yet been set. A tentative date is to be determined once the number of "digital households" reaches 60% and a firm date set when the level of 75% is reached. The expectation is that the DSO date will be in the 2012 to 2015 range.

FUTURE DISCUSSION PAPER

The Ministry would welcome comments on the current paper[12], presentations made at this workshop, and any other matters considered relevant to the creation and allocation of the digital dividend. Any comments made would not be attributed if they were used in future documents.

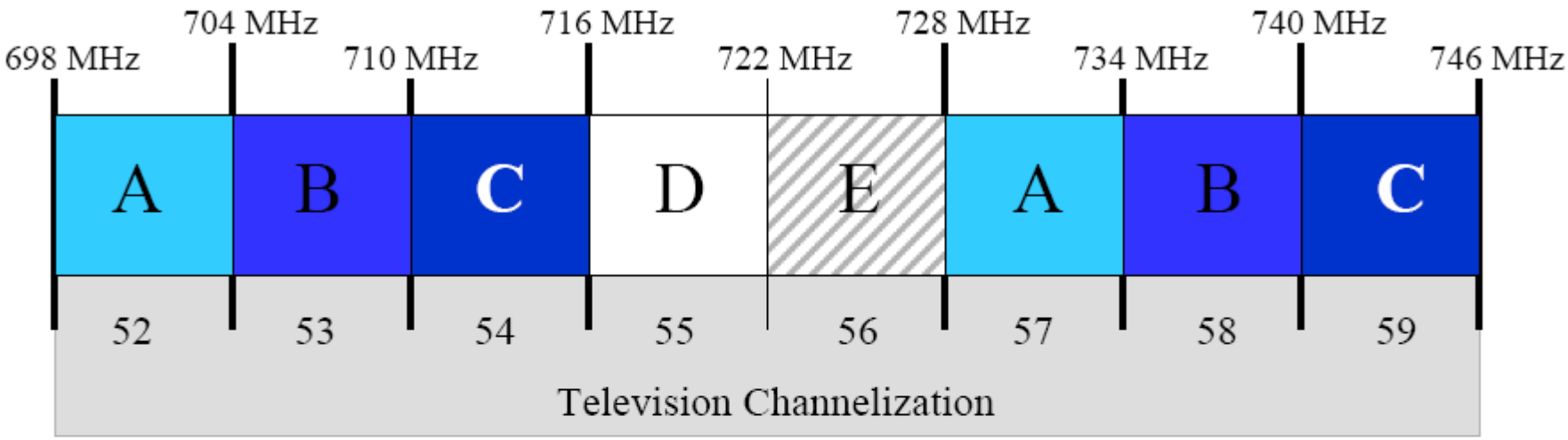
Comments can be made orally at the workshop, or by e-mail to radiospectrum@med.govt.nz

Any comments should be made within 4 weeks from the workshop date, i.e. by 11 June 2009

In mid 2009 the Ministry will be preparing a discussion paper for Ministers to consider and release for formal submissions from interested parties. This future discussion paper is intended to allow Ministers to make informed decisions by the end of 2009.

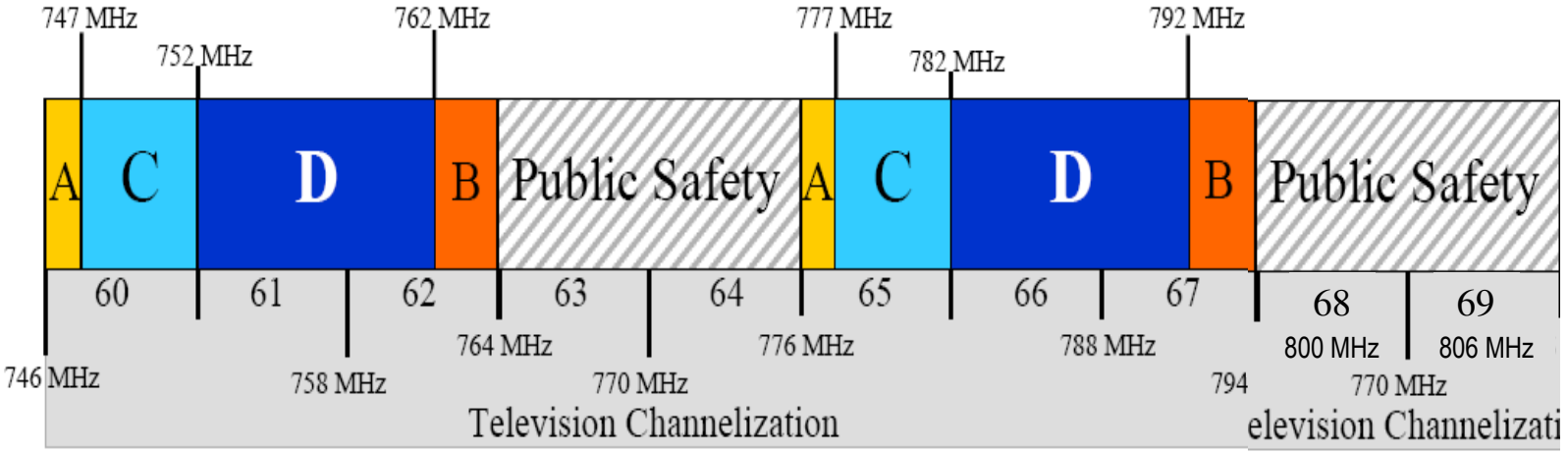
[12] This paper does not purport to represent Government policy or a formal viewpoint of the Ministry. Assumptions stated are for the purpose of encouraging discussion and the provision of further relevant information to the Ministry.

Lower 700 MHz Band Plan (US)



Block	Frequencies (MHz)	Bandwidth	Pairing	Geographic Area Type	No. of Licenses
A	698-704, 728-734	12 MHz	2 x 6 MHz	700 MHz EAG	6
B	704-710, 734-740	12 MHz	2 x 6 MHz	700 MHz EAG	6
C	710-716, 740-746	12 MHz	2 x 6 MHz	MSA/RSA	734
D	716-722	6 MHz	unpaired	700 MHz EAG	6
E	722-728	6 MHz	unpaired	700 MHz EAG	6

Upper 700 MHz Band Plan (US)



Block	Frequencies (MHz)	Bandwidth	Pairing	Geographic Area Type	No. of Licenses
A (Guard Band)	746-747, 776-777	2 MHz	2 x 1 MHz	Major Economic Areas	52
B (Guard Band)	762-764, 792-794	4 MHz	2 x 2 MHz	Major Economic Areas	52
C	747-752, 777-782	10 MHz	2 x 5 MHz	700 MHz EAG	6
D	752-762, 782-792	20 MHz	2 x 10 MHz	700 MHz EAG	6