PRICEWATERHOUSECOOPERS

The Fully Allocated Cost (FAC) of services on Vodafone Australia's GSM network – Model update incorporating data for the financial year ended 31 March 2004

20 October 2005

PricewaterhouseCoopers LLP does not accept any responsibility and disclaims all liability (including negligence) for the consequences of any person other than Vodafone Australia acting or refraining from acting as a result of the contents of this Report. For your information the word "person" above is used in the legal sense, which applies to companies, public bodies etc., not just to individuals.

1 Introduction

1.1 PricewaterhouseCoopers' team

The PricewaterhouseCoopers team on this engagement includes Alastair Macpherson and Ben Wreschner.

Alastair Macpherson, Partner

Alastair is a partner in the PwC UK office responsible for telecommunications regulatory services. He has more than 18 years of experience in the industry working for operators, regulators and governments in more than 25 countries. A major part of Alastair's work has focused around the debate defining what is the appropriate form of regulatory intervention in the case of market failure and specification of regulatory obligations including interconnection and access pricing and costing, retail price controls, universal service and regulatory reporting.

Professional Qualifications:

- BSc Economics
- Association of Chartered Certified Accountants

Professional experience includes:

- While at British Telecommunications plc Alastair spent two years working on the design and implementation of BT's accounting separation system and was responsible for the design and implementation of BT's top down and bottom long run incremental cost models;
- Acted as an expert on telecommunications costing matters before the UK Competition Commission, New Zealand Commerce Commission and Fair Trade Commission of Barbados;
- Designed and implement numerous historical and forward looking costing models for various fixed and mobile telecommunications operators;

Ben Wreschner, Assistant Director

Ben is an assistant director in the UK practice specialising in providing regulatory advice to telecoms operators.

Professional Qualifications:

- Ben is a member of the institute of Chartered Accountants in England and Wales
- Ben is a CFA charter holder

Professional experience includes:

- Ben has been providing regulatory advice to telecoms operators for 5 years

- Ben has provided advice to Vodafone on mobile termination issues and built or reviewed cost models in numerous jurisdictions, including, the UK, Sweden, Japan, Hungary, Greece, Netherlands.

- Ben has also provided valuation advice to numerous UK mobile operators as well as other telecoms operators

1.2 Model update

In March 2005, Vodafone Australia submitted its access undertaking, which was supported by a high-level cost model prepared by PricewaterhouseCoopers ("PwC"). This paper sets out the further modelling work that has been performed in the subsequent period, and should be read in conjunction with the original paper that was provided with the model[1].

The 2003/04 model includes further refinements and enhancements to allocation bases. It also takes into account comments received on the 2002/03 model and corrects for any errors that were noted[2].

1.3 The modelling approach

The high-level cost model that was originally prepared has been updated with data for the financial year ended 31 March 2004. The nature of the model and its functionality remains unchanged. However, apart from changes to the inputs, there have also been changes to some of the allocation assumptions as a result of a more detailed interrogation of the underlying financial data. The detailed interrogation work that was performed is set out in section 2. The changes to assumptions are detailed in section 3.

The allocation of costs – and the proportion of costs in each category – is shown in the diagram below

<table>
<tr><td rowspan="2">Direct allocation: Subscription ([removed] %)</td><td>Direct allocation: Incoming ([removed]%)</td><td>Direct allocation: Outgoing ([removed] %)</td><td>Direct allocation: On-net ([removed] %)</td><td>Direct allocation: SMS ([removed] %)</td><td>Direct allocation: GPRS ([removed] %)</td></tr>
<tr><td colspan="5">Indirectly allocated network costs ([removed] %)</td></tr>
<tr><td colspan="6">Indirectly allocated non-network costs ([removed] %)</td></tr>
</table>

1.4 Model inputs

1.4.1 Service volumes

Vodafone provided annual service volumes for incoming, outgoing and on-net calls, annual SMS messages and GPRS megabytes and average subscribers for the year ended 31 March 2004.

[1] "The Fully Allocated Cost (FAC) of services on Vodafone Australia's GSM network", dated 22 March 2005.

[2] The model errors that were corrected are; exclusion of some traffic, the uplift for working capital on network assets, the treatment of SMSC costs, the specification of the tilted annuity formula and the allocation of indirect network opex.

[Removed]

1.4.2 Operating costs

A breakdown of operating costs is shown at Appendix 1. Changes that have been made to the allocation of operating costs have been detailed in section 3 of this report.

1.4.3 Capital costs

The treatment of capital costs is consistent with the treatment set out in the paper provided with the 2002/03 model. Appendix 3 and 4 show breakdowns of the network and non-network assets respectively. Changes to the allocation of assets have been detailed in section 3 of this report.

A detailed process to estimate the gross replacement cost of the network was completed by Vodafone's network engineers. The network engineers provided estimates of the number of units of equipment that would be required to convey all the volumes demanded on Vodafone's network in the financial year 2003/04. For each unit of equipment, the purchase cost, the expected economic life and the expected annual asset price trend were all provided.

With respect to the purchase price, the model inputs reflect the purchase price at the start of the year. The purchase prices have been estimated to reflect the expected current replacement costs including an allowance for capital indirect costs (such as planning and supervision) of [Removed]%. Where estimates have been constructed using bottom-up techniques, a contingency has been included to ensure that the estimates reflect the actual expected replacement costs rather than some 'perfect world' outcome. The maximum contingency included was [Removed]%. An allowance for assets in the course of construction (AICC) was then included by marking up the annualised cost of assets in service to allow for a return on the AICC as at 31 March 2004.

Vodafone's methodology and process for determining the units in operation and also the unit replacement cost figures for the 2003/04 model was similar to that used for the 2002/03 model. Units in operation were derived from internal databases and information. Replacement cost figures were derived using actual invoices for replacing equipment where a recent purchase had been made or quotes from vendors and outsource partners where no recent invoice exists. There were also some limited instances where such sources were not available or used. These replacement cost figures were based on the knowledge of Vodafone's engineering team and internal data.

For the radio access network, Vodafone sourced the number of units in operation from an internal Vodafone database. The unit replacement cost figures for the BTS sites were sourced from a model used to price Vodafone's current 3G deployment project and from equipment vendor price lists applicable to Vodafone. For the RBS and transmission equipment, the unit replacement cost figures were also based on equipment vendors price lists applicable to Vodafone. Pricing for the balance of RAN related items were sourced from recent quotations or projects where the item (tools, systems, etc) had been replaced or considered for replacement.

For the switch equipment, the unit price is based on Ericsson's global pricelist for the Vodafone group for new nodes and expansions, and actual installation costs based on previous installations. The number of units in operation was based on the actual number of nodes carrying traffic.

A summary of the detailed network fixed asset data reviewed by Vodafone is set out in Appendix 3.

The expected economic life was also estimated by Vodafone's engineers. The process followed was to use the accounting lives as a starting point, and consider whether there were

or were not any specific reasons why the accounting life would not be suitable for use in the model, given the requirement for the financial statements to fairly present the Net Book Value of Vodafone's assets. It was concluded that the accounting lives were suitable for all asset categories.

For most assets, the forward looking price trend reflected the expected change in price from one year to the next of the same asset with the same functionality. For some assets, e.g. MSCs, because the asset price has stayed constant for a number of years, but the asset functionality improves each year, the asset price trend reflects the increase capacity expected year on year rather than the change in price of the asset.

The tilted annuity formula used to calculate the annualised cost of the network assets is as described in the model documentation provided with the 2002/03 model.

There were also a number of assets that were not included in the network engineers' calculations of the Gross Replacement Cost of the network. For these assets, accounting data was used to determine the annualised costs of the assets. Appendix 2 shows a reconciliation of the asset inputs to the financial statements, and which assets were re-valued and which were not.

1.4.4 Cost of Capital

The cost of capital estimate remains unchanged from the 2002/03 model at [Removed]%. The original estimate was based on input parameters at December 2003 and is therefore still considered appropriate for a model containing data relating to the year ended 31 March 2004.

1.4.5 Other inputs

Routing factor inputs and the conversion of SMS and GPRS volumes to minute equivalents remain unchanged as set out in the report provided with the 2002/03 model.

1.4.6 Assumptions and caveats

Whilst additional work has been performed in producing the 2003/04 model, the following assumptions and caveats, which were originally set out in the paper provided with the 2002/03 model remain relevant.

i. The model incorporates a series of checks which are designed to ensure that all costs are reflected in the model results, and no costs are included twice; however no formal model audit has been performed.

ii. We rely on Vodafone in respect of the appropriateness of current cost asset values and forward-looking price trends.

iii. Whilst network costs are typically a function of busy hour traffic, we have used total call minutes in calculating the volume drivers in the model; we thereby implicitly assume no difference in the average to busy-hour call volume ratios across services. Based on our experience, we do not expect this to systematically bias the model results.

iv. We assume the routing factors provided to us by Vodafone are accurate and appropriate. Whilst we have assessed them at a high-level against routing factors used in other jurisdictions (for example, the UK) and consider them to be reasonable, we have not reviewed the engineering data from which they have been sourced.

v. Customer care costs in their entirety have been allocated to the subscription event, rather than being defined as fixed common costs. This is a potential conservatism: there exist reasonable arguments to define at least a proportion of customer care costs as fixed and common, along with other non-network costs which are, rather than being incremental to the subscription event, incurred in the ongoing

maintenance and management of the subscriber base in order to facilitate the making and receiving of calls.

vi. The granularity of Vodafone's cost data is such that, in our experience, further disaggregation has been necessary in a number of specific instances, so as to prevent a biasing of results. In the absence of detailed data, the preferred alternative was to rely upon a combination of our experience in other jurisdictions (and, specifically, information from costing modelling undertaken for Vodafone in the UK) and estimates provided by Vodafone. These further disaggregations, and the sources used in deriving such, are set out below:

- billing (capital costs) – split wholesale ([Removed]%) and retail ([Removed]%). Source: Vodafone UK cost model, with costs split consistent with the ratio of gross book value of assets.

- IT costs (to be used in allocating the hardware and software capex and opex) – split retail ([Removed]%) and non-network indirect ([Removed]%). Source: Vodafone UK cost model, with costs split consistent with the ratio of gross book value of assets.

2 Detailed interrogation of supporting data

2.1 Operating cost data

A detailed review of the underlying operating cost data was performed to ensure the inputs to the cost model are consistent with Vodafone Australia's financial statements. Appendix 1 shows the costs from Vodafone's financial statements for the years ended 31 March 2004 and how those costs have been reconciled to the model inputs.

As can be seen, apart from an immaterial difference, the operating cost data included in the model reconciles with the financial statements.

Apart from reviewing the total costs that have been included in the model, a review of the categorisation of costs has also been performed. This has been done by reviewing outputs by account code from Vodafone's accounting system, and reviewing how the costs for the different account codes were allocated. Whilst PwC have not been able to check on a code-by-code basis (it is not always apparent what the codes relate to), it appears that Vodafone have adopted a logical approach in categorising the costs, and that the summary costs shown in the table in Appendix 1, appear to be consistent with the underlying accounting data that has been sourced from Vodafone's accounting system.

Whilst no inconsistencies were noted in terms of the categorisation of costs, we have noted an inconsistency between the nature of the "other opex" costs, and how they were treated in the original cost model with 2002/03 data. This is explained in more detail in section 3.1.

2.2 Fixed asset data

In the 2002/03 model a bottom-up approach was adopted for the valuation and depreciation of 'network' assets, and accounting data was used for the valuation and depreciation of 'non-network' assets. PwC relied on the asset inputs provided by Vodafone and assessed the reasonableness (for completeness) of the bottom-up data against the top-down data relating to network assets that was provided.

For the 2003/04 model, PwC has performed a more detailed review of the top-down data provided by Vodafone including a reconciliation of the trial balance asset codes to the gross carrying value of assets in the financial statements. Appendix 2 includes details of the trial balance codes, how the total of all the trial balance codes reconciles to the financial statements, and for which codes a detailed revaluation was performed.

Whilst the inputs to the model can now be shown to have been appropriately sourced from Vodafone's accounting systems, it appears that the high-level cost allocation relating to fixtures and fittings used in the 2002/03 model can be refined as a result of the detailed review of the underlying accounting data. Additionally, allowance has now been made for capitalised overheads and assets in the course of construction. This is explained in more detail in section 1.4.3.

2.3 Traffic data

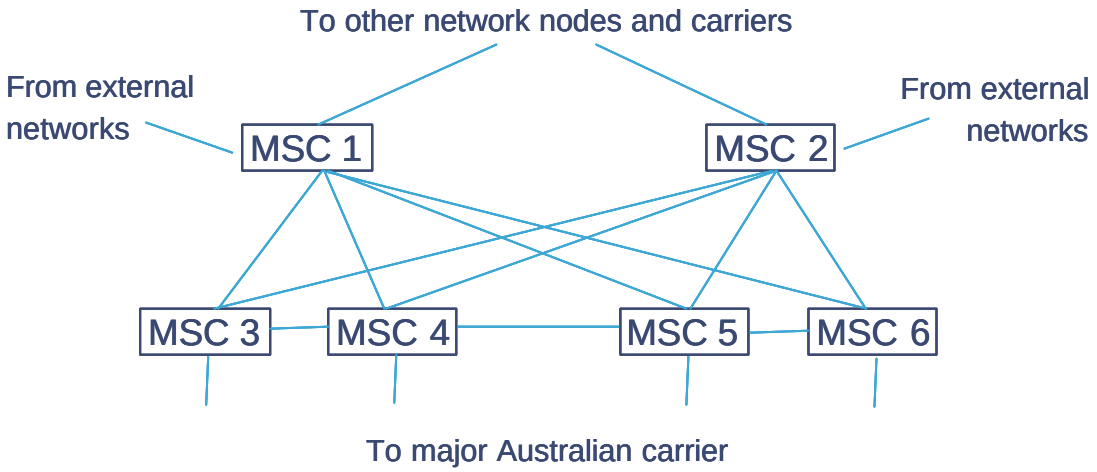
Traffic data was provided by Vodafone in a spreadsheet on a month-by-month basis in the same format as was provided for the financial year 2002/03. We have checked that the total minutes for the year by service have been sourced from the updated spreadsheet consistently with the approach adopted for the previous year.

2.4 Routing factor inputs

There have been no material changes to the routing factor inputs[3]. PwC has sought a further understanding of how the routing factor inputs were estimated by Vodafone. Vodafone provided PwC with a presentation showing the different call routings that occur, on average, in the Vodafone network. PwC performed a high-level review and agrees that the average routings have been appropriately used in estimating the routing factors. Whilst PwC has not sought to trace the average routings back to statistical data, the call routings appear consistent with those experienced in other jurisdictions.

Vodafone has semi-hierarchical network architecture. Traffic is routed in the network from node to node via the transit layer; however traffic within the same region is directly routed from one core network node to another for all traffic within the Vodafone network. Traffic to other carriers is always routed to the transit layer, except for traffic to the largest carrier as each network node has a direct connection. An example of this is shown in the diagram below, which shows the core network topology for New South Wales.

NSW Network topology



To calculate the routeing factors, Vodafone used traffic statistics and the routing in the Vodafone topology to determine the percentage of how many network nodes are used in a call. For calls to and from external networks, in many cases the call can be routed directly and only use one core network element, but in other cases two core network nodes must be used. Calls between Vodafone subscribers have to use at least two core network elements, unless the subscribers are both in the coverage area of the same core network node.

2.5 Working capital

In the 2002/03 model, a single input for working capital was included in the model, and the costs associated with the working capital balance were allocated as a mark-up to the capital costs in the model. In order to improve the robustness of the model, a more detailed analysis of working capital has been performed, and the separate components of working capital have been allocated separately. The approach followed has been to determine the percent of each working capital balance that applies to call termination, and add those costs to the modelled costs of termination (which exclude any working capital related costs).

[3] The on-net BSC routing factor was changed from [Removed] to [Removed].

The 2003/04 model includes a new tab which sets out the calculation described above and documents the assumptions made with respect to each component of working capital.

3 Key changes to assumptions

3.1 Other opex

In the 2002/03 model, there was a category of costs entitled 'other opex' that included a variety of costs which were not separately identified. In the absence of more detailed information at the time it was assumed that [Removed]% of the costs were directly related to subscription and the remaining [Removed]% were incurred to support all services. This assumption was based on analysis undertaken in the UK to support the Vodafone UK model.

As a result of the more detailed review of the underlying accounting data undertaken for the 2003/04 model described in section 2.1, it has been subsequently possible to determine the main elements of the 'other opex' costs. The main items comprise the following cost categories: Public Policy Other; Head Office; HR Training & Learning and Managing Director. These 4 cost codes account for [Removed]% of the Other Opex category, and are all costs that are incurred to support the full range of services offered by Vodafone Australia. Therefore, for the 2003/04 model, other opex costs are treated non-network indirect costs and recovered across all services.

3.2 Furniture and fittings

In the 2002/03 model it was assumed that [Removed]% of furniture and fittings assets were subscription related, [Removed]% network related and [Removed]% head-office related based on the split experienced in other jurisdictions. However, from the detailed review of the fixed asset source data, it appears that furniture and fittings comprises two TB codes, furniture and fittings and network furniture and fittings. The network furniture and fittings comprise [Removed]% of the total of furniture and fittings. We have assumed the remaining [Removed]% of furniture and fittings costs should be allocated to subscription and head-office in proportion to the [Removed] split previously assumed.

Whilst we have not undertaken a similar review of the 2002/03 data, there was no material investment in fixtures and fittings in 2003/04 and therefore the previously adopted assumption appears to be conservative and results in an understatement of the termination rate.

3.3 Inclusion of capitalised overheads and assets in the course of construction

The 2002/03 model did not make any allowance for network capitalised overheads or assets in the course of construction. During the course of the detailed fixed asset work performed in populating the 03/04 model, it became evident that these assets were excluded from the 02/03 model. This has been rectified for the 03/04 model, as set out in section 1.4.3.

3.4 Allocation of general overheads

General overheads (all costs treated as non-network indirect in the model) are allocated across all services. In the 2002/03 model these costs were allocated in proportion to the total costs of each service as the allocation of non-network indirect costs is the final layer of cost allocation.

In the 03/04 model, these costs have been allocated in proportion to total costs minus cost of sales. This is to ensure that cost of sales, e.g. interconnect payments and dealer commissions which do not generate any meaningful support activity in the business do not inappropriately absorb general overheads.

3.5 Net book value of non-network assets

The net book value (NBV) of assets is included in the model to calculate the capital charge relating to assets. In the 02/03 model only the year-end NBV was included in the model and therefore a year-end NBV was used. However, for the 03/04 model, both the 02/03 and 03/04 NBV of assets is included in the model, and therefore the average NBV for the year is used. This is also consistent with the working capital calculation for which the average working capital balances were used.

3.6 Conservatisms in the 03/04 model

As explained in the report accompanying the 2002/03 model, the model is conservative in its treatment of costs relating to customer care. These costs have been treated as direct subscription costs, even though those costs are incurred in supporting customers who benefit from the full range of services offered by Vodafone. If customer care costs were to be allocated across all services, the cost of termination in the 2003/04 model would increase from [Removed] cents per minute to [Removed] cents minute.

4 Model outputs

4.1 Summary of model outputs

The 2003/04 model produces a cost of termination of [Removed] cents per minute. The allocation of costs for all services is shown in the table below:

[Removed]

5 Other factors to consider

5.1 Migration to 3G networks

There are two significant effects that 3G networks have on the appropriate termination rate:

- The impact of the migration of traffic from a 2G to 3G network
- The costs incurred in building a 3G network

Neither of these two effects have been reflected in either the 2002/03 or 2003/04 models, which were high-level in nature and built with an implicit assumption that the GSM network will continue at its full revenue-generating utilisation level for the foreseeable future. As a result, the outputs from the model need to be considered in this context, and allowance must be made for the impact of the two effects shown above, and described in more detail below.

5.1.1 The impact of the migration of traffic from a 2G to 3G network

The model has been built assuming that traffic continues to be conveyed over the GSM network for the foreseeable future. However, the mobile telephony industry is currently investing significantly in next-generation networks to meet the ever-more sophisticated demands of mobile subscribers, and therefore, there is greater uncertainty regarding the level of traffic that will be conveyed over GSM networks in the coming years. The model assumes that all GSM assets will be at their optimal revenue-generating utilisation level throughout the life of the assets that are currently deployed (up to 20 years in the case of the GSM licence). However, with the expectation that utilisation levels on Vodafone's network will begin to fall once the UMTS network is established, it would be reasonable to bring forward some of the cost recovery of the GSM network, to ensure a better matching of cost and revenue-generation.

Additionally, the model assumes economic lives for the GSM network assets that are consistent with experience to date. However, going forward it is likely that assets will have to be removed from service earlier than currently anticipated as equipment vendors stop supporting - e.g. in the form of software drops - previous generation equipment, especially in the core network. The effect of this would be to shorten the average life of assets, thereby increasing the cost recovery in the period under consideration. In the 2003/04 model, a one year reduction to the life of all network assets results in the model output increasing from [Removed] cents per minute to [Removed] cents per minute.

5.1.2 The costs incurred in building a 3G network

There costs of building a 3G network are significant. Vodafone has already invested [Removed] and is forecasting investing approximately [Removed] in the two years ended March 2006 and March 2007. This will bring the total investment in 3G networks to over [Removed] before any significant levels of demand are expected. There is a significant cost associated with such a large investment. In a world of perfect information where future demand for new products and services is known with great certainty, it would be reasonable to defer any cost recovery relating to the 3G network to the period in which it will be generating revenues. However, given the uncertainty associated with future levels of demand, it is reasonable for the costs associated with carrying such a large investment (the return on assets but not the depreciation of assets) to be recovered in the period in which the costs are incurred, across all services that are demanded in that period.

5.2 Investment life-cycle

The models that have been built for 2002/03 and 2003/04 produce estimates of the cost of terminating calls on Vodafone networks for certain periods of time. However, they do not reflect the full life-cycle of investment in a network and its ability to generate revenue. As such, the outputs from the models are susceptible to fluctuations through the lifetime, or indeed lifetimes, of a network. As noted above, the model assumes that all voice volumes will be conveyed over Vodafone's 2G network for the foreseeable future. However, in actuality, Vodafone is deploying a 3G network with the intention of migrating traffic from the 2G network to the 3G network, and as such there are no plans to reinvest heavily in the 2G network. This would not be the case if Vodafone were not deploying a 3G network, and further reinvestment in the 2G network would be required. As a result cost estimates based on data in the period 2002 – 2004 are depressed to the extent that such future reinvestment is not included.

6 Conclusions

The 2003/04 model updates and replaces the 2002/03 model as the best and most recent estimate of the forward looking fully allocated cost of terminating voice calls on Vodafone's GSM network.

The methodology remains unchanged but further analysis of Vodafone's cost structure, accounting and operational data, which has been possible in the time since production of the 2002/03 model, has allowed the improvement and refinement of apportionment bases. Further review of the model and consideration of comments received from various parties has led to a small number of amendments and error corrections to model algorithms; although the overall impact of these has been small (-3%).

The 2003/04 model provides an estimate of the fully allocated cost of terminating calls on Vodafone's GSM network at [Removed] cents per minute.

The specification of the model, the assumptions contained in it, the allocation bases applied and its results produced are in our opinion reasonable. It is important to note however that there are a number of important factors and considerations which are not explicitly considered in the model which is likely to mean that the modelled costs underestimate an appropriate *price* for terminating voice calls on Vodafone's network. In particular:

1. fixed common and joint costs , as estimated in the 2002/03 model, are significant and a Ramsey pricing solution would be expected to yield a figure in excess of that adopted under a fully allocated method (or the broadly equivalent LRIC+ approach with common costs recovered on an equi-proportional basis);

2. we have not included any allowance to reflect the presence of a network externality. Given the low level of penetration in Australia relative to comparator countries, we expect that such an allowance should be made; this would, other things equal, increase the appropriate price level of the call termination service; and

3. the adopted tilted annuity method of economic depreciation may, in comparison with the cash-flow based approach used in regulatory processes in, *inter alia,* the UK, Sweden, Greece, Israel and Belgium, understate the annualised capital costs due to the lack of recognition of the changes in output profiles of assets over time. This was borne out in the modelling undertaken by Ofcom in the UK Competition Commission inquiry into mobile termination rates and reflects, in part, the fact that output profiles in mobile telephony since launch have tended to follow the traditional 'S-curve' profiles of new technologies.

4. we have not included any investments or costs relating to 3G networks and services; nor have we included any acceleration of depreciation of 2G investments to reflect a future migration to 3G.

5. conservatisms in the model, for example we have allocated customer care costs in their entirety to subscription. An alternative but still reasonable assumption could be to treat these as a general cost of all services. This alternative treatment on its own would increase the estimate of the unit cost of call termination from [Removed] cents per minute to [Removed] cents per minute.

Appendix 1 – Opex reconciliation

The table below shows the operating costs and costs of sale from Vodafone Australia's financial statements for the year ended 31 March 2004:

[Removed]

The table below shows the operating costs that have been included in the model.

[Removed]

The difference between the model inputs and the costs included in the financial statements is deemed to be immaterial.

Appendix 2 – Schedule of fixed asset accounting inputs

The table below contains details of the trial balance codes that were used as the starting point for the fixed asset analysis. The table shows:

- Total GBV of the trial balance codes reconciles to the GBV in Vodafone's financial statements; and
- For each trial balance code, which method used for including the assets in the model.

[Removed]

Appendix 3 - Network asset inputs

The table below shows the network revaluation inputs provided by Vodafone's network engineers.

[Removed]

Appendix 4 – Non network asset inputs

The following table sets out the non-network asset inputs and the allocation bases used.

[Removed]

Note: the marked-up total charge includes the allowance for assets in the course of construction.