A REVIEW OF THE APPLICABILITY TO NZ OF INTERNATIONAL DIGITAL DIVIDEND COST AND BENEFITS STUDIES

Ministry of Economic Development

Sydney, 29 June 2010

VENTURE Consulting

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1 Executive Summary

The Ministry of Economic Development asked Venture Consulting to review two international studies of the net economic benefits generated by awarding 'digital dividend' spectrum freed up by digital switchover (DSO) in order to determine the extent to which their approach and findings could be applied to the NZ environment.

An assessment of the methodologies employed by the studies reviewed suggests that they are broadly compatible with the New Zealand market environment.

On a conservative approach, using straightforward '% of GDP' and population comparisons, the net benefits of the award of circa 90MHz of digital dividend spectrum in New Zealand, assuming a mid-level of demand for wireless data, is estimated at NZ$1.1 billion to NZ$2.4 billion, as shown in the exhibit below.

Exhibit 1: Assessing the implications of the studies reviewed

	Population			GDP		
	Study $ per pop	NZ Pop ('000)	NZ implied benefit ($m)	Study %GDP	NZ GDP ($bn)	NZ implied benefit ($m)
Australia study (Low scenario)	402	4,291	**1,726**	0.59%	180	**1,068**
Australia study (High scenario)	566	4,291	**2,431**	0.84%	180	**1,504**
SVP Europe study (average)	388	4,291	**1,665**	0.61%	180	**1,101**
EU study – review (Low)	528	4,291	**1,499**	0.83%	180	**2,267**

Source: Analysys Mason Group, Venture Consulting, SVP, Eurostat, Statistics NZ, Australian Bureau of Statistics

Note: The Australian and SVP Europe studies are based on 20 years modelling plus Terminal Value, whilst the EU study is based upon a 'discounted value over 15 years' analysis.

We have not undertaken a detailed comparison between these studies and the 2006 Cost Benefit Analysis (CBA) study produced for the Ministry for Culture and Heritage. However, we have identified those components of the previous work that would overlap with the type of studies undertaken in Australia and Europe: the overseas studies were more limited in scope; and the net benefits identified in these studies were focused on the benefits of awarding digital dividend spectrum for new uses. However, these costs and benefits were reviewed in much more detail. If these are stripped out from the 2006 analysis, the net benefit of a 2015 DSO date, before considering the award of digital dividend spectrum for new uses is approximately NZ$100m.

The 2009 update of this work focused only on the broadcast market; the spectrum valuation changed only in terms of being updated to 2009 dollars. Therefore, the updated net benefit of a 2015 DSO date, before considering the award of digital dividend spectrum for new uses is approximately NZ$143m. Therefore, if a methodology similar to the overseas studies was applied to NZ, it is reasonable to expect that the net benefit would be circa NZ$150m plus the benefit of putting the digital dividend spectrum to new use.

Based on this review, we believe that a conservative estimate of '*more than NZ$1.2 billion of net economic benefit*' from DSO would be reasonable based on the analysis undertaken overseas.

2 Australia Cost Benefit Analysis Study for AMTA

2.1 Report Context

The study, '*Getting the most out of the digital dividend in Australia*', published April 2009, was commissioned by the Australian Mobile and Telecommunications Association (AMTA) on behalf of its members, the Australian mobile operators and vendors. The study assessed the net economic benefit of awarding 700MHz spectrum freed up by Digital Switchover (DSO), also known as 'digital dividend' spectrum, to mobile operators and broadcaster in varying combinations.

The results of the study were used by the mobile industry to lobby the Australian Government for a policy outcome that ensured a significant proportion of the digital dividend spectrum was reserved for mobile operators rather than broadcasters. The study methodology was based upon an earlier study conducted for the leading European mobile operators.

The study calculated the net economic benefit generated by the mobile and broadcast industries and then overlaid the two to calculate the net benefit across both industries under different scenarios. The study considered a range of future market demand scenarios and a range of spectrum allocation scenarios.

2.2 Summary of Findings

The report found that allocation a portion of the 700MHz digital dividend spectrum to mobile operators would generate a significant net benefit for the Australian economy:

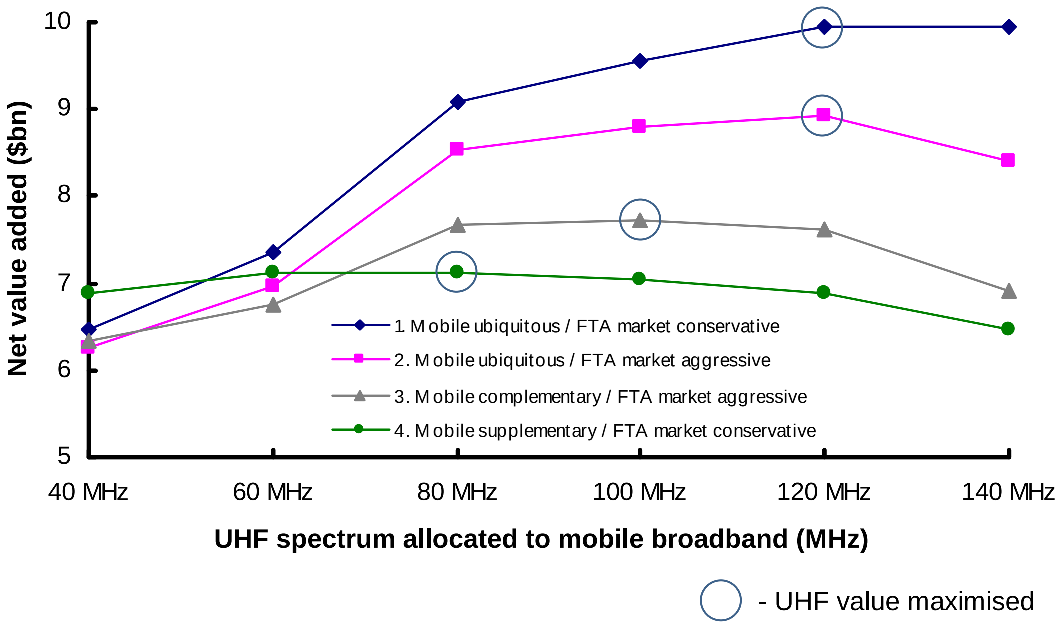
- Allocating the 'optimal mix' of UHF spectrum to mobile operators was forecast to generate a net benefit to the economy of between A$7bn and A$10bn[1] , depending on which overall market scenario was considered
- In the high demand scenario, where mobile broadband becomes a ubiquitous part of the broadband access mix, the maximum net economic benefit to society was forecast if 120MHz of 700MHz spectrum was allocated to mobile services
- In rural areas, where population density is lower, the propagation characteristics of the 700MHz spectrum are more suited to mobile coverage. As a result, the maximum net economic benefit under the same high demand scenario was forecast with an allocation to mobile of 140MHz of spectrum

The study considered a variety of demand scenarios across the mobile and broadcast markets. These were then combined into four 'whole of market' scenarios. For each of these whole of market scenarios, the net benefit to the Australian economy of different spectrum allocations was calculated.

The report found that awarding between 80MHz and 120MHz of digital dividend spectrum to mobile operators would deliver the maximum net economic benefit to the Australian economy. The chart below shows the how the range of A$7 to A$10 billion net benefit was arrived at across the four scenarios.

[1] NPV based on 20 years modelling (2008-2028) and a Terminal Value

Exhibit 2: Net value added – national ($bn)



2.3 Applicability to New Zealand

The Cost Benefit Analysis (CBA) methodology applied in the Australian report (and in the previous European report) could certainly be applied in a New Zealand context. The Australian study assessed benefits in metropolitan and rural markets. This would need to be modified in a NZ context. However, the overall methodology is not unique to one market.

The range of potential costs and benefits identified by the study would apply equally in New Zealand.

2.3.1 Applicability of mobile methodology

The Australian study worked on the basis that the net benefits generated by the mobile industry would be the same with or without the use of 700MHz spectrum. In other words, the availability of additional spectrum, per se, would not generate increase mobile usage or resulting consumer benefits.

However, the capital and operation costs facing the industry would be less if 700MHz spectrum was available. Therefore, the net economic benefit was calculated based on the difference between the costs with and without the digital dividend spectrum. This methodology is explained in the exhibit below.

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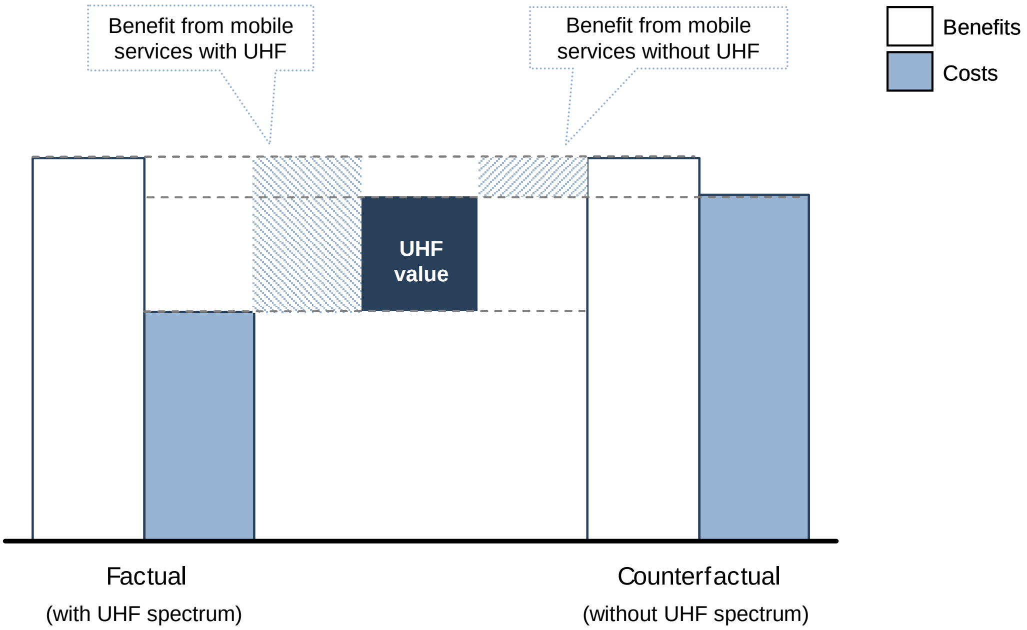
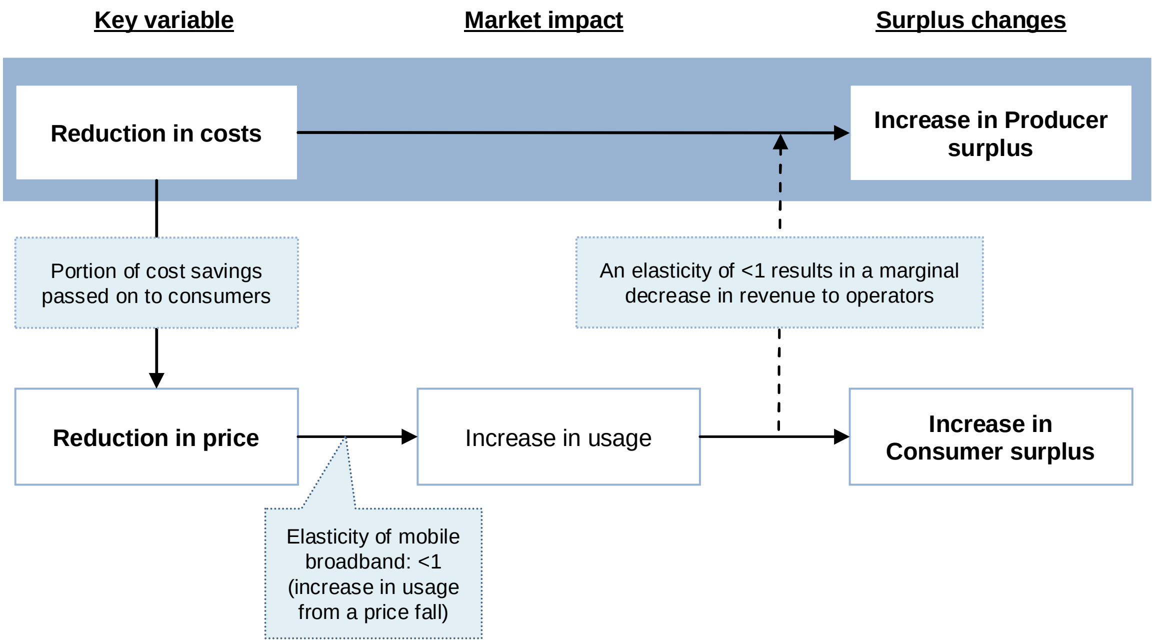
Exhibit 3: Assessing the value of UHF spectrum for mobile services



Under this methodology, the main benefits come from a reduction in capital costs require to deploy mobile coverage at higher frequency during the twenty year life of the study. This saving is driven primarily by the need for future mobile data capacity as devices become ubiquitous and as the capacity demanded per device increases. These savings are translated into a mixture of consumer surplus (as they are passed on in price reductions) and producer surplus (as they reduce operators' cost to serve their customers).

Exhibit 4: Direct consumer and producer surplus



Indirect benefits and externalities were assumed by the study to be negligible.

We expect that the NZ mobile industry will be able to make similar capital and operational cost savings if it is able to deploy services in the 700 MHz spectrum. All three operators have the potential to benefit for 700MHz spectrum as mobile data demand takes off.

The MED confirms that, as in other markets, operators either own or are likely to have access to other spectrum (at 850MHz, 900 MHz, 1800MHz, 2100MHz and 2.3/2.5GHz). However, as in other markets, there is a strong preference to use the digital dividend spectrum for cost effective build out of wireless data infrastructure.

Based on a review of the current spectrum market in NZ, there is no reason to suppose that the benefits to NZ operators (translated into direct producer or consumer surplus) would be of a different order of magnitude from those calculated for their Australian counterparts.

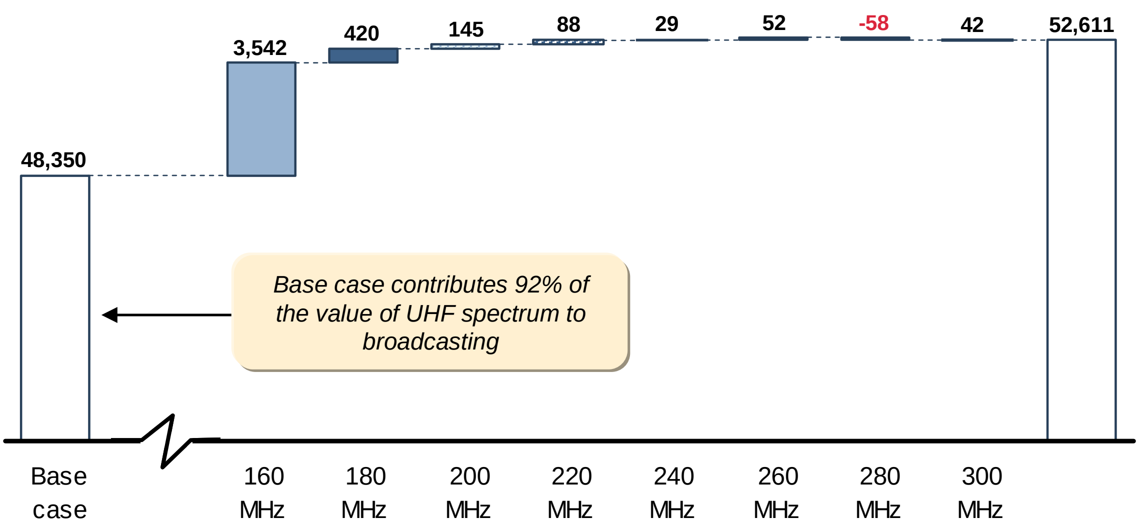
2.3.2 Applicability of broadcasting methodology

The main economic benefit from using spectrum for broadcast services is the increased consumer benefit of more channels. Given that these services will typically be free to consumers (Free-to-Air or FTA), a tool is needed to measure consumer benefit; this is 'willingness to pay' (WTP).

WTP assesses, through primary research, what a customer would be willing to pay for a channel that they currently receive for free. This ascribed value represents a measure of the consumer benefit generated by the incremental services. Quantitative research has shown that the consumer benefit of adding additional channels reduces quickly as the channel count increases.

This is illustrated in the chart below taken from the report.

Exhibit 5: Value of UHF to broadcasting in FTA market conservative scenario – national ($m)



We would expect a similar rapid decline in consumer benefits as additional DTT services are introduced in New Zealand. The ability of broadcasters to develop new FTA channels given the size of the NZ market is not clear. However, if we assume that additional channels will be delivered (even locally or from Australia), then we can assume that the incremental benefit to consumers to be similar given that studies across markets have show Willingness To Pay at similar levels.

Exhibit 6: Applicability to NZ of broadcasting costs and benefits

Direct producer surplus	• Broadcaster and equipment manufacturer's profit • Costs focused on transmission, programming and marketing • Benefits focus on sale of CPE	• NZ broadcasters and equipment manufacturers will experience a similar mix of costs as benefits as the number of digital services is expanded
Direct consumer surplus	• Costs are focused on the installation of new receiving equipment • Benefits focused on consumer utility of receiving new services. 'Willingness to Pay' used as a tool to measure benefit	• NZ potentially starts from a lower channel base, giving higher incremental consumer benefit for early services
Indirect producer surplus	• Incremental advertising revenue is a conservative proxy for additional profit generated by advertisers	• Same dynamic will apply in NZ
Externalities	• Social benefits from additional channels around education, national identity • Assumed at 10% based on UK research	• Similar incremental benefits could be expected for NZ given the relatively low 'PSB' base

2.3.3 Applicability summary

Our review suggests that both the mobile and broadcast CBA methodologies would be applicable in New Zealand. Therefore, the overall net benefit methodology should also be applicable to the New Zealand market. The differences identified would certainly impact the actual benefit that could be expected in the NZ economy, but not by an order of magnitude.

The table below shows how the net benefit in Australia would translate into a New Zealand environment based on two metrics: $ benefit per pop and benefits as a % GDP. In our view, both metrics are valid and provide a useful cross-check. **This suggests a benefit in New Zealand of NZ$1.1 billion to NZ$2.4 billion depending primarily on the scale of demand for mobile data.**

Exhibit 7: NZ benefit if equivalent to Australia

	Population			GDP		
	Study $ per pop	NZ Pop ('000)	NZ implied benefit ($m)	Study %GDP	NZ GDP ($bn)	NZ implied benefit ($m)
Australia study (Low scenario)	402	4,291	**1,726**	0.59%	180	**1,068**
Australia study (High scenario)	566	4,291	**2,431**	0.84%	180	**1,504**

What is more, given that broadly the same methodology was previously employed across three reference European markets and then expanded to all 27 European Union countries, we have extended this review to include this previous work as well. The EU report, '*Getting the most out of the digital dividend*' was published by Spectrum Value Partners in March 2008. The European study split countries intro three categories based upon their level of economic development and the state of their Free-to-Air television market. This provides the basis for comparative analysis across Europe suggesting total benefits of circa EUR100bn.

Exhibit 8: Summary of EU analysis of net benefits from awarding digital dividend spectrum (Demand Scenario 2, 80MHz awarded)

EU	GDP €bn	Pop	Net Benefits (€bn)	% GDP	€ per cap
Germany	3,309	82002356	23.4	0.71%	285
Spain	1,669	45828172	13.1	0.78%	286
UK	2,717	61634599	12.1	0.45%	196
France	2,509	64350759	11.0	0.44%	171
Italy	2,145	60045068	11.0	0.51%	183
Netherlands	797	16485787	5.6	0.70%	340
Sweden	392	9256347	5.3	1.36%	575
Belgium	451	10750000	4.6	1.03%	432
Austria	390	8355260	4.0	1.02%	476
Greece	451	11260402	2.9	0.63%	254
Poland	781	38135876	2.8	0.35%	72
Ireland	238	4450014	2.4	1.01%	541
Finland	214	5326314	2.2	1.05%	421
Denmark	251	5511451	1.8	0.71%	325
Czech	297	10467542	1.6	0.54%	153
Romania	305	21498616	1.2	0.40%	57
Portugal	279	10627250	1.1	0.39%	104
Hungary	245	10030975	1.1	0.43%	106
Slovakia	150	5412254	1.0	0.67%	185
Bulgaria	113	7606551	0.6	0.54%	80
Latvia	55	2261294	0.3	0.56%	137
Lithuania	77	3349872	0.3	0.38%	87
Estonia	37	1340415	0.3	0.68%	187
Slovenia	60	2032362	0.2	0.33%	98
Luxembourg	45	493500	0.2	0.37%	340
Malta	11	413609	0.2	1.53%	406
Cyprus	23	796875	0.1	0.35%	100
Total / average	**18011**	**499723520**	**110.2**	**0.61%**	**221**

Note: Reference markets were Italy, The Netherlands and Slovakia
Source: Eurostat (est. population 2009), Spectrum Value Partners (GDP, Net benefit), Venture Consulting analysis

The table above was based upon a mid-range demand scenario, which assumes that mobile data demand continues to grow substantially, but in a complementary manner to fixed.

It can be seen that in many of the wealthier markets, a benefit of between EUR150 – EUR450 per capital is expected. In GDP terms the range is narrower with benefits of between 0.5% and 1.5% of GDP are expected. For the purpose of this exercise, we have taken the average across Europe as a reference point. Given New Zealand's level of development, we believe that this represents a conservative approach.

The average level of benefit across Europe identified by the European study was EUR221 per capita, or 0.61% of GDP. These are both at the low range of the wealthier markets. **Translated into the New Zealand environment, this represents total net benefits of NZ$1.1 billion (on a %GDP basis) and NZ$1.7bn (on a per capital basis).**

3 EU Digital Dividend Study for the European Commission

3.1 Report Context

The study, *'Exploiting the Digital Dividend' – a European Approach*, was commissioned by the European Commission to determine '*the scope for action at a European Union (EU) level to promote the efficient use of 'digital dividend' spectrum*'. The study was undertaken by Analysys Mason Group, Dot Econ and Hogan & Hartson, and was published in August 2009. The report was intended to inform policy making at the European level.

The study identified seven potential uses of digital dividend spectrum, with the two highest value uses being digital terrestrial television (DTT) and commercial wireless broadband (the same two services considered by the Venture / Spectrum Value Partners report). As in Australia, the report determined that the 700MHz spectrum is valued by service providers because of its propagation characteristics and the fact that large contiguous spectrum bands are available.

The study focused on assessing the benefits of co-ordinated Europe-wide action. In particular it looked at the benefits of a European-wide clearance of the 790-862MHz band for award to new uses, the benefits of clearing a further sub-band, and the benefits of additional spectrum clearance.

The study also reviewed six previous studies, including the European Spectrum Value Partners study referred to in the previous section, in order to determine the base level net economic benefit of awarding digital dividend spectrum for new uses.

3.2 Summary of Findings

For the purposes of this review, we have focused on the calculations of economic benefit contained within the report. The analysis considered two main sources of value, defined as:

- Private value: taken to mean to sum of net consumer and producer surplus
- External value: taken to be the sum of all externalities including '*public value*' and '*other sources of value*' such as investment spill-overs to other parts of the economy and non-internalised network effects

As with the Australian study, the EU study focused on measuring incremental value, i.e. the additional value that can be ascribed directly to the provision of services using digital dividend spectrum as opposed to using alternative technologies or platforms.

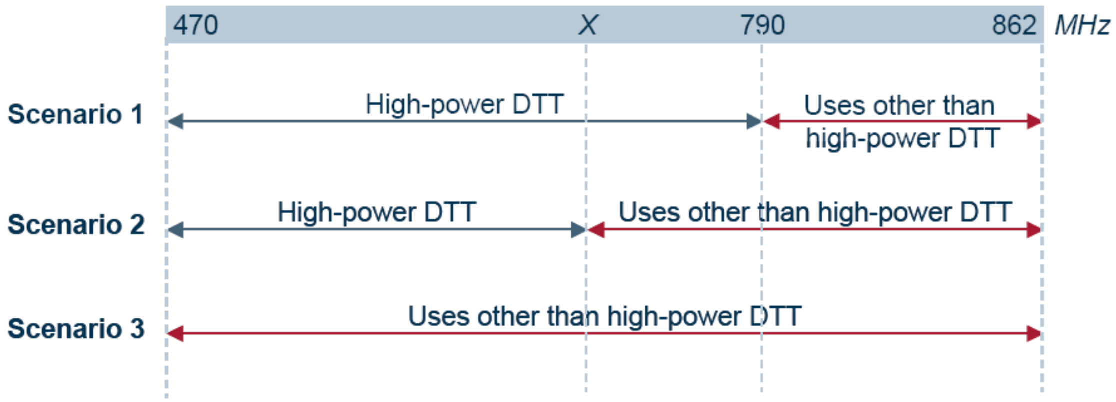
Based on an assessment of six previous studies (including the Spectrum Value Partners' European study referred to above), the report's authors estimated the total net private value of awarding digital dividend spectrum to be EUR150 billion to EUR600 billion across the EU ('discounted value over 15 years'). They then took the OFCOM benchmark of public value being worth 5-15% of private value to arrive at a total expected net benefit for EUR150 billion to EUR700 billion. It is important to recognise that these figures were based upon the authors' interpretation of previous studies and not on new research or analysis.

The rest of the study focused on identifying European-wide actions and assessing the further value that they could generate. The study defined a reference case in which 16 Member States use the 790-862MHz band for mobile services and the other 11 Member States retain high powered DTT across the whole band. Three scenarios were then assessed against this reference case:

1. The whole EU uses the 790-862MHz band for wireless;
2. By 2018, all States clear the 694-790MHz of DTT for additional uses; and

3. A radical scenario where DTT is cleared entirely from the whole 470-790MHz band by 2020

Exhibit 9: Three scenarios for pan-EU digital dividend use



The study considered these three scenarios under six different demand scenarios based upon the likely demand for DTT and for wireless.

Exhibit 10: Demand scenarios employed

	Wireless broadband: Low	Wireless broadband: High	Wireless broadband: High with new use
DTT: Low	Scenario A	Scenario B	Scenario C
DTT: High	Scenario D	Scenario E	Scenario F

The Cost Benefits Analysis (CBA) approach employed appears to be very similar to the Australian study, with private value modelled on the assumption that operators build out in the most cost effective manner possible. The exhibit below shows the incremental costs and benefits considered as part of the study.

Exhibit 11: Incremental costs and benefits considered under the CBA

Incremental benefits	*Scenario 1*	*Scenario 2*	*Scenario 3*
No use prevented in the 790–862MHz sub-band in any Member State	✓	✓	✓
Increased value from economies of scale and roaming	✓	✓	✓
Greater certainty for manufacturers	✓	✓	✓
Additional benefits from spectrum beyond the 790–862MHz sub-band		✓	✓
Incremental costs	*Scenario 1*	*Scenario 2*	*Scenario 3*
Loss of DTT multiplexes	✓	✓	(✓)
Upgrade and changes to broadcasting networks	✓	✓	(✓)
Consumer switching costs – change in broadcasting networks	✓	✓	(✓)
Development of alternative free-to-view platform			✓
Consumer switching costs – alternative free-to-view platform			✓

The table below summarises the results of the CBA analysis. The analysis found that the case for clearing the 790-862MHz band, even before Europe-wide benefits were taken into account, was strong, and that this remained true even with low wireless demand. As wireless demand increased, the case for clearing a further sub-band strengthened.

Exhibit 12: Summary of CBA analysis results

	Incremental private value of supply scenarios relative to the Reference Scenario as of 2009		
Demand scenarios	***Scenario 1*** *(Sub-band for non-high-power DTT use introduced at 790–862MHz)*	***Scenario 2*** *(Second sub-band in addition to the 790–862MHz sub-band)*	***Scenario 3*** *(High-power DTT is cleared from the entire band)*
Scenario A *(DTT low, wireless broadband low)*	**EUR17 billion**	EUR13 billion	EUR1 billion
Scenario B *(DTT low, wireless broadband high)*	EUR44 billion	**EUR61 billion**	EUR51 billion
Scenario C *(DTT low, wireless broadband high with a new use)*	EUR44 billion	EUR75 billion	**EUR95 billion**
Scenario D *(DTT high, wireless broadband low)*	**EUR17 billion**	EUR12 billion	EUR0.2 billion
Scenario E *(DTT high, wireless broadband high)*	EUR44 billion	**EUR60 billion**	EUR50 billion
Scenario F *(DTT high, wireless broadband high with a new use)*	EUR44 billion	EUR74 billion	**EUR95 billion**

Based on the analysis, the study's authors made two main recommendations:

- That all EU nations clear and award the spectrum in the 790-862MHz range, generating a net economic benefit of EUR17 billion – 44 billion (NPV over 15 years). This is the incremental benefit due to all member states clearing their spectrum
- That a review should be undertaken in the near to medium term to '*consider preparatory actions for the further clearance of spectrum in the 470-862MHz band.*'

The report also made a number of sector specific recommendations, such as the immediate replacement of spectrally inefficient MPEG-2 DTT receivers across Europe.

3.3 Applicability to New Zealand

The approach taken in the EU study is relevant to the New Zealand context. The two most valuable uses of spectrum identified by the study (DTT and mobile wireless) are also the two uses most likely for the spectrum in New Zealand. Also, the frequency bands considered match closely; NZ has announced that the 694MHz to 806MHz band will be allocated to new uses.

As discussed in the previous chapter, the issues facing the European market are very similar to those facing the New Zealand market. The market structures are also similar. Therefore, whilst there are not insubstantial differences between markets, the main sources of economic costs and benefits are the same, with differences impacting the scale of benefits, but not in a fundamental fashion. Therefore, the assessment of the underlying economic value derived from awarding digital dividend spectrum to DTT and mobile operators, based on the six previous studies assessed, is relevant to New Zealand.

Despite the fact that the EU study does not include any new analysis in this regard, the authors included professional economists and their review of previous studies can be taken as being professionally undertaken.

The six studies assessed were all commissioned for different reasons and with different contexts. However, they were all looking to measure in some shape or form the net benefit due to the award digital dividend spectrum to new uses. Therefore, given that the NZ market has a similar level of economic activity to a number of European countries, the estimate of the range of private and public value generated across the EU can be taken as a basis for assessing the broadest range of value likely to be generated in NZ, especially if a conservative approach is taken.

The EU study estimated net economic benefit of EUR150 billion to EUR750 based on its review. The exhibit below shows that, on a per capital and %GDP basis, this range of net economic benefit identified in the previous six studies, translates to a range of economic benefits from NZ$1.5 billion to NZ$10.6 billion.

Exhibit 13: Range of economic benefits from previous EU studies in a NZ context

	Population			GDP		
	Study $ per pop	NZ Pop ('000)	NZ implied benefit ($m)	Study %GDP	NZ GDP ($bn)	NZ implied benefit ($m)
EU study – review (Low)	528	4,291	**1,499**	0.83%	180	**2,267**
EU study – review (High)	2,465	4,291	**6,996**	3.89%	180	**10,579**

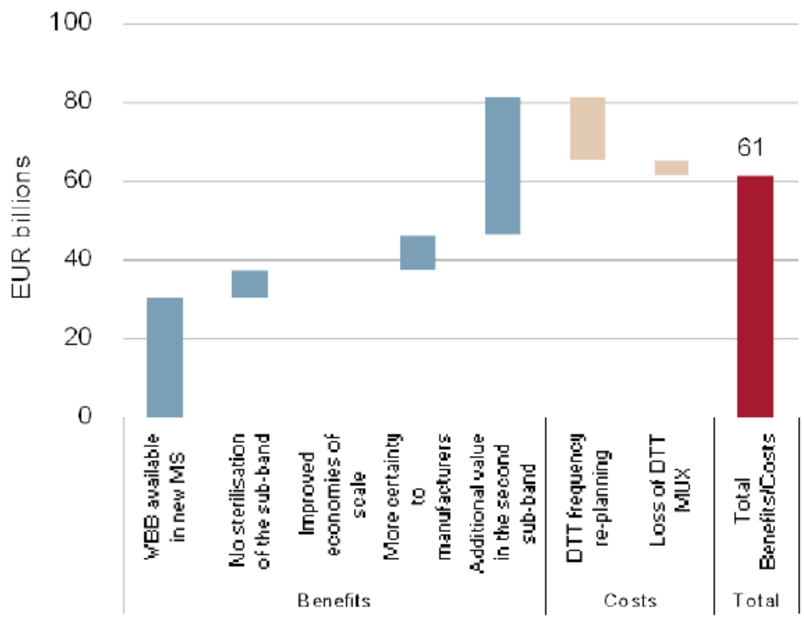
Based on the fact that these six studies are already 'once removed' from this review, we recommend using only the lower range of NZ$1.4 billion to NZ$2.3 billion as an indicative range for New Zealand.

The additional Europe-wide cost benefit analysis contained in the EU report is less relevant to the New Zealand environment. The pan-European benefits identified included reduced cross-border interference, roaming benefits and scale benefits to manufacturers. These will not be relevant in New Zealand.

The incremental scenario analysis showed that if mobile demand is very high, the benefits of clearing additional spectrum and making it available to new uses are significant. This finding reinforces the findings of the Australian report and is relevant to every market, including New Zealand. The study estimated up to EUR96 billion of additional benefits.

In this context, the scenarios most relevant to NZ today are probably Scenarios B and E (high demand for wireless) where an additional sub-band is cleared. These generated an estimated net economic benefit of EUR60-61 billion. The exhibit below shows that of this benefit, circa EUR15 billion (25%) can be attributed to non-Europe wide benefits.

Exhibit 14: CBE breakdown for 'Scenario 2' under 'Demand Scenario B'



On this basis, the NZ Government should continue to review the likely benefits of clearing additional spectrum for wireless broadband as demand grows.

However, in the context of this review, we propose ignoring these potential benefits as they will only accrue based on a combination of high demand for mobile coupled with further action from Government.

4 Reasonable Expectation of NZ Benefits

4.1 NZ Background and Current Policy

The New Zealand Government has announced that the spectrum band from 694 MHz to 806 MHz will be allocated to new uses (presently used for Broadcasting) following digital switchover (DSO). The manner in which this will be awarded has not been confirmed, but in terms of quantum and approach is similar enough to the situations in Australia and across the EU to consider the findings of the Australian and EU studies as relevant to New Zealand.

4.2 Mobile Environment

The current spectrum environment in New Zealand is similar to that in the markets considered by the studies under review. Mobile operators currently hold spectrum in the 850MHz, 900MHz, 1800MHz and 2100MHz ranges. They do not face immediate capacity constraints, but significant growth in mobile demand would require them to build out significant additional mobile radio infrastructure. Their preference from a cost perspective in New Zealand, as elsewhere, would be to utilise the DSO spectrum for much of this growth.

4.3 Broadcast Environment

The New Zealand market is different from most European markets in that considerable DTT spectrum has already been awarded. This is held by a range of broadcasters, including SKY, and some UHF analogue services have already been discontinued whilst some others, including analogue services in the digital dividend spectrum will likely continue until DSO. This makes the process of clearing or ‘restacking’ digital broadcasting services possible before the DSO date and this approach is being investigated. The analogue services would simply cease at DSO and their licences would be replaced with digital licences in the broadcasting frequency range. This means that the digital dividend spectrum would be available immediately after DSO. This does not change the underlying dynamics of the digital dividend equation: that there are significant benefits available from awarding spectrum to new uses, wireless data in particular. Rather it allows those benefits to be realised at an early date.

Therefore, it is assumed that New Zealand is able to clear / re-stack its digital dividend spectrum to realise 90MHz of spectrum for new uses as announced by the Government, from the DSO date.

In addition, the small size of the NZ broadcasting market means that broadcasters may not be able to step forward and launch as many new services as in other markets. However, the vast majority of the benefits identified in other studies come from wireless data applications. This can be seen in the mix of value in the Australian study and in the incremental benefits delivered under various demand scenarios in the EU study.

Therefore, we do not expect the possible lower level of incremental DTT activity to impact the realisable economic benefits in NZ in any significant fashion.

4.4 Potential Economic Benefits to NZ from the Award of Digital Dividend Spectrum

This review does not constitute a formal calculation of the economic benefits to the New Zealand economy of awarding DSO spectrum to new uses.

However, it is clear from an assessment of the Australian and EU reports that the methodologies employed would in large part be valid if employed in the New Zealand market. Thus, whilst significant differences exist between the New Zealand market and the Australian of EU markets, the benefits identified by the studies under review provide a reasonable basis for assessing the likely benefits of DSO in New Zealand.

It is not possible to pinpoint and exact figure, but the analysis conducted overseas can be used to determine a reasonable range of benefits that New Zealand might expect to enjoy.

The table below takes a range of the benefits identified by the international studies. These are based upon the wireless data demand scenarios in the mid-range (rather than the high or low demand scenarios). If New Zealand experiences similar levels of wireless data demand, then this analysis provides a good start point for an assessment of NZ benefits.

The international data has been translated into a New Zealand impact using two metrics: net benefits per capita and net benefits as a % of GDP. We believe that both are reasonable metrics to employ. The analysis suggests that the award of digital dividend spectrum in New Zealand will result in net economic benefits in the NZ$1.1 billion to NZ$2.4 billion range.

Therefore, we believe that a conservative estimate of '*more than NZ$1.1 billion of net economic benefit*' on an NPV basis, would be reasonable based on the analysis undertaken overseas.

Exhibit 15: Summary of range of expected NZ economic benefit from award of DSO spectrum

	Population			GDP		
	Study $ per pop	NZ Pop ('000)	NZ implied benefit ($m)	Study %GDP	NZ GDP ($bn)	NZ implied benefit ($m)
Australia study (Low scenario)	402	4,291	**1,726**	0.59%	180	**1,068**
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Note: The Australian and SVP Europe studies are based on 20 years modelling plus Terminal Value, whilst the EU study is based upon a 'discounted value over 15 years' analysis.

4.5 Relationship with previous CBA work undertaken for MCH

A previous study was undertaken for the Ministry for Culture and Heritage (MCH), '*Cost benefit analysis of the launch of digital free-to-air television in New Zealand*', by Spectrum Strategy Consultants in 2006[2]. We have not undertaken a formal comparison with the work previously undertaken for the MCH. However, we have identified those components of the previous work that would overlap with the type of studies undertaken in Australia and Europe.

The original CFH work considered:

- The incremental net economic benefit of launching Free to Air digital television (Scenario 2)
- The incremental net economic benefit of Digital Switchover (Scenario 3)

[2] The Sydney office of Spectrum Strategy Consultants became Venture Consulting. The MCH study was led by Justin Jameson, author of this review.

The study forecast a net economic cost of launching digital television of NZ$156m (in 2006 NZ$) compared to a net economic benefit of NZ$230m (in 2006 NZ$) in the base case scenario where DSO occurred in 2015. The table below summarises the results.

Exhibit 16: Results from the 2006 MCH cost benefit analysis

Benefits	Sc.2 - low	**Sc.2 - base**	Sc.2 - high	Sc.3 - low	**Sc.3 - base**	Sc.3 - high
WTP	100	**481**	1,043	191	**695**	1,303
Benefit to non-adopters	0	**0**	0	6	**5**	5
CPE and Installation margin	12	**15**	16	39	**38**	36
Analogue transmission savings	0	**0**	0	123	**123**	123
Transmitter replacement savings	0	**0**	0	12	**12**	12
Analogue spectrum savings	0	**0**	0	5	**5**	5
Value of released spectrum	0	**0**	0	131	**131**	106
Total benefits	**112**	**496**	**1,059**	**507**	**1,009**	**1,590**
Costs						
CPE	63	**102**	134	175	**186**	204
Electricity bills	10	**19**	27	28	**36**	42
Digital spectrum	0	**0**	0	7	**16**	25
Digital transmission	61	**185**	260	61	**185**	260
Programming	0	**311**	418	0	**311**	418
Marketing/Promotion	17	**34**	52	22	**44**	66
Total costs	**151**	**651**	**890**	**294**	**779**	**1,015**
Total CBA	**(40)**	**(156)**	**169**	**214**	**230**	**575**

It can be seen that costs and benefits arose from several areas including savings from discontinuing analogue transmissions, the cost of launching new digital services, and the revenue from awarding digital dividend spectrum for new uses.

The Australian and European studies were more focused in their scope The net benefits identified in these studies were limited to the benefits from awarding digital dividend spectrum for new uses. However, they reviewed these costs and benefits in much more detail.

The 2006 NZ study assessed the net benefits of digital dividend spectrum using a conservative per MHz per pop benchmarking methodology to assess net benefits. The Australian and European studies looked at a range of potential uses for the spectrum released by ASO and built bottom up net benefit analyses for each use.

Using the same definitions as in the table above, the only component of the 2006 study that is overlapping with this analysis of the award of digital dividend spectrum is the benefit 'Value of released spectrum' on the basis that this represents a proxy for the net benefits associated with releasing spectrum for new uses.

The remaining incremental Scenario 3 costs and benefits are all associated with the switch off of analogue television and the resulting transfer of households from analogue to digital, with all the associated benefits (such as increased total 'Willingness To Pay' and CPE revenues) and costs (such as CPE costs and additional electricity).

If the spectrum related net benefits are stripped out from the 2006 analysis, the net benefit of DSO before considering the award of digital dividend spectrum for new uses is approximately NZ$100m (in 2006 dollars).

However, the review of the Australian and European studies suggests that there would be a net benefit from awarding the digital dividend spectrum of over NZ$1bn (in 2009 dollars). There are several reasons why this benefit could be more than forecast in the 2006 analysis:

- As discussed, the original work for the MCH applied a conservative 'per MHz per pop' benchmark approach to valuing spectrum, whereas the Australian and European studies looked at possible uses for the spectrum and sought to value the resulting costs and benefits. The NZ benchmarking approach was identified at the time as being very conservative and would be likely to underestimate net benefits
- In addition, and probably more importantly, since the 2006 work was done, the current and expected future demand for wireless data has grown exponentially. Wireless data is now seen as critical to the future of the mobile industry, with demand expected to grown significantly going forward. As a result, the potential benefits of building out wireless infrastructure in the UHF band have increased substantially

This 2006 work was subsequently updated by Venture Consulting in 2009 to take account of market developments. However, the update was limited to reviewing the changes to the broadcast market. As a result the broadcast market forecasts were recast and the original model methodology was run again. The methodology for calculating the value of the digital dividend spectrum did not change. The revised estimates of net economic benefit in the base case scenario were NZ$317m for a DSO date of 2015 and NZ$405m for a DSO date of 2013. However, since the 2009 analysis was focused exclusively on changes in the broadcast environment, it did not consider any change in spectrum valuation and therefore, it did not capture any impact of the changing mobile environment. The only difference in spectrum value relates from translating from 2006 dollars (NZ$131m) to 2009 dollars (NZ$174m).

Therefore, under the 2009 assessment, the net benefit of DSO before considering the award of digital dividend spectrum for new uses is approximately NZ$143m (in 2009 dollars) with a 2013 DSO date and NZ$209m with a 2013 DSO date. The circa NZ$1billion of potential digital dividend spectrum related net benefits can be added to this.

4.6 Impact of DSO timing on benefits

As elsewhere, the value of the digital dividend spectrum is directly related to the costs avoided building out radio infrastructure at higher frequency bands. This in turn is dependent on the timing of award of DSO spectrum and the timing of future mobile demand.

New Zealand is understood to be considering either late 2013 or late 2015 for a DSO date. The components that make up the net economic benefit do not change according to time, but their relative value will. The critical factor is the combined consumer and producer surplus generated through the use of DSO spectrum for wireless broadband. This is derived from the avoided cost of building out more expensive radio infrastructure at higher frequencies. Therefore, the impact of moving the DSO date between 2013 and 2015 will depend on the level of demand for mobile data and how fast NZ operators need to build out additional infrastructure.

This review has not sought to quantify the benefits associated with the NZ Government awarding digital dividend spectrum earlier or later. However, most of the studies[3] assume that the digital dividend spectrum is awarded in the 2013 timeframe, so any delay to this date could be expected to reduce the total economic benefit available to New Zealand over and above the benefit reduction identified in the previous work undertaken for MCH.

[3] The Australian study assumes DSO spectrum is available from 2014. The SVP European study assumes DSO spectrum is available from 2013. The AMG study, where it discusses an ASO date, works on the basis of the Europe-wide agreed date of 2012, whilst recognising that not all EU Members will meet this target

5 Contact information

Venture Consulting is Australia's leading independent telecommunications and media consultancy firm. It came into being following local management's buyout of the Sydney office of the global management consultancy Value Partners in January 2009. We are a broad-based consultancy, having worked with Australia and New Zealand's leading operators, policy makers, regulators, vendors and financiers to provide strategic, commercial, financial and technical advice. Specifically, we work across corporate and commercial strategy, financial advisory support, bid support, operational improvement and change management, policy and regulation, rights management, strategic technology decisions and strategy implementation.

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