

Synopsis of 15-year spectrum licence valuation methodology

Spectrum licences at 800 MHz, 1800 MHz, 2.1 GHz, 2.3 GHz and 3.4 GHz will be reissued during the period 2013-2017 either through renewal at an administratively determined price or through price based reallocation (e.g. auction).

This is a synopsis of the methodology employed by Plum Consulting and the identified value range for the spectrum licences considered for reissue. This synopsis excludes references to individual operators and does not include derived recommended values.

The spectrum licences to be valued are currently used to provide either public mobile services (voice and data) or broadband wireless access. It was assumed that the licences will continue to be used for these applications over the next 15 year licence period as the bands are used internationally for these applications.

There are three elements to the study:

- A review of international evidence on the value of spectrum licences in the same or similar frequency bands as revealed in auctions and licence renewal processes elsewhere.
- Modelling of values based on the projected revenues and costs of a hypothetical operator. A spreadsheet business model was constructed and calibrated against data and projections for the Australian market.
- An assessment of the disruption costs that might be associated with auctioning licences.

International evidence

Simple inflation of the original auction receipts in line with either CPI inflation or GDP growth would suggest spectrum values in 2013 that would be 50% higher than the original auction values. This approach does not give a reliable estimate of value because it does not take account of the impact of increased spectrum supply and technology change, both of which may tend to reduce value. Furthermore international evidence shows no clear trend in values over time.

The findings from a review of international evidence on spectrum value since the original auction of the Australian spectrum licences are as follows.

- International benchmarks suggest that the value of the 800 MHz band is likely to exceed the original auction value of \$328m. The international benchmarks and the current 900 MHz apparatus licence tax indicate increases over a wide range (15-200%) could be appropriate.
- The 1800 MHz auction results look reasonably high when compared with the results of more recent auctions. This suggests that a premium to these values would not be expected in future.
- The original 2.1GHz values were moderate but not unduly low by international standards.
- The original auction/reissue values for the 2.3GHz and 3.4 GHz bands look high relative to international indicators.

Modelling was not undertaken for the 2.3 and 3.4 GHz bands as the opportunities here are much more speculative and relative values are likely to be low. International benchmarks were used to determine a value in these cases.

Modelled values

Values were calculated based on a hypothetical incumbent operator and assuming that the market continues to support three operators. The value of the spectrum to the weakest of the three operators was modelled on the assumption that the government would not want to set prices at a level that might result in further industry consolidation.

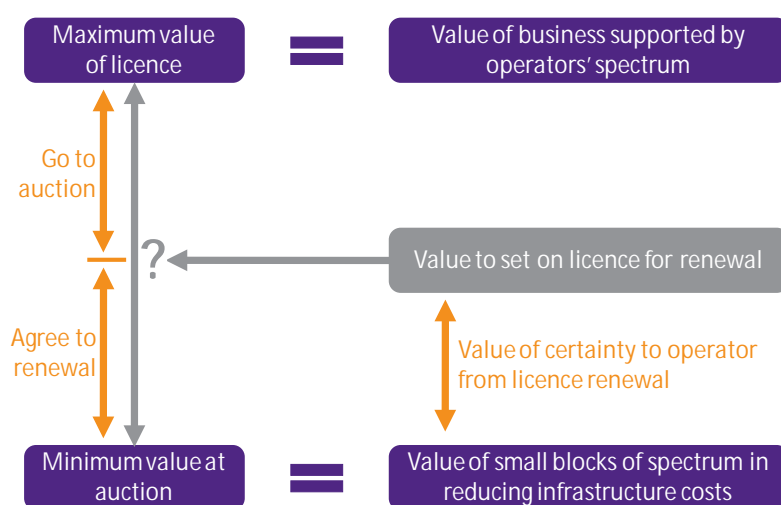
To provide bounds on the value of the spectrum licences the following two measures were modelled:

- **Cost reduction:** This is the value arising from the use of an incremental block of spectrum to reduce infrastructure costs. The cost reduction value is calculated by modelling infrastructure costs with and without additional spectrum. In congested areas additional spectrum allows more capacity to be deployed per site (and therefore fewer sites are required). The coverage and in-building penetration advantages of lower frequency bands were values based on differences in the number of base stations needed to provide coverage. It was assumed that the minimum block size for efficient deployment of 3G services is 2x5 MHz while that for LTE services is 2x10 MHz.
- **Full enterprise value:** This is the net present value (NPV) of total business cashflows (i.e. revenues less costs) that a mobile operator earns from all of its spectrum holding. This sets an upper bound on what might be charged on licence reissue. A price higher than this level would mean that the operator modelled would go out of business.

In both cases, values were estimated values for a hypothetical incumbent operator, where this operator is assumed to be the weakest incumbent and so has a market share of 26%. The reason for choosing the operator with the lowest market share is that in an auction either this operator or a new entrant is likely to have the lowest spectrum valuation and so will determine a hypothetical auction price.

Licensees will be prepared to pay more than the cost reduction value for a licence because licence renewal removes the costs and uncertainty of going to auction (see Figure 1).

Figure 1: Range of spectrum value measures



It was assumed that in future 3G services will be supplied using 800 MHz, 900 MHz and 2100 MHz spectrum and that LTE services will be supplied using 700 MHz, 1800 MHz and 2500 MHz spectrum. Values for low, medium and high market assumptions and for several regulatory scenarios were

estimated. The regulatory scenarios differ in terms of the assumed licence start dates and the amount of spectrum that may be released in future in the 700 MHz and 2500 MHz bands.

From the modelling it was found that the main drivers of value are:

- The forecast growth in ARPU expected across the mobile sector. Higher ARPU growth increases the full enterprise valuation but has no impact on the cost reduction valuation.
- The future growth in the data traffic that will be supported by the operators. This increases network deployment costs but is mitigated in part by the adoption of more spectrally efficient technology, namely LTE.
- Spectrum supply in the 700 MHz and 2500 MHz bands. Greater supply in these bands reduces overall deployment costs but reduces revenues available to operators using the 1800 MHz band for LTE.

The findings are given in Table 1.

Table 1: Summary of spectrum values (all referenced to present value in 2013)

Band	NPV in \$/MHz/pop			Implied full value of band (\$bn)		
	Cost reduction	Full value	Value based on international benchmarks	Cost reduction	Full value	Value based on international benchmarks
800 MHz	1.15	3.12	-	\$1.04bn	\$2.8bn	-
1800 MHz	0.17	0.54	-	\$0.46bn	\$1.5bn	-
2100 MHz	0.41	1.01	-	\$1.12bn	\$2.8bn	-
2.3 GHz	-	-	0.02	-	-	\$0.05bn
3.4 GHz	-	-	0.04	-	-	\$0.1bn

Source: Plum analysis

The total value for the cost reduction case for mobile operators is less than the sum raised in the original auctions (\$2.9bn). One reason for this is that an abnormally high value (\$1328m), by international and Australian standards, was achieved in the auction of just over half of the 1800 MHz band in March 2000.

The modelling results give a wide range of values. Values at the upper end of the range are not plausible based on international benchmarks. In setting an offer price for licence reissue the following policy objectives should be taken into account:

- Promoting efficient spectrum use.
- Obtaining a fair value for the public purse.

Efficiency points towards setting values that mimic the results of an auction (i.e. at or somewhat above the cost reduction value). A fair value is one that does not take all of the benefit that an operator might gain from spectrum use (i.e. is less than the full valuation).

Disruption costs

If licences were taken back and auctioned then there is the potential for consumers and industry to incur disruption costs. Disruption costs are not inevitable, but there is some, if low, risk of unforeseen events in an auction process.