Australian
Competition &
Consumer
Commission

Draft MTAS Pricing Principles Determination 1 July 2007 to 31 December 2008

Report

June 2007

CONTENTS

List of abbreviations and terms

AAPT	AAPT Limited
AAR	Allens Arthur Robinson
ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
Access Economics	Access Economics Pty Limited
ACMA	Australian Communications and Media Authority
Act	Trade Practices Act
ARPU	Average Revenue Per User
bps	Bits Per Second
BSC	Base Station Controller
BSS	Base Station Subsystem
BTS	Base Transmission Station
BULRIC	Bottom-Up Forward Looking Long Run Incremental Cost
CAPEX	Capital Expenditure
CBD	Central Business District
CBP	Countervailing Bargaining Power
CCC	Competitive Carriers' Coalition
CDMA	Code Division Multiple Access
C-I-C	Commercial-In-Confidence
cpm	Cents Per Minute
CPP	Calling Party Pays
CRA	Charles River Associates
DGTAS	Domestic GSM Terminating Access Service
DSG	Digital Signal Groups
EBITDA	Earnings Before Interest, Taxation, Depreciation and Amortisation
EPMU	Equi-Proportional Mark-Up
EU	European Union
FAC	Facilities Access Code
FCC	Fixed and Common Costs
FL-LRIC	Forward Looking Long-Run Incremental Cost
FTM	Fixed-To-Mobile
GAAP	Generally Accepted Accounting Principles
GIS	Geographical Information System
GMSC	Gateway Mobile Switching Centre
GSM	Global System for Mobiles
GSM 2G	Second Generation of Global System for Mobile Communications
GSM 3G	Third Generation of Global System for Mobile Communications; the

	generic term used for the next generation of mobile communications systems
HLR	Home Location Register
H3GA	Hutchison 3G Australia Pty Ltd
HSDPA	High-Speed Downlink Packet Access
HTAL	Hutchison Telecommunications (Australia) Limited
Hutchison	Together HTAL and H3GA
IN	Intelligent Network
IT	Information Technology
LRIC	Long Run Incremental Cost
LSS	Line Sharing Service
LTIE	Long-term Interests of End Users
Macquarie Telecom	Macquarie Telecom Pty Ltd
MHz	Megahertz
MJA	Marsden Jacob and Associates
MNO	Mobile Network Operator
MNP	Mobile Number Portability
MSC	Mobile Switching Centre
MSR	Mobile Services Review
MST	Minimal Spanning Tree
MTAS	Mobile Terminating Access Service
MTM	Mobile-To-Mobile
NES	Network Externality Surcharge
NSS	Network Subsystem
Ofcom	Office of Communications (United Kingdom), formerly Oftel
OPEX	Operating Expenditure
OPTA	Onafhankelijke Post en Telecommunicatie Autoriteit (The Netherlands)
Optus	Optus Mobile Pty Limited and Optus Networks Pty Limited
PMTS	Public Mobile Telecommunications Service
POA	Postal Area
POI	Point of Interconnection
PowerTel	PowerTel Limited
PSTN	Public Switched Telephone Network
PwC	PricewaterhouseCoopers
RAF	Regulatory Accounting Framework
RAPM	Regulatory Accounting Procedure Manual
R-B	Ramsey-Boiteux
RFT	Request for Tender for the Provision of Expert Telecommunications Sector Consultancy Services to the Australian Competition and Consumer Commission, 31 March 2006
RKR	Record Keeping Rule (Rule 5)

SDH	Synchronous Digital Hierarchy
SingTel	Singapore Telecommunications Limited
SIO	Services in Operation
SLA	Statistical Local Areas
SMS	Short Message Service
SNPT	Strategic Network Planning Tool in the WIK Model
STP	Signalling Transfer Point
TELRIC	Total Element Long Run Incremental Cost
Telstra	Telstra Corporation Limited
TIO	Telecommunications Industry Ombudsman
TPA	Trade Practices Act
TRAU	Transcoder Rate Adaption Unit
Tribunal	Australian Competition Tribunal
TRX	Transceivers
TSLRIC	Total Service Long-Run Incremental Cost
TSLRIC+	Total Service Long-Run Incremental Cost plus a mark-up to account for a contribution to organisational-level common costs
UK	United Kingdom
ULLS	Unconditioned Local Loop Service
US	United States of America
VLR	Visitor Location Register
VMS	Voicemail System
Vodafone	Vodafone Australia Limited
WACC	Weighted Average Cost of Capital
WIK	WIK-Consult GmbH

Currency contained in this report is Australian dollars unless otherwise stated.

1. Background to the Mobile Terminating Access Service (MTAS) Regulation

1.1. The Declared Service

On 30 June 2004, the MTAS for voice services terminating on all digital mobile telecommunications networks was declared. The MTAS as a declared service expires after 30 June 2009.

The MTAS is a wholesale input, used by providers of calls from fixed-line and mobile networks, in order to complete calls to mobile subscribers connected to other networks. When a mobile call is made between consumers (or end-users), it will involve two essential elements – 'origination' and 'termination.' Origination refers to the carriage of a call from the end-user who makes, or originates, the call over the network to which this end-user is connected. Termination refers to the carriage of the call to the person receiving the call over the network on which the person receiving the call is connected. Where the person making the call and the person receiving the call are on different networks, a point of interconnection (POI) between these two networks will exist. The main network elements of providing the MTAS are illustrated in Figure 1-1 below.
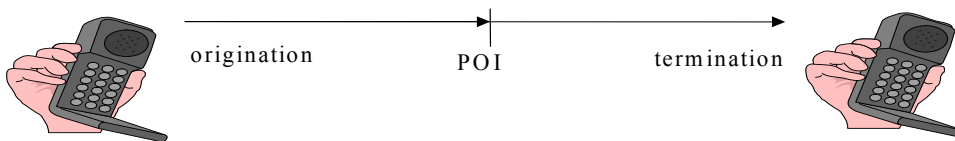

origination   POI   termination

Figure 1-1 – Termination, origination and the POI

Under current commercial arrangements between network owners, the network owner that originates a call to a mobile network will, generally, purchase the MTAS from the network owner that completes the call. The originating network owner will recover these costs, and the costs it incurs from originating the call, through the retail price it charges its directly connected end-user for providing the call. This commercial arrangement is typically referred to as the calling party pays (CPP) model.

An example of how the MTAS is used in the provision of a fixed-to-mobile (FTM) call is depicted in Figure 1-2 below. In this example, Telstra purchases access to Hutchison's MTAS in order to provide a call from a Telstra fixed-line end-user to a Hutchison mobile end-user. Telstra would then bill its directly-connected consumer for providing a FTM call service.
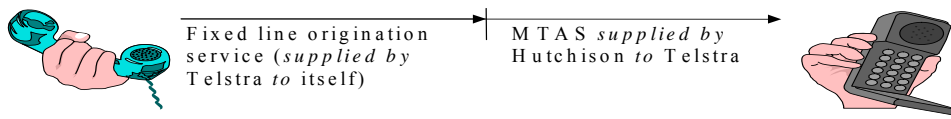
Figure 1-2 - Use of the MTAS to supply a FTM call

The MTAS is therefore an essential input into the provision of calls to mobile phone users where the mobile phone user is on a different network to the individual who originates the call. This is the case irrespective of whether the call terminates on a second generation (2G) global system for mobiles (GSM) or code division multiple access (CDMA) network, a two and a half generation (2.5G) or a third generation (3G) mobile network.[1]

1.2. MTAS Declaration and MTAS Pricing Principles Determination

The current exercise of developing a bottom-up cost model has been part of an extensive consultation process which began with the *Mobile Services Review* commencing in 2003.[2]

This consultation process informed the *MTAS Pricing Principles Determination* for the period 1 July 2004 to 30 June 2007 which will expire on 30 June 2007.

Given that the current MTAS declared service will not expire until 30 June 2009, to support any future pricing principles determination for the MTAS, WIK-Consult (WIK) has been engaged to develop a bottom-up cost model which will, among other material, inform the Commission about the estimated efficient cost of supply of the MTAS in an Australian context using a total service long-run incremental cost (TSLRIC) conceptual framework, for use in its regulatory processes.

1.3. MTAS developments since 1 July 2004

Since 1 July 2004 the MTAS has become the most litigated and arbitrated single telecommunications access service in Australia. Three of the four mobile network operators (MNOs) have also submitted undertakings for the MTAS.

A brief outline of the regulation activity is provided below.

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[1] 2G protocols use digital encoding and include GSM and CDMA. 2G networks support high bit rate voice and limited data communications. They are capable of offering auxiliary services such as data, fax and the short messaging service (SMS). 2.5G protocols extend 2G systems to provide additional features, such as packet-switched connection and enhanced data rates. 3G protocols support much higher data rates, measured in megabits per second, intended for applications such as full-motion video, video conferencing, and full Internet access.

[2] Australian Competition and Consumer Commission (ACCC), *Mobile Services Review – Mobile Terminating Access Services: Final Decision on Whether or not the Commission Should Extend, Vary or Revoke its Existing Declaration of the Mobile Terminating Access Service*, (*MTAS Final Report*), June 2004.

1.3.1. Arbitrations

The Commission has had 34 MTAS disputes notified since July 2004. A complete list of disputes notified to the ACCC is contained in Appendix A.

The Commission has issued 18 final determinations and 19 interim determinations.

The Commission has currently six MTAS disputes outstanding.

From published interim determinations the following prices have been made:

- 18 cents per minute (cpm) (2005)[3]

- 15 cpm (2006)[4]

- 12 cpm (2007)[5]

The prices made are consistent with the price-related terms and conditions outlined in the *MTAS Pricing Principles Determination*.

1.3.2. Undertakings

Optus DGTAS undertaking

On 23 December 2004 Optus Mobile Pty Limited and Optus Networks Pty Limited (together 'Optus') lodged an ordinary access undertaking for the supply of its domestic GSM terminating access service (DGTAS) with the Commission. The DGTAS relates to a 'subset' of the declared MTAS because it only covers services on Optus's GSM network.

The Optus undertaking proposed a 'target' price for the DGTAS of 17 cpm for the calendar year 2007. The target price was constructed using a mark-up on Optus's forward-looking long-run incremental cost for the supply of the DGTAS comprising 'fixed and common costs' based on Ramsey-Boiteux pricing principles and a 'network externality surcharge' based on a model developed by Charles River Associates Pty Ltd. (CRA) for Optus. A gradual adjustment to the target price was

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[3] ACCC, *Interim Determination: Access Dispute Between AAPT Limited (Access Seeker) and Optus Networks Pty Limited and Optus Mobile Pty Ltd (Access Provider)*, 28 October 2005; ACCC, *Interim Determination: Access Dispute Between Hutchison 3G Australia Pty Ltd (Access Seeker) and Optus Networks Pty Limited, Optus Mobile Pty Ltd and Optus Vision Pty Ltd (Access Provider)*, 5 August 2005; ACCC, *Interim Determination: Access Dispute Between Hutchison Telecommunications (Australia) Limited (Access Provider) and Optus Networks Pty Limited, Optus Mobile Pty Ltd and Optus Vision Pty Ltd (Access Provider)*, 5 August 2005; ACCC, *Interim Determination: Access Dispute Between PowerTel Limited (Access Seeker) and Optus Networks Pty Limited and Optus Mobile Pty Ltd (Access Provider)*, 14 July 2005; ACCC, *Interim determination: Access Dispute Between Hutchison 3G Australia Pty Limited (Access Seeker) and Vodafone Pty Limited (Access Provider)*, 14 July 2005; ACCC, *Access Dispute Between AAPT Limited (Access Seeker) and Vodafone Network Pty Limited (Access Provider)*, 14 July 2005; ACCC, *Interim Determination: Access Dispute Between Primus Telecommunications Pty Ltd (Access Seeker) and Vodafone Network Pty Limited (Access Provider)*, 2 August 2005; and ACCC, *Interim Determination: Access Dispute Between PowerTel Limited (Access Seeker) and Vodafone Pty Limited (Access Provider)*, 15 July 2005.

[4] ibid.

[5] ACCC, *Interim Determination: Access Dispute Between Telstra Corporation Limited (Access Seeker) and Optus Mobile Pty Limited (Access Provider)*, 18 December 2006.

intended to occur over a three-year period from 2005 to 2007, in which the price for the MTAS would fall from 19.25 cpm to 17 cpm.

On 8 November 2005 the Commission released its draft decision to reject the Optus undertaking and on 3 February 2006 the Commission released its final decision to reject the Optus Undertaking on the basis that the Commission could not be satisfied that these terms were reasonable.

Optus applied to the Tribunal for review of the Commission's decision on 23 February 2006.

The Tribunal hearings were held in August 2006 and a decision was handed down on 22 November 2006.

The Tribunal affirmed the Commission's decision in this matter.

Vodafone ordinary access undertaking

Vodafone initially lodged an ordinary access undertaking for the supply of its MTAS on its GSM network on 26 November 2004, this was subsequently withdrawn and Vodafone resubmitted a new undertaking on 23 March 2005.

The undertaking proposed an adjustment path from a price of 19.38 cpm in 2005 to a 'target' price for the MTAS of 16.15 cpm for 2007, with a proposed 'FTM pass-through safeguard.' The proposed price of 16.15 cpm for 2007 for the supply of the MTAS was based on 2002-03 data, which was subsequently revised using 2003-04 data.

The framework for the Vodafone model developed by PricewaterhouseCoopers (PwC) was a top-down fully allocated cost (FAC) model to arrive at these 'target' prices.

The FTM pass-through safeguard required access seekers (where relevant) to reduce average retail price for FTM calls terminating on Vodafone's GSM network or compensate Vodafone with a 'Pass-Through Rebate.'

The Commission released its draft decision to reject the Vodafone Undertaking on 22 December 2005.

On 31 March 2006, the Commission issued a final decision to reject the Vodafone Undertaking on the basis that the price terms and conditions were not reasonable when assessed against the relevant statutory criteria in section 152AH of the Trade Practices Act (the Act).

On 21 April 2006, Vodafone applied to the Tribunal for review of the Commission's decision.

The Tribunal hearings were held in August and September 2006 and a decision was handed down on 11 January 2007.

The Tribunal affirmed the Commission's decision in this matter.

Hutchison ordinary access undertakings

On 7 October 2005, Hutchison lodged six ordinary access undertakings under Division 5 Part XIC of the Act with the Commission. The undertakings covered the provision of the MTAS on both Hutchison's 2G and 3G networks.

Hutchison proposed differential pricing for the supply of the MTAS based on the call origination:

- the single rate undertakings for Hutchison's proposed a price of 12 cpm for mobile-to-mobile (MTM) calls of 12 cpm if certain reciprocal arrangements and transit traffic conditions were met for the period to 31 December 2007;

- the dual rate undertakings proposed a dual rate for the supply of the MTAS: a price of 12 cpm for MTM calls (if the rate was provided reciprocally and certain transit traffic conditions were met) and an alternative or 'fall back' rate of 21 cpm, if either of the conditions for a 12 cpm price were not met for the period to 31 December 2007; and

- the Non-Public Mobile Telecommunications Service (Non-PMTS) undertakings proposed a price of 18 cpm for the supply of MTAS for FTM calls and calls originating from international networks for the period to 30 June 2006.

Hutchison requested that the Commission consider accepting the undertakings in combination or individually.

On 18 November 2005, the Commission released a discussion paper on the Hutchison undertakings seeking views of interested parties.

In April 2006, the Commission released its draft decision to reject the Hutchison Undertakings.

On 23 June 2006, the Commission released its final decision to reject the Hutchison Undertakings, on the basis that the price-related terms and conditions for the dual rate and Non-PMTS undertakings were not reasonable and the non-price terms and conditions for all the Undertakings (including the single rate undertakings) were not reasonable.

Optus DGTAS 2007 undertaking

In February 2007, Optus submitted an undertaking for assessment by the Commission for a price of 12 cpm relevant to the period 1 July 2007 to 31 December 2007.

1.3.3. Federal Court Review

Vodafone instituted proceedings in July 2004, challenging the power of the Commission to include prices in its pricing principles determination for the mobile termination service. Vodafone also argued that the prices set out in the Commission's pricing principles determination should not apply to 3G mobile networks.

Vodafone's challenge was rejected by the Federal Court in September 2005. Justice Edmonds found that the Act 'does empower the Commission, if it decides to exercise

the discretion vested in it by that provision, to specify a price or prices as part of its … determination.'[6] It was noted that such specification of prices are indicative only.

Justice Edmonds also upheld the Commission's decision that the price-related terms and conditions should apply equally to the supply of the service on 2G and 3G networks.

1.3.4. Outcomes arising from the regulatory and judicial processes

These regulatory and judicial processes over the last four years (commencing with the *Mobile Services Review* in 2003) have afforded an opportunity for the Commission to extensively consult with industry across a broad range of policy, methodological and empirical issues, in the context of cost models developed for an Australian context.

These processes in the main have been considered in public fora, and the Commission considers that the industry is well aware of the Commission's view on a range of issues in relation to cost models. The Commission's view about these methodological and empirical issues has been affirmed on multiple occasions by other judicial bodies such as the Tribunal.

The Commission's approach to access pricing has been considered by the Tribunal. Key areas affirmed by the Tribunal include the:

▪ appropriateness of a bottom-up TSLRIC framework for efficient cost-base pricing for the MTAS, because while cost models distinct from TSLRIC+ models are not unreasonable, such as the models developed by Vodafone and Optus, it is generally not in the long term interest of end-users (LTIE) to depart from TSLRIC pricing and further that access prices should reflect and not exceed forward-looking efficient costs;[7]

▪ recognition as stated in the Optus Undertaking and Vodafone Undertaking Decisions[8] as well as affirmed by the Tribunal that alternative model approaches may also be appropriate if it can be established that the actual costs incurred by an MNO are efficient;[9]

▪ support for the relevant markets as espoused by the Commission, especially for the Commission's conclusion in the *MTAS Final Report* that there is a separate monopoly market for the supply of the MTAS on each MNO's network;[10] and

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6   *Vodafone Australia Limited v Australian Competition and Consumer Commission*, [2005], FCA, 16 September 2005, at [69].

7   *Application by Vodafone Network Pty Ltd & Vodafone Australia Limited* [2007] ACompT 1, 11 January 2007, at [44].

8   Refer to the discussion about the appropriateness of different model frameworks in ACCC, *Optus's Undertaking with Resect to the Supply of its Domestic GSM Terminating Access Service (DGTAS) Final Decision*, (*Optus Undertaking Decision*), February 2006, pp.29-30., and ACCC, *Assessment of Vodafone's Mobile Terminating Access Service (MTAS) Undertaking, Final Decision, Public Version*, (*Vodafone Undertaking Decision*), March 2006, pp.29-32.

9   *Application by Optus Mobile Pty Limited & Optus Networks Pty Limited* [2006] ACompT 8, 22 November 2006, at [116-118].

10   *Application by Optus Mobile Pty Limited & Optus Networks Pty Limited* [2006] ACompT 8, 22 November 2006, at [80].

- lack of empirical support for: the 'waterbed' effect in an Australian context with the Tribunal noting that:

  > we do not consider that Optus would be strongly constrained in setting its DGTAS price by competition in the retail market. The mobile operators could set their termination charges on a reciprocal basis at above cost while still competing vigorously in the retail market. Indeed, it was accepted that that is what they do;[11]

- difficulty in accurately accounting for externalities and including a Network Externality Surcharge (NES);[12] and the inappropriateness of Ramsey-Boiteux pricing to allocate organisational level costs compared with an equi-proportionate mark-up.[13]

In this way, the Commission considers that the current consultation on the WIK Mobile Network and Cost Model (WIK Model) is not a 'one-off' or isolated consultation process comprising the initial six weeks consultation period (including and four weeks for the WIK Model) and the further six week consultation period, (including release of the WIK Model on an extended basis) but is part of this continuous engagement with the industry about cost models that commenced in 2003 with the *Mobile Services Review*. As outlined below, the Commission considers that this consultation process about the WIK Model will continue into the future with specific and further consultation about the *MTAS Pricing Principles Determination* for the period 1 July 2007 to 31 December 2008 and other relevant regulatory processes. Interested parties will be provided with additional documentation (such as the Technical Specification Manuals[14] and User Guide[15]) and longer access periods to the WIK Model in these processes.

Of course, this regulatory activity has brought significant benefits to end-users and industry participants, which are outlined in sections 2.7 and 5. For example, industry participants required to purchase the MTAS have all been the beneficiaries of lower input costs, reflected in prices that are more closely aligned with the efficient cost of the service.

However, the reduction in MTAS prices has not been uniformly welcomed by industry. Some MNOs are net recipients of MTAS revenue which means that these MNOs terminate more calls on their networks than they terminate on other networks. A fall in the price of the MTAS over time has, and will result in, lower MTAS revenues for these MNOs. At this point, the Commission notes that lower MTAS revenues are inevitable as MTAS prices (cpm) fall and converge to the TSLRIC+ of supply, but this in itself does not necessarily result in financial impacts contrary to the legitimate business concerns of MNOs. To date there is no substantiation of overall adverse financial impacts except lower MTAS revenues as further discussed in section 5.3.2, but these lower MTAS revenues have coincided with lower input costs for all MNOs and fixed-line and integrated carriers that purchase the MTAS.

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[11]   ibid., at [84-85].

[12]   ibid., at [287-91].

[13]   ibid., at [242].

[14]   WIK, *Specification of the Strategic Network Planning Tool GSM-Connect for Implementing the WIK Mobile Network and Cost Model Manual* and WIK, *Specification of the Cost Module of the WIK Mobile Network and Cost Model*.

[15]   WIK, *WIK Mobile Network and Cost Model Version 1.1 User Guide*.

Instead, what seems to have happened is that the volume of calls has increased, retail prices have fallen, mobile revenues for MNOs have increased, profits have remained stable or improved, and investment in 3G networks has increased, which all points to improved competition and industry dynamism benefiting end-users and industry participants alike.

Some MNOs made strong cases in support of their undertakings[16] that lower input prices associated with the supply of the MTAS would have the opposite effect: retail prices would not fall and may actually increase to compensate for lower MTAS revenues. The so-called 'waterbed' effect and lack of pass-through in markets such as in which FTM services are provided were proposed as countervailing forces that would reduce any of the benefits that could flow through to consumers and business users emanating from lower MTAS prices. The Commission notes that there has been good progress made to date and an even closer association of price with the TSLRIC+ of supply of the MTAS can only improve pass-through and the benefits to end-users over time, which can be in the form of both lower retail prices and improved quality of services.

A summary of the benefits include the:

- promotion of the LTIE in the form of lower retail prices for mobile services and in particular lower FTM mobile rates;

- convergence over time of the price of the service with the underlying efficient and direct cost of providing the MTAS; and

- combined benefits of improved competition and encouragement of efficiency in investment and use of infrastructure through lower input (MTAS) costs for fixed and mobile providers that access the MTAS from another provider.

These benefits for end-users and access seekers have been delivered without an adverse impact on the legitimate business interests of mobile service providers. At the same time as MTAS revenues have fallen, mobile service operators have experienced:

- sustained or improved profits over time;

- increased mobile services revenue; and

- increased demand for mobile services.

These trends have occurred in a market which is virtually saturated as market penetration has remained high at, or over, 95 per cent since the end of 2005.[17]

These issues are explored and quantified as relevant in subsequent sections of this report.

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[16] ACCC, *Optus's Undertaking with Resect to the Supply of its Domestic GSM Terminating Access Service (DGTAS) Final Decision*, (*Optus Undertaking Decision*), February 2006, pp. 219-226.

[17] Singapore Telecommunications Limited and Subsidiary Companies, *Management Discussion and Analysis of Unaudited Financial Condition, Results of Operations and Cash Flows for the Third Quarter and Nine Months Ended 31 December 2006*, p. 42; and Singapore Telecommunications Limited and Subsidiary Companies, *Management Discussion and Analysis of Unaudited Financial Condition, Results of Operations and Cash Flows for the Third Quarter and Nine Months Ended 31 December 2005*, p. 39

2.   Underlying Pricing Principles

2.1.   Technological neutrality

The declaration for mobile terminating access (voice) services is technologically neutral such that it covers terminating access services on 2G (including CDMA), 2.5G and 3G networks.

In June 2004, the pre-existing service description for the declared voice mobile termination service from 2G/GSM networks was extended to encompass services on 2.5G and 3G networks. In the *MTAS Final Report*, the Commission considered that:

> in the absence of evidence to the contrary, the nature of the supply of 3G voice services is largely the same as the supply of 2G voice services with bottleneck characteristics.[18]

And further:

> For the purposes of this inquiry, the Commission believes it is appropriate to broaden the eligible service to include termination of voice services on 2.5G and 3G mobile networks.[19]

2.1.1.   WIK Model approach

WIK assumes that a hypothetical efficient operator utilises the best-in-use technology. The WIK Model approach adopts 2G as the best-in-use technology as this represents the technology an efficient forward-looking operator would apply today under the current level of demand. This technology is mature, with well-known characteristics and is optimised for carrying voice traffic.[20]

2.1.2.   Parties' views

Optus submits that 3G migration has not been adequately considered by the WIK Model and that 'this is an area of concern as 3G subscribers will represent an increasing proportion of the mobile market as evidenced by the increased numbers of subscribers each year.'[21]

Optus submits that the WIK Model does not allow 3G operators to receive an appropriate return on their investment and that 'at best this inadequacy provides a disincentive to invest in new 3G technology, and at worst it does not allow operators to recover their costs of providing voice termination over the 3G network.'[22]

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[18]   ACCC, *Mobile Services Review – Mobile Terminating Access Service: Final Decision on Whether or not the Commission Should Extend, Vary or Revoke its Existing Declaration of the Mobile Terminating Access Service*, (*MTAS Final Report*), June 2004, p. 22.

[19]   ibid., p. 23.

[20]   WIK Consult, *Mobile Termination Cost Model for Australia*, (*WIK Report*), January 2007, pp. 48-52.

[21]   Optus, *Optus Submission to the Australian Competition and Consumer Commission on the WIK Mobile Network and Cost Model for Australia*, (Optus submission), March 2007, p. 12.

[22]   ibid., p. 13.

Vodafone submits that 3G cannot be ignored as 'this technology is expected to be the most efficient to meet the forward looking requirements of the market.'[23] In this regard, Vodafone submits that market realities necessitates that the Commission have regard to operating a converged 2G/3G network and migration of customers from 2G networks to 3G networks.[24]

Vodafone submits that a new entrant would roll out a converged network utilising both 2G and 3G technologies and that this is the price benchmark that would be set in a competitive market for MTAS.[25]

2.1.3. Commission's views

One of the key conclusions of the *WIK Report* is that the use of 2G technology would represent the best available option for providing 2G services in certain circumstances. These circumstances are outlined in detail the WIK Report.[26]

The Commission has maintained that the efficient cost of delivery of the MTAS, a voice service, should not be impacted by the network over which it is carried.

Other regulators have adopted a similar approach. For example, the Onafhankelijke Post en Telecommunicatie Autoriteit (OPTA) in the Netherlands has used a 'cost-orientated' 2G price as a reference point for the cost of a termination service on a 3G network.[27] In contrast, Ofcom, which differentiates the termination price over 2G and 3G networks has also indicated that, in the United Kingdom, it is a market-specific factor – the inflated costs of the initial 3G spectrum licences[28] – as the source of this price difference.[29] Spectrum costs are not a relevant factor in an Australian context and the Commission notes the European Commission's views as to whether the United Kingdom has appropriately dealt with these issues of spectrum in arriving at a mobile termination price on 3G networks, by including these 3G spectrum costs which are inflated in today's terms.[30]

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[23] Vodafone Australia Limited, *Submission to the Australian Competition and Consumer Commission: WIK Mobile Network and Cost Model and MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*, (Vodafone submission), March 2007, p. 16.

[24] ibid., p. 11.

[25] ibid., p. 17.

[26] WIK, *WIK Report*, p. 144.

[27] Onafhankelijke Post en Telecommunicatie Autoriteit (OPTA), *Summary Notification Form Relating to a Draft Decision of the Commission of the Independent Post and Telecommunications Authority in the Netherlands with Respect to the Implementation of Price Control Obligations on the Relevant Markets for Voice Call termination on Individual Mobile Networks*, 21 June 2006, p. 5.

[28] Ofcom, *Mobile Call Termination Statement*, 27 March 2007, Annex 14, pp. 286-308.

[29] Ofcom has approached the issue of 3G termination costs inconsistently with the EU Commission's technologically-neutral definition of 2G and 3G termination. It has imposed different rates for termination of calls on 2G/3G networks and the single 3G network. It states that this approach to 3G termination has not been followed by any other EU regulator. See Ofcom, *Mobile Call Termination Statement*, 27 March 2007, p. 12.

[30] Letter from the European Commission, to Ofcom, dated 22 November 2006. Available at:

http://europa.eu/rapid/pressReleasesAction.do?reference=IP/06/1628&format=HTML&aged=0&language=EN&guiLanguage=en, viewed on 23 April 2007.

Further, both Telstra and Optus either currently, or have plans to, operate 3G networks in the spectrum used for their respective 2G (CDMA and GSM respectively) networks.[31] Therefore it is expected that an efficient 3G operator would use similar spectrum to that of a 2G operator in an Australian context.

The Commission considers that the conclusions drawn from the WIK Model in respect of the delivery of voice services on 3G networks are reasonable and that the use of a 2G benchmark for the establishment of a cost for the supply of the MTAS on 3G networks is appropriate.

2.2. Neutrality concepts for different call types

The *Access Pricing Principles Guide* first established that, while the pricing principles do not imply that all access seekers should pay the same access price, differential access pricing can reduce competition and discourage investment.[32] For example, the *Access Pricing Principles Guideline* stated that preferential access pricing between a limited group of network operators can have the effect of discouraging entry of more efficient operators. The incentive for the access provider to discriminate against competitors can inhibit efficient entry and competition in those markets.[33]

The Commission's practice in access pricing (whether for fixed-line or mobile services) has been to price termination at the same level, irrespective of the origination of the traffic.

In the *MTAS Final Report*, the Commission reviewed whether it is appropriate for the MTAS declaration to apply to all calls to mobile networks, irrespective of the type of network they originate on, or whether it is appropriate for the declaration only to apply in relation to FTM services.[34]

The Commission concluded that the presence of asymmetric traffic flows between mobile operators indicates there may still be an incentive for MNOs to raise the price they charge each other for termination of voice calls above their underlying cost of production – irrespective of whether this is for the completion of FTM or MTM calls. Further, the Commission considered that, given this incentive exists, it was appropriate that the service description should apply equally to termination of FTM and MTM calls.[35]

Since the release of the *MTAS Final Report*, the Commission has had further opportunity to consider the relevance of origination as a factor in influencing the efficient price of supply of the MTAS. Except for the case of the Hutchison

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[31] Telstra Corporation Limited, *Telstra's Turbo-charged, Nationwide Mobile Broadband Network Goes Live*, Media Release, 6 October 2006, available at: http://www.telstra.com.au/abouttelstra/media/mediareleases_print.cfm?ObjectID=38377, accessed on 6 June 2007 and Huawei, *Optus Partners with Huawei to Deliver Australia's First UMTS900 Network Trial*, 16 April 2007, available at http://huawei.com/news/view.do?id=3605&cid=42, accessed on 6 June 2007.

[32] ACCC, *Access Pricing Principles – Telecommunications – A Guide*, (*Access Pricing Principles Guide*), 1997, p. 15.

[33] ibid.

[34] ACCC, *MTAS Final Report,* June 2004, p. 26.

[35] ibid., p. 27.

undertakings, this origination neutrality has not been a major issue in either fixed-line or mobile access pricing processes conducted by the Commission.

In its undertakings, Hutchison proposed a differential price for the supply of the MTAS based on where the call originated. The Commission concluded in that matter that there was no evidence provided by any party to support a differential rate, considering that the efficient cost for supply of the MTAS on the terminating network was unlikely to be a function of where the call originated.[36]

2.3. Commission's cost based approach to access pricing: Total Service Long Run Incremental Cost Plus (TSLRIC+)

2.3.1. WIK Model approach

The WIK Model applies the cost standard of 'total service long-run incremental cost' or TSLRIC. TSLRIC includes the cost due to lumpy investment that over certain ranges of traffic volumes do not change but of which each service is allocated an appropriate share. A per cent mark-up is added to TSLRIC to account for organisational-level common costs (as discussed in WIK Model Annexure A.2.4 below).

2.3.2. Parties' views

Telstra submits that it does not necessarily accept that TSLRIC+ pricing is appropriate in all circumstances, but that TSLRIC based pricing has been recognised by the Commission and Tribunal to be consistent with Part XIC of the Act.[37]

2.3.3. Commission's view

The Commission articulated its view in the *Access Pricing Principles Guide* that for access services the access price should, in general, be based on the TSLRIC of providing the service.[38]

TSLRIC is the incremental or additional cost the firm incurs in the long run in providing a specified volume of the service, assuming the scale of all of its other production activities remain unchanged. Alternatively, it is the cost the firm would avoid in the long run if – everything else being equal – it ceased to provide the

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[36] ACCC, *Hutchison's Undertakings with Respect to the Supply of its Mobile Terminating Access Service (MTAS) Final Decision,* (*Hutchison Undertakings Final Decision*), June 2006, p. 23.

[37] Telstra Corporation Limited, *Submission in Response to the ACCC's Discussion Paper on the WIK Mobile Network and Cost Model to Inform the MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*, (Telstra submission), March 2007, p. 17.

[38] ACCC, *Access Pricing Principles Guide*, p. 28. There may be exceptions to this. For example, there may be circumstances where a service has a limited time horizon. In such cases other pricing approaches may be more appropriate. Further, if the Commission arbitrates a dispute when an undertaking given by the access provider is in operation, it must not make a determination that is inconsistent with that undertaking (see section 152CQ(5) of the Act). However, in general, the Commission expects TSLRIC to be consistent with the terms and conditions in undertakings.

service. As such, TSLRIC represents the costs the firm necessarily incurs in providing the service and captures the value of society's resources used in its production.[39]

TSLRIC is interpreted by the Commission as a forward-looking measure of costs which means that the referable costs are those of the most efficient means possible and commercially available.[40] In practice this often means basing costs on the best-in-use technology and production practices available today and valuing inputs using current prices. It includes the costs an efficient carrier would necessarily incur in providing the service, or alternatively the costs that would be avoided if the service was no longer provided in the long run.[41]

The Commission has previously outlined why it preferred to establish access prices with reference to the TSLRIC.[42] These reasons are summarised below:

1. it encourages competition in telecommunications markets by promoting efficient entry and exit in dependent markets;

2. it encourages economically efficient investment in infrastructure and provides the appropriate incentives for future investment in decisions by access seekers to 'build' or 'buy';

3. in the long run TSLRIC based pricing provides for the efficient use of existing infrastructure, promoting allocative efficiency in the use of infrastructure;

4. it provides incentives for access providers to minimise the costs of providing access by using the most efficient technology commercially available today and best-in-use technology compatible with the existing network design;

5. by allowing efficient access providers to fully recover the costs of producing the service, it promotes the legitimate business interests of the access provider; and

6. it protects the interests of persons who have rights to use the declared service.[43]

2.4. Commission's cost based approach to access pricing: Total Element Long Run Incremental Cost Plus (TELRIC+)

2.4.1. WIK Model approach

The WIK Model implements a TSLRIC framework in the form of TELRIC. The WIK Model adopts this approach so that each service is allocated the shares of the costs of network elements in proportion to its relative use of these elements, both in respect of the immediately traffic-sensitive parts and the parts of costs that are due to lumpy investment.[44] This ensures the resulting cost figure will be below a stand-alone cost and that common costs (i.e. the cost of joint production) are included in exact proportion to the relevant service's use of the various network elements.

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[39] ibid.

[40] ibid., p. 29.

[41] ibid., p. 38.

[42] ibid., pp. 29-30.

[43] ibid.

[44] WIK, *WIK Report*, pp. 21-22.

2.4.2. Parties' views

Telstra submits that in the assessment of the PIE II Model the Commission contrasted TELRIC and TSLRIC models stating that TELRIC models tended to allocate all costs to the set of services that are modelled. Telstra continues to disagree that this is a point of difference between TSLRIC and TELRIC models, and continues to disagree that TELRIC models tend to allocate costs only to the services that are being modelled. Properly constructed, each model is able to cost the range of services that use the network and allocate costs appropriately. Telstra stated that its position accords with the *WIK Report*.[45]

2.4.3. Commission's view

The Commission considers that the submission made by Telstra in relation to TELRIC and the PIE II model relate to a different process and model. The Commission's view in relation to the implementation of a TELRIC approach specific to that process and particular model is contained in its decision on Telstra's ULLS Monthly Charge Undertaking,[46] which has been more recently affirmed by the Tribunal.[47]

2.5. Organisational-level cost mark-ups using of the Equi-proportionate mark-up (EPMU) approach

2.5.1. WIK Model approach

The WIK Model allocates organisational-level costs using an equi-proportionate mark-up on network element (direct, indirect and operating) costs.[48]

2.5.2. Parties' views

Only Telstra made submission on this issue. Telstra submits that WIK should have considered alternative approaches to the allocation of common costs rather than simply adopting the Commission's preferred EPMU approach.[49] Telstra submits that there are two well recognised ways in which this can be done. The first is by way of an EPMU for common costs (as adopted by WIK and preferred by the Commission). The second is to allocate common costs according to what are commonly referred to

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[45] Telstra submission, March 2007, p. 18.

[46] ACCC, *Assessment of Telstra's ULLS Monthly Charge Undertaking – Final Decision (Public Version)*, August 2006.

[47] Telstra Corporation Ltd (No 3) [2007] ACompT 3, in particular at [329-373]. The Tribunal handed down its decision on 17 May 2007 to affirm the Commission's decision of 25 August 2006 to reject Telstra's proposed price for the Unconditioned Local Loop Service.

[48] WIK, *WIK Report*, pp. 88-89.

[49] Telstra submission, p. 3.

as Ramsey-Boiteux ('R-B') principles.[50] Without clearly stating which method Telstra prefers, Telstra submits that the EPMU is preferred by the Commission over alternatives like the Ramsey-Boiteux approach as a 'rule of convenience rather than due to any inherent characteristics of this approach consistent with considerations of efficiency or consumer welfare.'[51]

2.5.3. Commission's view

Non-network common costs are organisational-level costs incurred in the provision of all of the firm's services that are unattributable to any particular service. Stated alternatively, they are not incremental to a particular service in the sense that they are not avoided if the firm does not produce the service. However, they are incremental in the sense that they would need to be incurred by an efficient firm if the service was provided on a stand-alone basis. An efficient multi-product firm would have the expectation of recovering, in some manner, these common costs. As a result it would be expected that the prices of the firm's services (including prices for access) incorporate some contribution to these costs.[52]

As common costs are not directly attributable to the production of any one service, the allocation of these costs across services is somewhat arbitrary. There is a range of possible methods of allocating common costs.[53]

The criteria that need to be satisfied include:

1. the total costs of providing the service should not exceed the stand-alone costs;

2. common costs should not be 'over-recovered';

3. common costs must be common to (shared by) the declared service and not unduly allocated to that service; and

4. the inclusion of common costs (incorporated into the access price) in the internal transfer price of a vertically-integrated firm.[54]

The Commission is of the view that the TSLRIC should include a portion of organisational-level common costs, as represented by the TSLRIC+ approach.

The approach preferred by the Commission to the allocation of organisational-level costs is the EPMU over directly attributable costs. This involves measuring the directly attributable costs of each service within the group and allocating the common costs based on each service's proportion of the total directly attributable costs.[55]

For many reasons the EPMU is considered preferable to other approaches for the allocation of organisational-level costs, in particular the overwhelming information

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[50] ibid., p. 31.

[51] ibid., p. 32.

[52] ACCC, *Access Pricing Principles Guide*, p. 39. Failing to account for these common costs could violate the legitimate business interests of the access provider, reduce incentives to maintain and invest in infrastructure, and distort the choice of technology towards technologies with low common costs.

[53] ibid., p. 39.

[54] ibid., p. 40.

[55] ibid., p. 39.

requirements of the alternatives. The Commission has also drawn attention to the need to devise efficient mark-ups for *all* services simultaneously, whereas the actual application is only to the regulated service while prices of other services sharing the common costs find their own level. The EPMU approach has been universally accepted by regulators around the world.[56]

The Tribunal has made several comments about the use of an EPMU including: that regulators prefer the EPMU approach[57] and that it is incorrect to say that applying an EPMU is an over-cautious reaction to uncertainty regarding elasticities[58] and has concluded:

> The body of expert economic material is persuasive of the proposition that consistent with accepted economic theory and principles, it is not appropriate to use the R-B[59] pricing principles to determine the allocation of FCCs[60] to an MTAS.[61]

2.6. Network externality surcharge

2.6.1. WIK Model approach

The WIK Model does not account for a NES in the cost estimate.

2.6.2. Parties' views

Telstra outlines the circumstances in which an NES would be considered appropriate and has been accepted in the UK.[62]

Telstra submits that an estimate of a network externality surcharge would need to consider:

- fixed-line impacts;

- the level of mobile penetration in the Australian market;

- the need to ascribe any impact of the externality to fixed-line services; and

- the likelihood that some proportion of the externality will be internalised by either parties known to the subscriber or by MNOs themselves.[63]

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[56] ACCC, *Optus's Undertaking with Resect to the Supply of its Domestic GSM Terminating Access Service (DGTAS) Final Decision*, (*Optus Undertaking Decision*), February 2006, pp. 85-7; see also: *Application by Optus Mobile Pty Limited & Optus Networks Pty Limited* [2006] ACompT 8, 22 November 2006, at [236].

[57] *Application by Optus Mobile Pty Limited & Optus Networks Pty Limited*, [2006], ACompT 8, at [236].

[58] ibid., at [240].

[59] Ramsey-Boiteux.

[60] Fixed and common costs.

[61] *Application by Optus Mobile Pty Limited & Optus Networks Pty Limited*, [2006], ACompT 8, at [242].

[62] Telstra submission, p. 34.

[63] ibid., pp. 34-35.

Telstra submits that negative effects can operate, such as lower demand for fixed-line subscriptions and increasing mobile subscriptions (which is evidence of growing FTM substitution).[64]

Telstra also considers that the value of an NES falls as a market reaches saturation.[65]

Telstra submits that WIK appears to concur with Telstra's view in the WIK Undertakings Report, where fixed-line impact was recognised as one of the most relevant externalities:

> In our context financial mobile subscription subsidies by means of FTM prices above costs would have a negative impact on fixed-line subscription. Overpricing FTM calls to increase mobile subscription would at the same time [sic] due to the fixed-line externality decrease fixed-line penetration. Such externality effects do not simply balance out.[66]

2.6.3. Commission's view

The Commission maintains that no NES should apply to the MTAS in an Australian context. As the Commission has outlined, for example in the *Optus Undertaking Final Decision*, it considers that, while the concept of a network externality has intuitive appeal for some telecommunications services, it also considers that a surcharge on termination to fund subscription subsidies is inappropriate in relation to the supply of the MTAS in current Australian circumstances.[67]

The Commission has various reasons for this view. For example, it considers that the empirical importance of 'network externalities' is likely to be low or non-existent in a highly mature mobile market such as Australia as the marginal social benefits derived from additional subscribers is likely to decline with population penetration of mobile subscription reaching zero at saturation. As at March 2007, the mobile penetration rate in Australia was estimated to be 99 per cent.[68]

In addition, if these benefits do exist, individuals (and to some extent MNOs) have a number of methods – other than subscription subsidies funded out of above-cost charges for the MTAS – to ensure these external benefits are considered (or 'internalised') by individuals in their consumption decisions. For instance, parents or employers may pay for their children or employees to have a mobile subscription.

Further, mobile operators may be able to target late subscribers through specially designed (or 'targeted') retail packages. Such forms of internalisation would reduce the extent to which all mobile subscriptions need subsidisation, and therefore the necessity for substantial 'taxes' on MTAS prices. In this regard, the Commission agrees with Telstra's submission in regard to the breadth of externality issues that

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[64]   ibid., p. 35.

[65]   ibid., p. 37.

[66]   ibid., p. 36.

[67]   ACCC, *Optus's Undertaking with Respect to the Supply of its Domestic GSM Terminating Access Service (DGTAS) Final Decision*, (*Optus Undertaking Decision*), February 2006, pp. xiii and 92-93.

[68]   Singapore Telecommunications Limited and Subsidiary Companies, *Management Discussion and Analysis of Unaudited Financial Condition, Results of Operations and Cash Flows for the Fourth Quarter and Financial Year Ended 31 March 2007*, p. 44.

would need to be considered if an externality adjustment was to be made to the MTAS price.

Further, the Commission recognises that there are externalities other than the network externality that appear to suggest a subsidy to termination rather than a tax. For example, consideration of the FTM call-receipt externality (enjoyed by mobile subscribers receiving calls from fixed-lines) suggests that FTM calls should be encouraged, rather than discouraged by above-cost pricing of termination.

The Tribunal concluded that if externalities are to be considered in pricing services, they need to be surveyed with some degree of thoroughness and that in the absence of evidence it was difficult to be conclusive. It considered that it is not sufficient to include some externalities in the analysis and ignore others purely on an *a priori* basis that they matter less. Further, while the Tribunal does not rule out the possibility that taking into account externalities may be a valid part of coming to a reasonable price; it indicated that there are difficulties in the approaches put before it. Namely, the degree of empirical accuracy required about likely behaviour, and which was absent, for it to have confidence that a particular approach adopted leads to a well-based outcome.[69]

The Commission considers that this provides a high benchmark for acceptance of any adjustment (upwards or downwards) to the termination charge to account for a network externality in the context of pricing of the MTAS.

2.7. Fixed-line services, retail FTM pass-through and no 'waterbed' effect

2.7.1. Background

There are several issues submitted by interested parties concerning a bundle of fixed-line services. These are considered below. In addition, parties raised two interrelated issues concerning retail FTM pass-through and the 'waterbed' effect have been the subject of consultation with industry over the last two years.

The Tribunal in its decision on the Optus undertaking indicated that even if the retail mobile services market were effectively competitive it did not consider that Optus would be strongly constrained in setting its DGTAS price by competition in the retail market. The mobile operators could set their termination charges on a reciprocal basis at above cost while still competing vigorously in the retail market.[70] This adds weight to the apparent interdependence of pricing in the wholesale market and the retail market. It also is not reflective of the assumed relationships outlined in the 'waterbed' effect.

The Commission considers there is empirical information to support the extent of retail pass-through and of the converse of the 'waterbed' effect is in operation. The Commission is of the view that the empirical evidence demonstrates that retail pass-

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[69] *Application by Optus Mobile Pty Limited & Optus Networks Pty Limited*, [2006], ACompT 8, at [287-291].

[70] ibid., at [85].

through has occurred and, contrary to the waterbed effect, retail prices have decreased since the *MTAS Pricing Principles Determination* was made.

2.7.2. Parties' views

Access Economics for the Competitive Carriers' Coalition (CCC) submits that regulation of the MTAS has led to cost pass-through in the form of lower average prices for FTM calls. Access Economics for the CCC notes that the *Telstra Results and Operations Review* for fiscal years 1999-2006 indicates that there was little decrease in Telstra's FTM prices prior to July 2004. However, the decrease in FTM prices since July 2004 may have been due to other factors than regulation, including 'introduction of new lower cost technologies, the increased growth in FTM retail minutes, and pass-through of economies of scale experienced in providing the service.'[71]

Access Economics for the CCC submits that with reference to Telstra's average FTM prices from 1 July 2004 to 31 December 2006 there was 75.53 per cent pass-through of the reduction of the MTAS from 21 cpm to 18 cpm in 2005, and a further 78.82 per cent pass-through of the reduction of the MTAS from 18 cpm to 15 cpm in 2006. Access Economics for the CCC notes that 'while there appears to have been significant cost pass-through, much of this is likely to be occurring in the corporate customer segment, rather than residential segment of the market.'[72]

Access Economics for the CCC submits that there is no evidence of the 'waterbed' effect in operation in Australia.[73] Access Economics demonstrates this as follows, such that the decrease in the MTAS rate:

1. has not resulted in an increase in Telstra's average retail price for mobile services,[74] and Optus's financial data on post-paid subscribers from the September 2006 quarter and the December 2006 quarter do not reflect signs of lower demand for mobile services and the operation of the 'waterbed' effect;[75] and

2. there has been an increase rather than a decrease in handset subsidies since 2004.[76]

The Australian Telecommunication Users Group (ATUG) submits that 'Telstra's annual results suggest that retail prices are not reflecting the termination rate reductions in full.'[77]

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[71] Access Economics for the CCC, *Response to the ACCC MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009, Submission by Access Economics Pty Limited for the Competitive Carriers' Coalition (CCC)*, (Access Economics submission for the CCC), 16 March 2007, p. 13.

[72] ibid., p. 14.

[73] ibid., p. 6.

[74] ibid., pp. 6-8.

[75] ibid., pp. 8-9.

[76] ibid., pp. 6 and 9-11.

[77] Australian Telecommunication Users Group (ATUG), *Submission: Discussion Paper on the WIK Mobile Network and Cost Model to Inform the MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*, (ATUG submission), 16 March 2007, p. 5.

Vodafone submits that while the pricing principles provide an indicative decline in the MTAS from 21 cpm in 2004 to 15 cpm in 2006, the average retail revenue from FTM calls has reduced from 37.3 cpm in 2004 to 33.2 cpm in 2006. Vodafone submits that this may indicate greater competition, but that FTM margins have increased from 16.2 cpm in 2004 to 18.8 cpm in 2006. Vodafone subsequently submits that Telstra's margin on FTM calls has increased and that this is not consistent with increased competition in FTM services.[78]

Vodafone submits that assessment of FTM competition needs to consider total price change in the 'bundle' of fixed-line services. If the pricing principles promoted competition then there should be evidence of decreasing market power of integrated operators.[79]

Non-integrated operators (e.g. AAPT and Primus) have lost, rather than gained share and the growth in the market share of other independent fixed-line operators, while initially increasing, has flattened significantly over the term of the pricing principles.[80]

Vodafone submits that these trends are evidence that the stated objective of the explicit pricing guidance contained in the 2004-07 pricing principles has not been achieved.[81]

Vodafone submits that the quality of fixed-line services has not improved and that:

- total complaints relating to fixed-line providers increased; and

- customer satisfaction levels have remained relatively stable between 2003 and 2005. Vodafone submits that the FTM substitution is 'influential in the determination of whether the provision of MTAS is a monopoly bottleneck.'[82]

Vodafone notes that a paper by Wright and Hausman concludes that the monopoly outcome does not hold when FTM substitution is introduced (i.e. once subscribers are able to choose between using the fixed or mobile networks to make calls, market based termination rates do not reflect monopoly prices).[83]

While Vodafone does not advocate the outputs of Wright and Hausman, Vodafone does support two principles derived from their econometric model:

- it is incorrect to rely on economic studies that 'prove' that the supply of termination is a monopoly bottleneck since these cost models do not include fixed-mobile substitution; and

- when consumers can choose between making mobile or fixed phone calls, the market equilibrium mobile termination rate is significantly closer to the welfare-maximising mobile termination rate than the 'cost-based' regulated rate.[84]

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[78] Vodafone submission, p. 3.

[79] ibid., p. 4.

[80] ibid., p. 5.

[81] ibid.

[82] ibid., p. 7.

[83] ibid.

[84] ibid., p. 8.

Vodafone submits that 'in a situation where virtually all fixed-line callers to mobiles have the alternative of a MTM call, there is a real market constraint on the MTAS cost.'[85]

Vodafone disagrees with the Commission's view that MNOs have monopoly power over MTAS on their network and face little effective constraints on the exercise of this power. Vodafone submits that there are a number of factors that can attribute countervailing bargaining power to the purchasers of MTAS, specifically: importance of originating operators as outlets for the seller, in particular, when the former is a transit service provider; option not to purchase or delay reaching an agreement; and option to withhold payments.[86] Vodafone submits that fixed-line incumbents are able to use their countervailing buying power to effectively constrain the ability of mobile operators to charge above the welfare-maximising level of providing MTAS.[87]

2.7.3. Commission's view

Fixed-line services

Vodafone submits information about the total price of the bundle of fixed-line services.

The Commission notes that average retail prices for the bundle of services including national long distance calls, international direct calls and fixed-to-mobile calls have fallen by 9.6 per cent over the period of 30 June 2004 to 31 December 2006. It is important to recognise that the fall in retail prices for this bundle of services is larger since June 2004 than in the preceding two-year period. Data for national long distance calls and international direct calls show a decline between 30 June 2002 and 31 December 2006 of 14.3 per cent and 17.2 per cent respectively. [88]

In respect of FTM prices, which are considered in more detail below under Retail FTM pass-through, the average FTM rates have decreased by 15.3 per cent between 30 June 2004 and 31 December 2006.

The Commission notes Vodafone's submission primarily focuses on the increase in FTM margins that Telstra has experienced from 30 June 2004 to 30 June 2006. This does not negate from the competitive benefits that have resulted because of lower MTAS prices.

Vodafone submits that 'in the four years from 2003 to 2006, the revenue per minute from the bundle of fixed-line products has only decreased 0.1 cents.' The Commission has examined these data and calculates a fall of 0.3 cents for the bundle of fixed line products.

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[85] ibid.

[86] ibid.

[87] ibid.

[88] Telstra Corporation Limited and Controlled Entities, *Annual Report 2004*, p. 6 and p. 19; Telstra Corporation Limited and Controlled Entities, *Annual Report 2006*, p. 11; and Telstra Corporation Limited and Controlled Entities, *Half Year Report for the Half Year Ended 31 December 2006*, pp. 10-11.

Furthermore, if Telstra's results for the half year ending 31 December 2006 are also included in this analysis, then the revenue per minute from the bundle of fixed-line products has decreased by 1.4 cents since 30 June 2003.[89]

Retail FTM pass-through

In the *MTAS Final Report* the market in which FTM services are provided was considered one of the three relevant markets for the supply of the MTAS and the market which provided the most scope for manipulation, where prices above the TSLRIC+ of the supply of the MTAS could impede the promotion of competition.[90] Three years after the release of the *MTAS Final Report*, there is information to suggest that the reduction in MTAS rates has also been a factor in reducing retail FTM prices and that pass-through at the retail level has increased since 2004. The Tribunal has also confirmed that it considered the FTM market was not effectively competitive.[91]

Using data from Telstra's annual reports, Access Economics for the CCC demonstrates that average FTM prices have fallen from 40.37 cents in 1999-00 to 33.20 cents in 2005-06. This represents a retail price fall of close to 18 per cent since 1999-00. What is also telling about the analysis provided by Access Economics for the CCC is that the price decreases were relatively small in the period prior to 1 July 2004 when the Commission released the *MTAS Pricing Principles Determination*. In the period between 1999-00 and 2003-04, in which the Commission did not have any published information about indicative prices, the reduction in retail prices was a little over 6 per cent. This price fall has accelerated in the period 2003-04 to 2005-06, with a more than 12 per cent fall in retail FTM prices over a two year period, coinciding with a fall in wholesale input MTAS prices of 21 cpm to 15 cpm in access disputes arbitrated for the MTAS.[92] The decrease in average retail FTM prices, as presented by Access Economics for the CCC, for the financial year 2005-06, subsumes the absolute average FTM price reductions and percentage price falls in the period 1999-2000 to 2003-04.[93]

Access Economics for the CCC explains this phenomenon in the following way: 'where there was light handed regulation of the MTAS – there was very little decrease in Telstra's average FTM price per minute.'[94]

In spite of Vodafone's submission to the contrary, the price-related terms and conditions contained in the *MTAS Pricing Principles Determination* seem to have had a positive effect on reducing the MTAS prices since July 2004 which have flowed through to both the retail mobile services market and the market in which FTM services are provided.

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[89] ibid.

[90] ACCC, *MTAS Final Report*, pp. 26-28 and 119-25.

[91] *Application by Optus Mobile Pty Limited & Optus Networks Pty Limited*, [2006], ACompT 8, at [88].

[92] Calculated dividing reported FTM revenue by reported FTM minutes; see: Telstra Corporation Limited and Controlled Entities, *Annual Report 2004*, pp. 6 and 19; and Telstra Corporation Limited and Controlled Entities, *Annual Report 2006*, pp. 8-9.

[93] Access Economics submission for the CCC, p. 14.

[94] ibid., p. 13.

The Commission also considers that retail (FTM) price reductions are important, but just one indicator of improved competition in the relevant markets for the promotion of competition that are in the LTIE.

The Commission considers that there is retail FTM pass-through and that while there is debate as to the influence of lower MTAS rates on the full extent of this pass-through, there is strong support that the indicative price path in the *MTAS Pricing Principle Determination* through the regulatory processes that have occurred since 2004 have directly contributed to the FTM retail price reductions.

This has also been achieved without the need to mandate retail pass-through of any sort.

The Commission notes that while the reductions in FTM retail rates to date have been positive there is still opportunity for integrated operators such as Telstra and Optus to reduce retail FTM prices further particularly for residential end-users in line with reductions in MTAS.

The figure below highlights that while FTM retail prices for both business and residential users has fallen since 1 July 2004; business FTM rates remain 9 cpm to 10 cpm below residential FTM rates. Using quarterly imputation data for Telstra, residential rates have fallen from 43.38 cpm to 38.20 cpm (or 11.9 per cent) and the business FTM rates have fallen from 33.69 cpm to 31.66 cpm (or 6 per cent).[95]

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[95]   ACCC, *Quarterly Imputation Testing Reports Relating to the Accounting Separation of Telstra – September Quarter 2004*, December 2004, p. 9; and ACCC, *Quarterly Imputation Testing Reports Relating to the Accounting Separation of Telstra – September Quarter 2006*, December 2006, p. 12.

Figure 2-1: Telstra FTM – Revenue, minutes and yield by customer groups (indexed to September quarter 2004)[96]
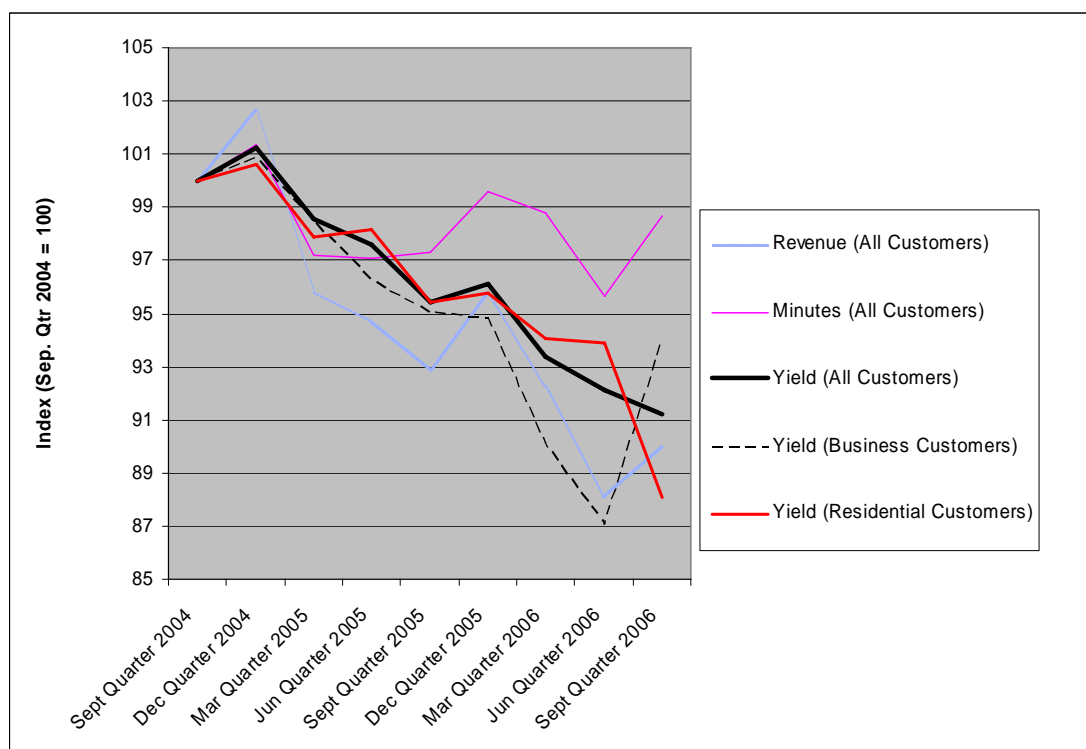
The converse of the 'waterbed' effect

The 'waterbed' effect refers to the extent to which regulated reductions in access prices such as the MTAS result in increases in retail prices, which includes the price of outgoing mobile calls and subscription, or fixed contract and handset prices. For further discussion on the 'waterbed' effect see ACCC, *Optus Undertaking with respect to its Domestic GSM Terminating Access Service (DGTAS) Final Decision*, February 2006, Appendix 5.

Access Economics for the CCC submits that there has been no empirical evidence of the so-called 'waterbed' effect. Instead of retail mobile prices increasing and handset

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[96] Sourced from ACCC, *Quarterly Imputation Testing Reports Relating to the Accounting Separation of Telstra – September Quarter 2004*, December 2004, p. 9; ACCC, *Quarterly Imputation Testing Reports Relating to the Accounting Separation of Telstra – December Quarter 2004*, March 2005, p. 10; ACCC, *Quarterly Imputation Testing Reports Relating to the Accounting Separation of Telstra – March Quarter 2005*, June 2005, p. 10; ACCC, *Quarterly Imputation Testing Reports Relating to the Accounting Separation of Telstra – June Quarter 2005*, October 2005, p. 11; ACCC, *Quarterly Imputation Testing Reports Relating to the Accounting Separation of Telstra – September Quarter 2005*, December 2005, p. 11; ACCC, *Quarterly Imputation Testing Reports Relating to the Accounting Separation of Telstra – December Quarter 2005*, April 2006, p. 9; ACCC, *Quarterly Imputation Testing Reports Relating to the Accounting Separation of Telstra – March Quarter 2006*, June 2006, p. 12; ACCC, *Quarterly Imputation Testing Reports Relating to the Accounting Separation of Telstra – June Quarter 2006*, September 2006, p. 9; and ACCC, *Quarterly Imputation Testing Reports Relating to the Accounting Separation of Telstra – September Quarter 2006*, December 2006, p. 12.

or subscription subsidies being eliminated due to a fall in the MTAS rates, there has been a decrease in retail prices for mobile outbound calls and an increase in the level of handset subsidies accompanying the fall in the MTAS rates.[97] This suggests that the opposite than was forecast by the 'waterbed' effect has been occurring.

i. *Average retail price reductions are occurring without pass-through mechanisms:*

Access Economics for the CCC illustrates that Telstra's average access fee and call charge revenue per minute does not provide evidence of the 'waterbed' effect:

Figure 2-2: Telstra Average Access and Call Charge Revenue/Minute[98]
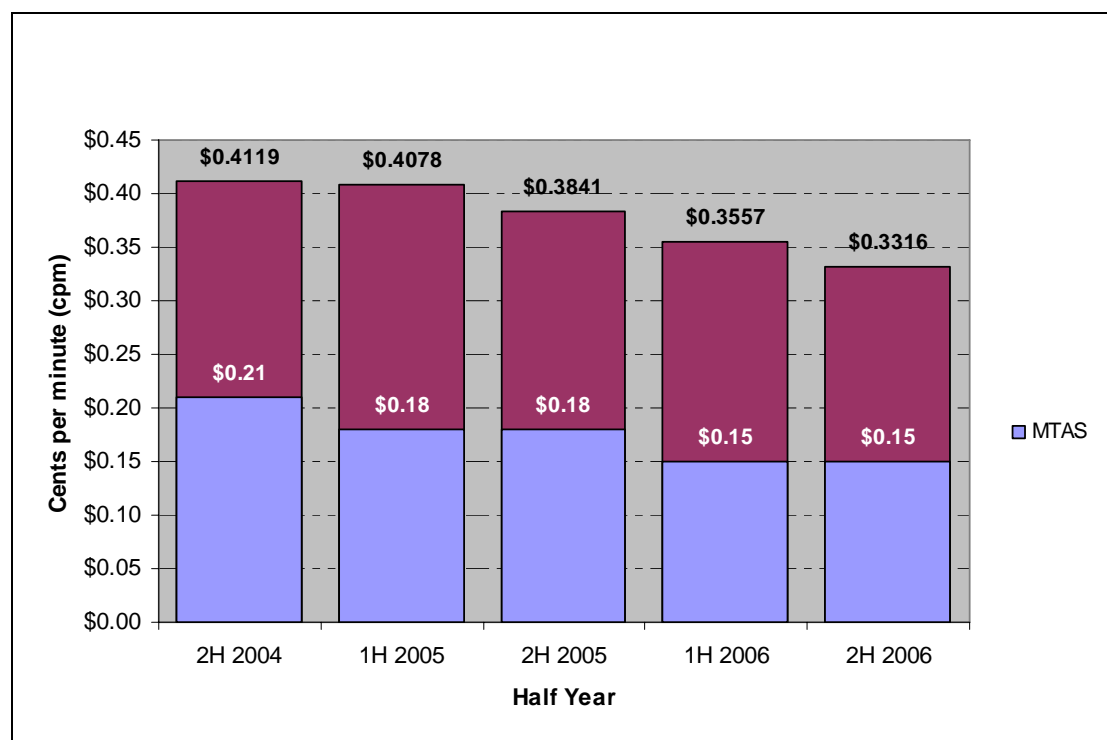
Access Economics for the CCC submits that Telstra's average call rates have fallen from 41.19 cpm in the second half of 2004 to 33.16 cpm in the second half of 2006, coinciding with a fall in the MTAS from 21 cpm to 15 cpm.

Similarly, Optus's 31 March 2007 year-end results indicate that total revenue increased by 3.5 per cent from 31 March 2006.[99] There is no information to suggest

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[97] Access Economics submission for the CCC, p. 1.

[98] Figure adapted from Access Economics submission for the CCC, p. 8, but has been updated to include correct data from Telstra's Annual Reports [Telstra Corporation Limited and Controlled Entities, *Financial Results for the Half Year Ended 31 December 2004*, p. 12; Telstra Corporation Limited and Controlled Entities, *Annual Report 2005*, p. 84; Telstra Corporation Limited and Controlled Entities, *Financial Results for the Half Year Ended 31 December 2006*, p. 23; and Telstra Corporation Limited and Controlled Entities, *Annual Report 2006*, p. 15.].

that this increase in revenue is as a result of increasing retail mobile rates brought about by the 'waterbed' effect, but rather this increase in revenue is mainly attributable to an increase in subscribers which grew by 3.9 per cent between March 2006 and March 2007.[100]

Optus's March year end 2007 results also illustrate that minutes of use per user per month grew at a faster rate than average revenue per user per month, implying decreasing revenue per minute in the March year end 2007 compared to previous quarters and the previous financial year.[101] This is also indicative of lower, not higher, retail mobile rates.

ii. *FTM retail pass-through occurring without mandated pass-through mechanisms*

In demonstrating the lack of substantiation for the operation of the 'waterbed' effect in Australia, it is clear FTM retail prices are lower compared with a period prior to the adjustment path for indicative prices for the MTAS as outlined above.

Also evident from the analysis of Telstra's FTM yields is that FTM volumes have consistently increased. The impact of falling MTAS prices on call volumes is a point that is often ignored in almost all of the analyses of the 'waterbed' effect, but at the same time these analyses put forward the improbable argument that profit can be sustained or increased from an increase in retail mobile prices to offset lost termination revenues.[102]

iii. *Handset subsidies are increasing not decreasing*

Handset subsidies for Telstra have not declined since 2004, notwithstanding changes to accounting treatment over time, which Telstra explains as 'attributable to a rise in the take up of handsets on subsidised plans as well as higher average subsidies offered.'[103]

iv. *Conclusion on the empirical substantiation of the 'waterbed' effect*

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[99] Singapore Telecommunications Limited and Subsidiary Companies (SingTel), *Singapore Telecommunications Limited and Subsidiary Companies, Management Discussion and Analysis of Unaudited Financial Condition, Results of Operations and Cash Flows for the Fourth Quarter and Financial Year Ended 31 March 2007*, p. 44.

[100] ibid., p. 45. It is unclear from the information that the Commission has available to it publicly as to the extent of this increase is attributed if at all to Virgin Mobile subscribers.

[101] Minutes of use per subscriber per month for pre-paid services grew by 10 per cent between 2005-06 and 2006-07, while ARPU per month grew by 9 per cent over the same period; and for post-paid services minutes of use per subscriber per month grew by 5 per cent, while ARPU per month fell by 1 per cent. From: Singapore Telecommunications Limited and Subsidiary Companies (SingTel), *Singapore Telecommunications Limited and Subsidiary Companies, Management Discussion and Analysis of Unaudited Financial Condition, Results of Operations and Cash Flows for the Fourth Quarter and Financial Year Ended 31 March 2007*, p. 44.

[102] These contrary effects are considered, for example, in: Albon, R. 'Fixed-to-Mobile Substitution, Complementarity and Convergence', *Agenda*, 13(4), 2006, pp. 315-17.

[103] Access Economics submission for the CCC, pp. 10-11.

The Commission considers that these trends of lower average retail prices (including lower FTM prices) and the increase in handset subsidies demonstrate that the converse of the 'waterbed' effect has been in operation.

3. Cost Model development and consultation since 2003

3.1. Regulatory Context

The Commission's decision to develop a bottom-up cost model builds on the international cost benchmarking analysis and the analysis of regulatory accounts (Regulatory Reporting Framework or Regulatory Accounting Framework (RAF) reports) that informs the *MTAS Pricing Principles Determination* for the period 1 July 2004 to 30 June 2007. In accordance with that determination, the conservative upper-bound estimate of supplying the MTAS, 12 cpm, is the indicative price as of 1 January 2007 to 30 June 2007. In the *MTAS Final Report* (June 2004), the Commission stated transparently and clearly that any reduction in pricing below 12 cpm could be supported by the development of its own bottom-up cost model:

> Given it (the Commission) has:
>
> - not developed a specific model to estimate TSLRIC+ in Australia at this time, and
>
> - concerns regarding the possible harm that might be caused by disrupting the business plans of MNOs if the Commission were to immediately reduce the price of the MTAS to TSLRIC+.
>
> The Commission believes a pricing principle that generates a gradual reduction in the price of the MTAS so that it reduces to a level that represents a closer association of price and the best measures the Commission has available to it of the TSLRIC+ of providing the service within Australia would be most appropriate under the Act at this time. The principles by which this price path should be determined are as outlined above.
>
> Over the longer term, however, the Commission wishes to stress that before it would reduce the price of the MTAS below the upper end of the range of best estimates available to it of the TSLRIC+ of providing the MTAS, the Commission would develop a more detailed estimate of the TSLRIC+ of providing the MTAS in Australia. This could be via developing a model to specifically model the TSLRIC+ of providing the MTAS in Australia, or via a detailed international benchmarking exercise that sought to make adjustments for all factors that drive the TSLRIC of providing the MTAS in different countries for Australia-specific factors.[104]

The development of a bottom-up cost model is considered an important and supplementary verification information to support the robustness and reliability of the international cost benchmarking and RAF data analyses that have informed the current 5 cpm to 12 cpm range for the estimate of costs and, in turn, supporting the indicative prices contained in the *MTAS Pricing Principles Determination* for the period 1 July 2004 to 30 June 2007.

The development of a bottom-up cost model has been the latest stage in an extensive consultation process which began with the *Mobile Services Review* in 2003. This broad consultation has continued, as mentioned in the context of processes associated with access undertakings proposed by three of the four carriers,[105] judicial review by the Federal Court concerning the *MTAS Pricing Principles Determination,* and merits reviews by the Tribunal in respect of two access undertakings. There has also been

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[104] ACCC, *Mobile Services Review – Mobile Terminating Access Services: Final Decision on Whether or not the Commission Should Extend, Vary or Revoke its Existing Declaration of the Mobile Terminating Access Service*, (*MTAS Final Report*), June 2004, p. 211.

[105] Namely, Hutchison (Hutchison Telecommunications (Australia) Ltd and Hutchison 3G refers to Hutchison 3G Australia Pty Ltd), Optus (Optus Networks Pty Ltd and Optus Mobile Pty Ltd) and Vodafone Australia Limited.

consultation with individual access seekers and access providers in relation to determinations made by the Commission related to over 30 access disputes notified about the supply of the MTAS.

The issue of the Commission's consultation with industry in relation to general cost principles that underlie the Commission's approach to access pricing, cost models developed by MNOs, RAF data, and this latest phase specifically about the WIK Model is considered in further detail below.

3.2. Ongoing MNO Consultation specifically relating to cost models in an Australian context.

As outlined in section 1.3, the Commission has continually engaged with the industry in a series of public consultations framed by regulatory decisions about cost models since late 2004.

Since the release of the *MTAS Pricing Principles Determination* for the period 1 July 2004 to 30 June 2007 and the *MTAS Final Report*, two carriers (Optus and Vodafone) have attempted to support their MTAS pricing with the development of their own top-down cost models. In each case the Commission has assessed the models with advice from international consultants and has identified deficiencies in the modelling approach or methodology and the empirical inputs (parameters) of these models in an Australian context.

The following table outlines the timing and extent of consultation undertaken in relation to cost models submitted in support of the MTAS undertakings since 1 July 2004.

Table 3-1 – Vodafone and Optus Undertaking Public Consultation Processes

Process	Date	Consultation Time on cost models (weeks)
Vodafone		
Initial undertaking submitted	26 November 2004	
Discussion paper released. Six week period from the date Vodafone made confidential material available.	25 February 2005	N.A. as initial undertaking withdrawn
Second undertaking submitted	23 March 2005	
Discussion paper released. Six week period from the date Vodafone made confidential material available.	13 April 2005	N.A. as confidential material not submitted.
Commission acknowledges that confidential material made available by Vodafone	6 July 2005	**6 weeks**
Submissions on discussion paper due	17 August 2005	
Draft decision released	22 December 2005	**4 weeks**
Submissions on draft decision due	19 January 2005	
Final decision released	3 April 2006	
Optus		
Undertaking submitted	24 December 2004	
Discussion paper released	25 February 2005	**6 weeks**
Submissions on discussion paper due	25 May 2005	
Draft decision released	8 November 2005	**4 weeks**
Submissions on draft decision due (2 week extension later granted to parties)	29 November 2005 initially extended to mid December 2005	
Final Decision released	3 February 2006	
Total (consultation time)		**20 weeks**

It is important to recognise that the extensive review of both the Optus and Vodafone cost models since late 2004 and early 2005 has centred on many of the input parameters that inform the WIK Model.

The Commission considers these processes have been relevant to the recent WIK Model process, in informing the framework and parameters in the WIK Model.

3.3.   Ongoing MNO Consultation about relevant costs in an Australian context

In addition to these public processes three of the four MNOs are required to report under the Record Keeping Rule (RKR) for the RAF.

This RKR requires Optus, Telstra and Vodafone (without any exemptions that may be operating) to provide half yearly reports about the relevant costs and revenues

associated with the delivery of relevant regulated access and other non-regulated services.

As part of an ongoing process of continual improvement of the RAF data the ACCC examines the reliability and robustness of the underlying allocation of costs across different services.

Notwithstanding any recent issues that the ACCC may have in relation to the allocation of costs across different services or whether these costs are efficient cost measures, particularly as services other than voice termination may now be included in these data reported, the underlying RAF data provide an important and confirmatory source of data about the actual costs incurred by MNOs that relate to the MTAS. These data serve as a basis for establishing the upper-bound of the total cost of, and especially costs of individual classes of network elements relevant to, the supply of the MTAS.

These RAF data sources also informed the range of estimates of 5 cpm to 12 cpm that support price-related terms and conditions contained in the *MTAS Pricing Principles Determination* for the period 1 July 2004 to 30 June 2007.

3.4. Economic Cost Model Project

3.4.1. Tender Process and Consultant Selection

On 31 March 2006, the ACCC released a request for tender (RFT) seeking the services of a consultant to construct a bottom-up cost model with specific economic and engineering parameters for estimating the cost of providing the MTAS in Australia.[106]

The RFT was publicly released and available on the ACCC's website from 31 March 2006 to 5 May 2006. The RFT has been provided to MNOs, on request, as it was not available on the ACCC's website after 5 May 2006 (when the tender closed). The RFT is available as Appendix 2 to the *WIK Report* and is currently available on the ACCC's website.[107]

Submissions for the RFT closed on 5 May 2006.

WIK was selected on the basis of merit against the relevant selection criteria in this open tender process.

3.5. WIK Model Development

WIK was engaged in June 2006 and has worked to develop a bottom-up cost model.

A draft report was issued by WIK to the ACCC on 22 December 2006.

A final report was provided to the ACCC on 16 January 2007 and was released publicly on 1 February 2007.

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[106] ACCC, *Request for Tender for the Provision of Expert Telecommunications Sector Consultancy Services to the Australian Competition and Consumer Commission*, 31 March 2007.

[107] WIK Consult, *Mobile Termination Cost Model for Australia*, (*WIK Report*), January 2007.

3.5.1. Industry Consultation in the lead up and after the consultation period on the WIK Model

To date the ACCC has:

- extended invitations at the end of July 2006 to each of the four MNOs, to meet with WIK and the ACCC;

- held a meeting either in person or by telephone with three of the four MNOs in Australia in September 2006. WIK was present at two of these meetings, arising from invitations extended to MNOs. One MNO declined to provide any information or assistance to WIK in developing the WIK Model;

- had several meetings (involving Commissioners and ACCC staff) with MNOs and other interested parties in the period November 2006 to May 2007 specifically related to the WIK Model development and initiated by these interested parties. Two parties that provided submissions on the WIK Model also presented these submissions in face-to-face meetings to the ACCC (ACCC staff and Commissioners); and

- continued its engagement with the carriers in respect of their RAF reporting requirements as appropriate and relevant to improve the consistency of information submitted.

Details about the WIK Model Consultation process are contained in the WIK Model Annexure A.4.

4. Conceptual Issues

4.1. Scorched-node and scorched-earth concepts

4.1.1. WIK Model approach

The Commission specified in the RFT that it 'seeks assistance in constructing a bottom-up engineering-economics cost model of the TSLRIC+ of providing the termination of voice calls on mobile networks in Australia.'[108]

A bottom-up modelling approach uses available market information to model costs that an efficient entrant would encounter such as efficient network structure, efficient operations and efficient costs and because of these inherent properties bottom-up models do not necessarily reflect the actual cost structure and level of a specific operator in the market at that point in time. But they do reflect an efficient cost structure relevant to that market.[109]

Bottom-up cost models can use either a scorched-earth or a scorched-node approach to optimising network design. The scorched-node approach assumes a network that reflects current network structure in terms of number and location of nodes. On the other hand, a scorched-earth approach assumes that the network is redesigned to optimise the number and location of network nodes.

WIK's interpretation of the RFT requirements was that a bottom-up approach models network and cost structures for a hypothetical MNO that is not constrained by technology, systems, and architectural decisions of the past. The WIK Model adopts a scorched-earth approach to the network design component, which deploys best-in-use technology that has proven its operational feasibility and is cost-effective. The resulting optimised network structure may not necessarily reflect the structure of any operator actually operating in the market.[110] This is particularly true as radio-communications technology (a key input for a mobile network) is constantly evolving, resulting in increased efficiencies in providing coverage to end-users.

4.1.2. Parties' views

ATUG submits that it 'supports the use of the WIK bottom-up engineering-economics TSLRIC model for determining the appropriate pricing principles for the proposed timeframe of two years up to 30 June 2009.'[111]

Optus submits that a scorched-earth model does not produce a reasonable estimate for the MTAS as it is impractical for an existing operator to realise all efficiencies available to a new entrant and it does not recognise the legitimate business interests of

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[108] ACCC, *Request for Tender for the Provision of Expert Telecommunications Sector Consultancy Services to the Australian Competition and Consumer Commission*, 31 March 2006, p. 3.

[109] WIK Consult, *Mobile Termination Cost Model for Australia*, (*WIK Report*), January 2007, p. 5.

[110] ibid., p. 118.

[111] Australian Telecommunication Users Group (ATUG), *Submission: Discussion Paper on the WIK Mobile Network and Cost Model to Inform the MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*, (ATUG submission), 16 March 2007, p. 4.

existing operators who have large investments in mobile network infrastructure.[112] A scorched-earth approach does not capture the importance of network resilience and redundancy.[113]

Optus submits that the WIK Model does not take into account 'many fundamental challenges and limitations faced by existing MNOs and a new entrant'[114] and that, subsequently, it is 'inaccurate to describe the network produced by the WIK Model as being designed in a more efficient manner than existing mobile networks in Australia.'[115] Optus further submits that:

> The WIK Model has in particular areas taken an 'aggressive' rather than a 'conservative' approach in choosing network parameters, modelling assumptions, decisions and algorithms and the scenarios chosen (though it purports otherwise).[116]

Optus submits that '[t]he scorched earth approach emphasises theoretical efficiency, re-designing the network with minimal constraints' and '[t]his approach risks underestimating what a reasonably efficient network deployment would be as in practice a network operator faces a number of restrictions'. Optus submits that '[a]s such it may not allow an existing operator to recover prudent but historically incurred costs.'[117]

Optus submits that there is 'more or less unanimous use of scorched node optimisation' in other jurisdictions and that the WIK Model does not incorporate parameters based on the experience of local mobile operators.[118] According to Optus the scorched-node approach is 'unanimously preferred' for several reasons, including that regulators have recognised the practical inability of MNOs to locate networks elements in any location.[119]

Optus submits that the WIK Model assumes technology that is 'not evidently best or in-use in Australia' and theoretically efficient network configurations which means that little concession has been made for the legitimate business interests of MNOs and the practicalities faced by MNOs in Australia.[120]

Optus submits that the scorched-node approach is also supported as mobile networks have been efficiently deployed and operated due to the existence of facilities-based competition.[121] However, there is no reason not to assume a similar degree of efficiency in historical investment and deployment decisions by Australian MNOs given the high degree of infrastructure competition in the Australian mobile market.[122]

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[112] Optus, *Optus Submission to the Australian Competition and Consumer Commission on the WIK Mobile Network and Cost Model for Australia*, (Optus submission), March 2007, pp. 6 and 23.

[113] ibid., p. 25.

[114] ibid., p. 6.

[115] ibid.

[116] ibid.

[117] ibid.

[118] ibid., p. 8.

[119] ibid., p. 7-8.

[120] ibid., p. 8.

[121] ibid., p. 8-9.

[122] ibid., p. 9.

In this regard, Optus submits that the Commission continues to have no issue with Telstra's PIE II fixed network model being based upon a scorched-node framework and that the Commission's model of Telstra's fixed-line network was based on a scorched-node approach. Optus submits that the 'scorched node method has been unanimously preferred because regulators have recognised that due to reasons of simplicity and feasibility, as well as historical factors, applying a scorched earth approach is generally not feasible.'[123] Further, the Independent Regulators Group considers the scorched-node approach to be a 'principle of implementation and best practise' in LRIC network modelling.[124] Optus also submits that 'the Commission needs to strongly re-consider whether the scorched-earth model is a reasonable and appropriate approach.'[125] Optus submits that to compensate for the inadequacies of bottom-up models, regulators in other jurisdictions have undertaken a process of cost calibration to compare actual data with that produced by the model to verify the legitimacy of such results.[126]

Telstra submits that is has concerns with:

- the use of a bottom-up cost model with no attempt to reconcile a top-down approach;

- the adoption of inputs and assumptions which do not reflect the realities of providing the MTAS in an Australian context; and

- the use of a problematic WACC that is based on international rather than domestic market data.[127]

Nevertheless, Telstra submits that 'the outputs generated by the WIK Model appear to be in line with other sources which suggest that the efficient cost of supplying the MTAS is at the lower end of the Commission's range of reasonable estimates (that is, in the order of 5-6 cpm).'[128]

Vodafone submits that it has concerns regarding the lack of calibration in the WIK Model as WIK holds that calibration is only applicable in so far as it ensures all 'relevant' costs are included.[129] Vodafone submits that WIK's scorched-earth approach may result in a theoretically optimal network design, but that 'such a result does not reflect market realities, nor does it reflect the reality of rolling out a network in Australia which would be experienced by the hypothetical efficient new entrant.'[130]

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[123] ibid.

[124] ibid.

[125] ibid.

[126] ibid., pp. 9-10.

[127] Telstra Corporation Limited, *Submission in Response to the ACCC's Discussion on the WIK Mobile Network and Cost Model to Inform the MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*, (Telstra submission), March 2007, p. 3.

[128] ibid.

[129] Vodafone Australia Limited, *Submission to the Australian Competition and Consumer Commission: WIK Mobile Network and Cost Model and MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*, (Vodafone submission), March 2007, p. 12.

[130] ibid., p. 14.

4.1.3. Commission's view

Background

The Commission has expressly stated in the RFT that it was seeking a model that 'would provide a tool for the assessment of the efficient costs of providing termination by hypothetical operators under different circumstances.'[131]

WIK has developed a flexible model that can consider a range of scenarios including variation in population coverage, market penetration and market share and also provides for some practical scenarios of relevance for MNOs in an Australian context as well as two scenarios that can be used to consider hypothetical operators.

WIK has, in providing this flexibility, demonstrated the practical implications of developing an efficient cost model using a scorched-earth approach. Sometimes the issues with a scorched-node approach include the identification of which network and what MNO's nodes to use as a reference point.

The Commission considers that under these circumstances the use of a scorched-earth approach to examining the costs of the most efficient operator providing the MTAS in Australia is an important tool to support future regulatory processes. The Commission also notes that it has discretion over input parameters and network calibration which contextualise the WIK Model for Australian conditions to enhance the applicability of the WIK Model for an Australian regulatory context. These enhancements are outlined in section 5.1.2.

Implicit references are made throughout Optus's and Vodafone's submissions about their cost of delivering the MTAS using actual costs to reflect their networks. This potentially confuses two issues:

1. Network design: an optimised network reflected in the WIK Model compared with the actual network deployed by MNOs in Australia; and

2. Cost model conceptual approaches: bottom-up models populated with efficient benchmark costs such as in the WIK Model and top-down models which are populated with the actual costs incurred by mobile network operators.

These issues are further discussed below.

i. Network design

Interested parties have submitted implicitly and explicitly about issues which relate to the design of a network.

The WIK Model replicates an optimised network for a hypothetical efficient operator under certain assumptions about market penetration and population coverage. As indicated, this is a scorched-earth approach to network design. In this way the WIK Model is not intended to represent the actual deployment of any mobile network operator's network in Australia. In general, many of the issues raised by interested parties in respect of network design relate to the actual network deployed by each MNO, not that of a hypothetical efficient operator. These issues are dealt with in the WIK Model Annexure A.1. and A.3. in detail.

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[131] ACCC, *Request for Tender for the Provision of Expert Telecommunications Sector Consultancy Services to the Australian Competition and Consumer Commission*, 31 March 2006, p. 3.

In some instances, MNOs have raised common and consistent issues relating to differences in the attainable network deployed in an Australian context by MNOs and that of the network of an efficient operator as deployed in the WIK Model. There are also some issues that also influence cost estimates, such as the WACC, which have been subject to Tribunal deliberation and decision. The Commission considers that these issues warrant further calibration of the WIK Model for an Australian context. The Commission has outlined in the WIK Model Annexure A.1 and A.3 the relevant network elements where finer calibration is appropriate in an Australian operating and regulatory context and summarises the modifications made to the WIK Model to account for these two sets of factors in section 5.1.2.

ii. Cost model conceptual approaches

As outlined, the Commission has reviewed and analysed several cost models developed by MNOs in Australia since July 2004. The consultation about and analysis and review of these models represents over three years of extensive consultation with the industry about modelling issues and the principles that underpin the Commission's approach to estimating the MTAS in the context of developing an engineering and economic cost model. Furthermore, the Commission's review of these models has been affirmed by the Tribunal in two separate decisions.

This consultation concerning model frameworks and related conceptual issues commenced with the *Mobile Services Review* in 2003. With the release of the *MTAS Final Report* in June 2004, the Commission formally signalled that a bottom-up cost model could be used to support regulatory processes (refer to section 3.1 for details).

To support Optus's undertaking (2004) CRA adopted a forward-looking long-run incremental cost (FL-LRIC) framework for an economic cost model to estimate a cost of supply of the DGTAS by Optus. While the Commission considers that FL-LRIC and TSLRIC are broadly consistent cost concepts. The Tribunal affirmed that an access price based on an FL-LRIC approach 'depending upon the construct of that approach' may be reasonable.[132] The model developed for Optus proposed mark-ups for common costs (using allocation methods based on Ramsey-Boiteux principles) and a NES. These mark-ups did not reflect the efficient costs of providing the MTAS service and represented premiums above the reasonable price for recovering investment costs.

The model developed by CRA was considered a top-down model based on Optus's historical accounting information for 2003-04; the forward-looking aspect of the model reflects that these costs were re-valued to reflect current costs.[133]

The model developed by PwC to support Vodafone's undertaking (2005) reflected a fully allocated cost (FAC) model or top-down approach. In its assessment of the PwC model the Commission indicated that a top-down FAC model, such as developed for Vodafone, would at best, for conceptual and practical reasons, and only if properly populated, produce an upper-bound estimate for the efficient cost of supplying the

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[132] *Application by Optus Mobile Pty Limited & Optus Networks Pty Limited*, [2006], ACompT 8, at [108].

[133] ACCC, *Optus's Undertaking with Respect to the Supply of its Domestic GSM Terminating Access Service (DGTAS), Final Decision, Public Version*, (*Optus Undertaking Decision*), February 2006, p. 28.

MTAS. It also indicated that the PwC model would lead to an overstatement of the 'forward-looking efficient economic costs' of Vodafone providing the MTAS.[134]

In examining both models, the Commission considered that a properly specified top-down model can be used to inform the cost of providing the MTAS, but concluded that both models would provide an upper-bound of these efficient costs.[135]

Throughout three years of consultation, analysis and review of these models the Commission's position on cost models has been well documented, widely publicised and affirmed by decisions of the Tribunal. For example, in its Vodafone decision the Tribunal indicated that while costs models distinct from TSLRIC+ models are not unreasonable, it is generally not in the LTIE to depart from TSLRIC pricing for regulated access services and that access prices should reflect and not exceed forward-looking efficient costs.[136]

> We do not consider that a fully allocated cost model, as distinct from a TSLRIC+ model is, of itself, unreasonable having regard to the matters specified in s 152AH and the objectives set out in s 152AB. We accept that in *Re Seven Network* (No 4) (2004) 187 FLR 373 at 410, the Tribunal expressed the view that it would generally not be in the long-term interests of end-users to depart from TSLRIC pricing where access is regulated. However, we would repeat the observation of the Tribunal in *Telstra Corporation Limited* (supra) at par [63]:
>
> > In this area of analysis there is no one correct or appropriate figure in determining reasonable costs or a reasonable charge. Matters and issues of judgement and degree are involved at various levels of analysis.
>
> Nevertheless, we still consider that in general terms the prices in access undertakings should reflect and not exceed forward looking efficient economic costs: *Telstra Corporation Limited* (supra) at par [46].

The Tribunal affirms this position that alternative model approaches may also be appropriate if it can be established that the actual costs incurred by an MNO are efficient.[137]

These two statements together reflect the Tribunal's support for the use of forward-looking efficient costs or a bottom-up approach to estimating costs that inform access prices.

The Commission maintains that while limitations may exist in practice, an appropriate method for estimating the costs of the most efficient operator in supplying the MTAS is using a bottom-up model, to generate a TSLRIC+ estimate (incorporating an equi-proportionate mark up or EPMU approach for common costs).

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[134] ACCC, *Assessment of Vodafone's Mobile Terminating Access Service (MTAS) Undertaking, Final Decision, Public Version*, (*Vodafone Undertaking Decision*), March 2006, pp. 29-30.

[135] ACCC, *Optus Undertaking Decision*, p. 30; and ACCC, *Vodafone Undertaking Decision*, p. 30.

[136] *Application by Vodafone Network Pty Ltd & Vodafone Australia Limited* [2007] ACompT 1, 11 January 2007, at [44].

[137] *Application by Optus Mobile Pty Limited & Optus Networks Pty Limited* [2006] ACompT 8, 22 November 2006, at [116-118].

4.2. Efficient operator

4.2.1. WIK Model approach

As outlined, the RFT indicated that the Commission was seeking a model that could reflect the efficient cost of supplying the MTAS by hypothetical operators under different circumstances.'[138]

The *WIK Report* identifies two possible reference case scenarios for the supply of the MTAS by a hypothetical efficient MNO. In both reference scenarios the hypothetical MNO is a new market entrant, has 96 per cent population coverage, operates using GSM technologies, and is a stand-alone mobile network. The two reference scenarios only differ in terms of the market share of the hypothetical efficient MNO.

In one scenario the hypothetical efficient MNO has a market share of 25 per cent. The *WIK Report* explains that a market share of 25 per cent provides a plausible reference case for a hypothetical efficient MNO as there are currently four MNOs in the Australian market.[139] The 25 per cent market share scenario is based on the assumption that it is theoretically possible for all four MNOs to achieve similar market shares in a competitive market. The Commission outlined in the RFT that it was conscious of the concept of achievability by existing mobile carriers and was seeking the ability to determine the costs of operators with, say a 25 per cent market share.[140] In the other reference scenario the hypothetical efficient MNO has a market share of 31 per cent. Given the specific historic licensing approach and market development in Australia, 31 per cent represents the equal market share achievable by three MNOs less Hutchison's market share (assumed to be 7 per cent).[141]

In both reference case scenarios, the WIK Model assumes that a hypothetical efficient MNO adopts the 'best-in-use' technology.[142] The *WIK Report* states that the best-in-use technology is 2G as it is:

> the one which is most cost-effective in current networks and at current levels of demand. WIK-Consult's modelling approach is based on the assumption that the 2G generation of mobile network technology is the 'best-in-use technology' representing the technology an efficient forward-looking operator would apply today under the current level of demand. 2G is optimised for carrying voice traffic.[143]

> The new operator makes a clear decision about the optimal technology to use. This reference point is not consistent with path-dependent investment decisions. The investment decision of an efficient operator does not depend on past decisions and existing networks or technologies.[144]

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[138] ACCC, *Request for Tender for the Provision of Expert Telecommunications Sector Consultancy Services to the Australian Competition and Consumer Commission*, 31 March 2006, p. 3.

[139] WIK, *WIK Report*, p. 118-19.

[140] ACCC, *Request for Tender for the Provision of Expert Telecommunications Sector Consultancy Services to the Australian Competition and Consumer Commission*, 31 March 2006, p. 4.

[141] WIK, *WIK Report*, p. 119.

[142] ACCC, *Access Pricing Principles - Telecommunications - A Guide*, (*Access Pricing Principles Guide*), July 1997, p. 29.

[143] WIK, *WIK Report*, January 2007, p. 50.

[144] ibid., p. 51.

In addition, the WIK Model estimates the efficient costs of a stand-alone MNO supplying the MTAS because it represents the likely characteristic of a new market entrant.

4.2.2. Parties' views

AAPT submits that, as the Australian market currently supports only three mobile service operators, a 33 per cent market share should be used with a 98 per cent market penetration rate.[145]

ATUG submits that the scenarios suggest model costs of around 6 cpm would mitigate various risks and uncertainties, using the 25 per cent market share assumption.[146]

Optus submits that 'hearings before the Tribunal have indicated that a number of recommendations discredit, and likely reject, the validity of applying the 25 per cent standard for the size of a hypothetical mobile operator' and should not be considered as a reference case.[147]

Optus submits that the Tribunal has indicated that an integrated MNO, such as Optus, should be treated as if it were a stand-alone MNO.[148]

Telstra submits that '[t]he concern of Part XIC with efficiently incurred costs has been emphasised many times by the Tribunal' and it should not be contentious that the appropriate benchmark is the efficient operator and that 'it should not be contentious that an operator, functioning efficiently, will possess the scale and scope achievable by all MNOs.'[149] Telstra submits that it is contrary to the objects of Part XIC of the Act to adopt differentiated MTAS prices for different operators depending on a given operator's degree of integration and market share and that the appropriate benchmark operator against which to consider the costs of supplying the MTAS is an efficient operator operating at or close to minimum efficient scale.[150]

Telstra submits that a standalone mobile operator with 25 per cent market share represents the practical application of the efficient operator standard in the Australian context as these characteristics reflects a MNO with the scale and scope achievable by all operators.[151]

Vodafone submits that the Commission has previously indicated that a 25 per cent market share is the relevant efficient benchmark. However, Vodafone submits that the Tribunal has rejected the view that 25 per cent is achievable by all MNOs,[152] as the

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[145] AAPT Limited, *AAPT Limited's Response to Request for Submissions Regarding the WIK Mobile Network and Cost Model to inform the MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*, (AAPT submission), p. 3.

[146] ATUG submission, p. 4.

[147] Optus submission, p. 11.

[148] ibid.

[149] Telstra submission, p. 39.

[150] ibid., p. 40.

[151] ibid., p. 42.

[152] Vodafone submission, p. 11.

'market reality is that not all operators will aim to service the complete market, or all of Australia, or provide fixed as well as mobile services.'[153]

In addition, Vodafone submits that an efficient new entrant should incur a similar percentage of common costs and that Vodafone's market size (around 17 per cent share) indicates that Vodafone is unlikely to be incurring significant diminishing returns to scale and management.[154]

4.2.3. Commission's view

One of the key factors reflected in the LTIE criterion is the impact of any access pricing outcomes that encourage economically efficient use of, and investment in, telecommunications infrastructure.

More broadly, the Commission has focused on the concepts of dynamic, productive and allocative efficiency. These concepts are outlined in the *Access Pricing Principles Guide*.[155]

The efficient operator is accounted for in the context of productive efficiency, whereby:

> As the [access] price will be based on the cost of providing the service using the most efficient means commercially available it will encourage access providers to continually improve their performance with the aim of achieving best practice and lowering cost. The competitive pressure generated in dependent markets will also encourage firms to improve productivity and reduce costs.[156]

The Commission has consistently considered that the appropriate costs to recover when determining the costs of supplying the MTAS are likely to be those of an efficient operator. This is because, in an effectively competitive market, it could be expected that prices would reflect an efficient level of costs.[157]

The Commission has also outlined previously that the question of efficient operator could encompass scenarios that are achievable by all MNOs such as an achievable minimum efficient scale; say a 25 per cent market share given the presence of four existing carriers,[158] or 31 per cent, based on the achievable share of the three 2G carriers (Telstra, Optus and Vodafone) after removing Hutchison's overall market share of approximately 7 per cent.[159]

An efficient operator has two implications in the context of the WIK Model. The first is that the network of a hypothetical operator will not necessarily mirror that of an actual mobile network and will reflect the best-in-use technology currently deployed,

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[153] ibid.; see also *Application by Vodafone Network Pty Ltd & Vodafone Australia Ltd*, [2007], ACompT 1, at [80].

[154] Vodafone submission, p. 28.

[155] ACCC, *Access Pricing Principles Guide*, pp. 17-18.

[156] ibid., p. 18.

[157] ACCC, *Vodafone Undertaking Decision*, March 2006, pp. 33-34.

[158] ibid.

[159]

http://www.hutchison.com.au/hutchison2004/hutchison2004staging/object/attachment/docs/ACF5 D.pdf., viewed January 2007.

despite one scenario closely reflecting the market share of an MNO operating in Australia.

The second is that the hypothetical operator will incur the efficient costs of providing a service rather than the actual costs necessarily incurred by MNOs. The cost difference derives from both the nature of the networks actually deployed and any distortions in cost that may be present; for example business strategies employed by the individual operators, pricing within multinational groups and cross subsidisation of certain services vis-à-vis other services.

In fact all scenarios presented in the WIK Model could reflect that of a hypothetical efficient operator. Consideration of what market share that best represents the minimum efficient scale achievable by all MNOs is appropriate. At present, there is no general consensus from interested parties about the market share that should be achievable by all MNOs to reflect that of a hypothetical operator, but there is almost uniform agreement that a stand-alone operator scenario should apply.

The Commission notes that the Tribunal did not consider a convincing case had been made in the Vodafone Undertaking Decision review that achievable scale and scope translates into a 25 per cent market share.

> It is relevant that an efficient new entrant – even, if realistic markets are envisaged, a hypothetical one- would not itself have immediate access to the economies of scale and scope that might be achievable overtime.[160] No evidence was presented regarding minimum efficient scale in this industry. It is possible that in the long run, four operators, each with a 25% market share, is not a sustainable outcome.[161]

This suggests that a higher market share benchmark is contemplated by the Tribunal and therefore a lower market share benchmark, such as a 25 per cent benchmark, is reasonable. The Tribunal's concerns about a lack of knowledge about economies of scale and scope have also been addressed through the development of the WIK Model. In its conclusion the Tribunal left the issue of the efficient operator open stating it did not consider it was necessary for it to reach a conclusion on what is the benchmark of an efficient operator by reference to which an MNO's costs are to be assessed for their efficiency, especially in the absence of information before it about the minimum efficient scale in the Australian mobile industry segment.[162]

The Commission considers that both hypothetical efficient operator scenarios illustrated in the *WIK Report* can be used as reference cases.

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[160] *Application by Vodafone Network Pty Ltd & Vodafone Australia Ltd*, [2007], ACompT 1, at [72].

[161] ibid., at [82].

[162] ibid., at [79-84].

5.   Indicative Prices for the MTAS

Before proceeding to provide an outline of the implications for the future indicative pricing of the MTAS arising from the WIK Model process and other corroborating information, it is important to step-back and review what has occurred since 1 July 2004.

When the *MTAS Final Report* was released in June 2004, the lowest prevailing MTAS price was 21 cpm, with even higher rates being used to set access prices in commercial negotiations.

For end-users the benefits have been pronounced with FTM rates and mobile service rates falling significantly since 1 July 2004, compared to the years preceding 1 July 2004.

As was shown previously, average real prices for mobile services has fallen significantly since 1 July 2004 falling close to 19 per cent and retail FTM rates which were as high as 42 cpm for residential customers have fallen by almost 12 per cent since then and are now around 38 cpm.

Moreover, the Commission has modelled that, in relation to FTM calls, the input cost savings achieved by lower MTAS are in the order of $350 million in the period 1 January 2005 and 31 December 2006,[163] when the prevailing rate of 21 cpm as at 1 July 2004 is used as the point of comparison. These cost savings are much higher as this modelling relates to only one type of MTAS call (calls originating from a fixed network) and do not include cost savings from calls that originate from either another mobile network or an international network. These cost savings, as shown below, have resulted in limited adverse impacts the mobile network operators. Their profits, market share or mobile revenues have been sustained despite lower termination revenues as a result of falling MTAS rates.

In terms of investment, Telstra and Optus have both announced and commenced extensions to their 3G Networks since June 2004.

Telstra announced plans in November 2005 to investment in a new 3G network at the 850MHz frequency, to replace its current CDMA network.[164] This network was commissioned in October 2006, and when fully operational is expected to cover 1.6 million kilometres and provide coverage to 98 per cent of the Australian population.[165] On 30 January 2007, Optus announced plans to expand its 3G network to cover 96 per cent of the population (to replicate its existing 2G mobile network) and further on 30 March 2007, Optus announced plans to upgrade its mobile network with High-Speed Downlink Packet Access (HSDPA) technology. It is expected that this upgrade will

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[163]   Refer to Appendix F for how this value is derived.

[164]   Telstra Corporation Limited, *Telstra Unveils 3G City-to-Country Delivering Mobile 3G Broadband*, Media Release, 15 November 2005. Available at: http://www.telstra.com.au/abouttelstra/media/mediareleases_article.cfm?ObjectID=35896, viewed on 17 May 2007.

[165]   Telstra Corporation Limited, *Regional and Rural Presence Plan*, July 2006, p. 36. Available at: http://www.telstra.com/countrywide/resources/pdf/RRPP_July2006.doc?SMSESSION=NO, viewed on 17 May 2007.

provide 55 per cent of the Australian population with high-speed wireless broadband services.[166]

5.1. Overall outcomes and efficient cost estimate

5.1.1. Parties' views

Access Economics for the CCC submits that 'the indicative price for the MTAS should be the appropriately chosen cost-based outcome from the WIK Model, which based upon the scenarios used by WIK-Consult, lies in the range between 5 and 7.3 cpm.'[167]

AAPT submits that it supports the implementation of the WIK Model to determine the MTAS Pricing Principles from 1 July 2007 to 30 June 2009 and that it is satisfied that the outcomes of the model reasonably reflect the costs faced by service providers.[168]

ATUG submits that it accepts the findings of the WIK Model and that 'at various decision points the WIK Model takes a conservative position allowing higher costs for operators than an alternative view would support.'[169] ATUG submits that these conservative positions are in regard to:

- cost of spectrum;

- working capital;

- fixed-mobile integration;

- 2G and 3G integration;

- exclusion of Government subsidies;

- site sharing assumptions;

- current replacement values for equipment;

- Telstra wholesale leased line price averages; and

- 10 per cent mark-up for common organisational costs.

ATUG supports the use of international cost modelling for reference purposes to benchmark the WIK Model estimates.[170]

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[166] SingTel, *Singapore Telecommunications Limited and Subsidiary Companies Management Discussion and Analysis of Unaudited Financial Condition, Results of Operations and Cash Flows for the Fourth Quarter and Financial Year Ended 31 March 2007*, May 2007, p. 46.

[167] Access Economics for the CCC, *Response to the ACCC MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009, Submission by Access Economics Pty Limited for the Competitive Carriers' Coalition (CCC)*, (Access Economics submission for the CCC), 16 March 2007, p. 2.

[168] AAPT Limited, *AAPT Limited's Response to Request for Submissions Regarding the WIK Mobile Network and Cost Model to inform the MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*, (AAPT submission), p. 1.

[169] Australian Telecommunication Users Group (ATUG), *Submission: Discussion Paper on the WIK Mobile Network and Cost Model to inform the MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*, (ATUG submission), 16 March 2007, p. 4.

[170] ATUG submission, p. 4.

Optus submits that 'at best, with some adjustments the WIK Model could then be said to produce the lowest bound of MTAS rates in Australia.'[171]

Telstra submits that there is no material available to the Commission by reference to which it could be satisfied of the reasonableness of the inputs and assumptions adopted in the WIK Model.[172] Nevertheless, Telstra also submits that, notwithstanding its concerns with the WIK Model, the model's output is consistent with sources which indicate that the efficient cost of supplying the MTAS is at the lower end of the Commission's previous 5-12 cpm estimate.

Vodafone submits that the Commission should be guided by a review of the effectiveness of the 2004-07 pricing principles against the stated objectives, and this should involve analysing whether:

- there is a correlation between lower mobile termination rates and increased competition in the market for fixed-line telecommunications services; and

- specific pricing guidance is consistent with the LTIE.[173]

Vodafone submits that reductions in the price of the MTAS have not assisted non-integrated fixed-line operators like AAPT and Primus compete with the integrated fixed-line operators.[174]

Vodafone expresses concern that, based on '*reasonable* inputs, based on accepted engineering principles and cost inputs that an efficient new entrant is likely to incur,' the WIK Model estimated the cost of providing MTAS to be 44.8 cpm which incorporates an increment of 37.5 cpm to account for the individual effects of the corrections that Vodafone proposes are required to the WIK cost model estimate.[175]

Vodafone subsequently submits that 'the weight of market evidence combined with the development of economic literature suggests that there is little justification for the imposition of explicit pricing guidance in the 2007-09 pricing principles.'[176]

[171] Optus, *Optus Submission to the Australian Competition and Consumer Commission on the WIK Mobile Network and Cost Model for Australia*, (Optus submission), March 2007, p. 8.

[172] Telstra, *Submission in Response to the ACCC's Discussion Paper on the WIK Mobile Network and Cost Model to Inform the MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*, (Telstra submission), March 2007, p. 15.

[173] Vodafone Australia Limited, *Submission to the Australian Competition and Consumer Commission: WIK Mobile Network and Cost Model and MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*, (Vodafone submission), March 2007, p. 2.

[174] ibid.

[175] ibid., p. 29.

[176] ibid.

5.1.2. Commission's view

WIK Model TSLRIC+ estimate[177]

The WIK Model has been modified to account for:

- a minimum of 2 SMSCs from 1 SMSC (as outlined in the Annexure: WIK Model Outcomes (WIK Model Annexure), at A.1.1.3.5);

- recognition of transient population in POAs encompassing airport precincts, industrial areas and military bases (as outlined in the WIK Model Annexure A.1.1.3.1);

- unbilled minutes (as outlined in the WIK Model Annexure A.3.1.3);

- more appropriate routing factors for the HLR (as outlined in the WIK Model Annexure A.3.2.3.1); and

- removal of the redundant terrain parameter (as identified in the WIK Model Annexure A.1.1.3.2)

In addition, the Commission has made further adjustment to contextualise the WIK Model for Australian conditions.

- an increase in the number of MSC switching machines from five to nine achieved by reducing the number of ports per MSC (as outlined in the WIK Model Annexure A.1.1.3.4;

- an increase in the number of voice equivalent minutes to reflect a more realistic level of voice equivalent minutes (voice and data) for 2006-07 (refer to Appendix F for details) This is achieved by increasing milli-Erlang demand from 8.3 to 13.1 and holding all other annual traffic variables constant;

- elimination of the traffic reduction factor by setting it to zero (refer to the WIK Model Annexure A.3.1.3.2);

- imposing restrictions to better reflect the influence of dual-band and single-band radio frequencies of actual MNO networks (refer to the WIK Model Annexure A.1.1.3.2); and

- an increase in WACC to 13 per cent, notwithstanding that the change in WACC parameters in light of interested party submissions would result in a much lower

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[177] *Relevant population coverage assumption*

The Commission considers that a 96 per cent population coverage assumption is a realistic and relevant coverage assumption for the period after 30 June 2007, as it reflects the current population coverage of two of the three the existing GSM networks.

The population coverage assumption of 96 per cent that applies to most 2G networks and that is used in the WIK Model would tend to produce a conservative upper-bound (higher) cost estimate for the MTAS than if the actual population coverage for 3G networks was used.

Relevant market penetration assumption

The market penetration assumption of 96 per cent reflects current services in operation and is considered relevant for the regulatory period for which the TSLRIC+ estimates derived from the WIK Model (that rely on this assumption) will apply.

WACC of between 10.7 per cent and 11.8 per cent (refer to the WIK Model Annexure A.2.2.3 and Appendix D for details).

Resulting TSLRIC+ estimate

The relevant reference points for TSLRIC+ estimates for the supply of the MTAS for consideration are summarised in the following table:

Table 5-1: TSLRIC+ estimates of MTAS supply

Population coverage: 96 per cent Penetration rate: 96 per cent	TSLRIC+ estimate of supply (cpm)
Reference Case 1 (25 per cent)	5.6
Reference Case 2 (31 per cent)	5.2

The results in this table indicate that a relevant efficient cost estimate for the supply of the MTAS is in the range of 5.2 cpm to 5.6 cpm, for relevant efficient operator scenarios detailed in the WIK Model version released on 16 February 2007. These WIK Model estimates have been updated to reflect recalibration of the optimised network and inclusion of parameters to reflect an Australian context. Inclusion of the more recent traffic volume data have more than offset any increase in the cost estimates arising from the update of other key parameters or increase in network elements.

The outcomes of the WIK Model verify and support the robustness and reliability of the international cost benchmarking and RAF data analyses that have informed the 5 cpm to 12 cpm range of costs contained in the current *MTAS Pricing Principles Determination* for the period 1 July 2004 to 30 June 2007, particularly TSLRIC+ estimates below 12 cpm.

5.2. Other corroborating information

5.2.1. International Cost Benchmarking

The Commission has relied on international cost benchmarking to support its position on TSLRIC+ estimates of 5 cpm to 12 cpm and that informed the upper-bound of the range which established the price of 12 cpm from 1 January 2007 contained in the MTAS Pricing Principles Determination. At the time, the Commission also outlined in the *MTAS Final Report* that before it would reduce the price of the MTAS below 12 cpm with reference to international cost benchmarking any such exercise would need to make adjustments for all factors that influence the TSLRIC of providing the MTAS in different countries for Australia-specific factors. For the purposes of this current process, the Commission has not undertaken this detailed benchmarking

exercise, so the information provided below in relation to cost and price benchmarking processes is used as corroborating information. [178]

Since the release of its June 2004, international cost benchmarking analyses have featured in regulatory processes and in particular Optus has sought to rely on such analysis to support its position in both its 2004 undertaking to support a price of 17 cpm and its 2007 Undertaking to support a price of 12 cpm.

The Commission notes that these international benchmarking analyses have not always related to cost benchmarking and have more recently focused on rate or price benchmarking. It was for this reason that the Tribunal concluded that (in reference to Optus's earlier undertaking) it did not consider 'The international benchmarking proffered by Optus is of any assistance to us in determining the issue as to the reasonableness of Optus's price…In order to place any reliance upon the international benchmarking analysis it would be necessary to know much more about the regulatory environment within which they were determined.' [179]

These analyses have confused price and cost. Further, these analyses have also not accurately represented the model framework and approaches used in other jurisdictions. Several examples of overseas models are submitted by Vodafone. [180] The relevance of these models are discussed below.

As mentioned, in the Commission's views on equipment prices (see the WIK Model Annexure A.2.1.3), the LRIC model framework adopted by Ofcom may look for intents and purposes similar to the TSLRIC framework used in the WIK Model but is distinguishable in fundamental ways from the underlying approach adopted in the WIK Model.

Ofcom parameterises its model using the actual costs incurred by MNOs rather than efficient cost benchmarks. The model developed for Ofcom was calibrated with the MNOs' accounting data, [181] one of the consequences of this approach was that Ofcom did not consider that it was possible in practice to collect a robust and consistent set of detailed accounting information for all MNOs. [182] This extensive consultation was required because of the very nature of the cost model developed: a hybrid bottom-up, top-down model. In this respect comparison of indicative prices derived from a top-down LRIC model are likely to provide an upper-bound cost estimate of the supply of the MTAS compared to a lower bound estimate that might emerge from a scorched-earth model like the WIK Model..

Other critical differences include the inclusion of a network externality charge of 0.3 pence per minute (ppm) or 0.72 cpm. [183] The inclusion of an externality surcharge has

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[178] ACCC, *MTAS Final Report*, p. 211.

[179] *Application by Optus Mobile Pty Limited & Optus Networks Pty Limited*, [2006], ACompT 8, at [296-297].

[180] Vodafone submission, pp. 20-23.

[181] Office of Communications (Ofcom), *Mobile Call Termination - Proposals for Consultations*, September 2006, p. 142. See also: Ofcom, *Mobile Call Termination Report Statement*, March 2007, p. 200.

[182] ibid.

[183] Using an exchange rate of AU$1 to 0.42 GBP

been dismissed for Australian purposes by the Tribunal.[184] Ofcom also differentiates 2G and 3G termination costs to account for the large initial outlay by MNOs for 3G spectrum in the United Kingdom. This approach to spectrum costs is peculiar to the United Kingdom regulatory context and is inconsistent with an European Union (EU) directive on how spectrum costs should be treated. In November 2006, the EU Information Society and Media Commissioner, Viviane Reding stated that:

> I am concerned that Ofcom's approach to calculate 3G spectrum costs could hinder the movement towards lower mobile interconnection prices. The (European) Commission believes that such costs should not be calculated on the basis of prices paid during the spectrum auction, which are in today's context inflated.[185]

The EU asked Ofcom in that same letter to reassess its method of calculating mobile termination rates in the UK.[186] The EU noted that the impact of the 3G spectrum costs added on average between 1.2 ppm to 1.9 ppm [187]or the equivalent of 2.9 cpm to 4.5 cpm[188] to the MTAS prices.

Together the impacts of these two factors reduce the target price to be implemented in the United Kingdom for 1 April 2010 by 3.6 cpm and 5.2 cpm resulting in target prices less than 9 cpm, when converted to Australian currency.[189]

Another example submitted by Vodafone as a relevant cost model for comparison is that developed by OPTA for the Netherlands. The Netherlands national regulatory authority, OPTA, has undertaken industry consultation for its Bottom-Up Forward Looking Long Run Incremental Cost (BULRIC) Model, informing it of the cost basis for a maximum MTAS price. OPTA's model is distinguishable from the WIK Model as it adopts a scorched-node approach to network dimensioning which has necessitated industry input, but as a result reflects the costs associated with the actual equipment and locations used by operators. While the OPTA model is based on a bottom-up approach, 'the unit costs used to populate the model have been derived by averaging across operator provided data' and in this way takes account of both bottom-up and top-down estimates of the unit cost of network elements.[190] Further the model has been calibrated using a scorched-node approach against the 'actual number of radio and switching sites deployed by the operators'.[191] OPTA's BULRIC Model is

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[184] *Application by Optus Mobile Pty Limited & Optus Networks Pty Limited*, [2006], ACompT 8, at [287-291].

[185] Letter from the European Commission, to Ofcom, dated 22 November 2006. Available at:

http://europa.eu/rapid/pressReleasesAction.do?reference=IP/06/1628&format=HTML&aged=0&language=EN&guiLanguage=en, viewed on 23 April 2007.

[186] ibid.

[187] European Commission, *Press Release: Telecommunications: Commission asks UK Regulator not to use Inflated 3G Auction Costs in Termination Rates for Mobile Phone Operators*, IP/06/1628, 27 November 2006.

[188] Using an exchange rate of AU$1 to 0.42 GBP.

[189] Using an exchange rate of AU$1 to 0.42 GBP.

[190] Onafhankelijke Post en Telecommunicatie Autoriteit (OPTA), *Summary Notification Form Relating to a Draft Decision of the Commission of the Independent Post and Telecommunications Authority in the Netherlands with respect to the Implementation of Price Control Obligations on the Relevant Markets for Voice Call termination on Individual Mobile Networks*, 21 June 2006, p. 5.

[191] ibid.

not directly comparable to the WIK Model in terms of its approach to cost parameterisation or network calibration.

The model developed in the Swedish regulatory context parameterises the model using a hybrid of bottom-up (LRIC + EPMU) and top-down (historic costs).[192] The Commission notes that the use of historic data may be unavoidable in certain circumstances but other approaches using forward-looking costs are preferable to sole reliance on historic cost measures.

The Commission considers that LRIC models, such as those Vodafone refers to in its submission, that adopt a top-down approach to parameterisation would provide an upper-bound cost estimate for MTAS, which may or may not be an efficient cost benchmark.

Since 2004, the Commission notes that there have been developments of comparable cost models that reflect the outcomes produced by the WIK Model. These models support that the TSLRIC+ estimate of supply of the MTAS may be in a range lower than 5 cpm to 12 cpm. Information from jurisdictions such as South Korea and Israel provide for cost estimates implemented in those jurisdictions of 4.49 cpm and 5.45 cpm respectively,[193] which support the WIK Model efficient cost estimates of 5.2 cpm to 5.5 cpm for the two reference scenarios.

However, as already noted the Commission has stated in the *MTAS Final Report* that before it would reduce the price of the MTAS below 12 cpm with reference to benchmarking any detailed benchmarking exercise would need to make adjustments for all factors that drive the TSLRIC of providing the MTAS in different countries for Australia-specific factors.[194]

5.2.2. RAF data

As outlined, the Commission used RAF data to provide corroboration and verification for the international cost benchmarking analysis.

Notwithstanding the issues as outlined in respect of the reporting of activity to reflect the technology neutral definition of the MTAS since 2004, the Commission has been able to reliably identify a cost of supply of the MTAS for GSM termination for some MNOs the period 2004-05.

This information suggests that an actual cost for the supply of the MTAS may lie below the conservative upper-bound estimate of 12 cpm established in June 2004.

5.2.3. Telstra's submissions and Optus Undertaking FL-LRIC

Further verification for a TSLRIC+ estimate tending toward 6 cpm is provided in Telstra's submission in which it acknowledges that the outputs generated by the WIK

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[192] Analysys, *Examination of Mobile Costs (Final Report for ACCC)*, 30 June 2004, pp. 24-25.

[193] ACCC, *Optus's Undertaking with Resect to the Supply of its Domestic GSM Terminating Access Service (DGTAS) Final Decision*, (*Optus Undertaking Decision*), February 2006, p. 123.

[194] ACCC, *Mobile Services Review – Mobile Terminating Access Services: Final Decision on Whether or not the Commission Should Extend, Vary or Revoke its Existing Declaration of the Mobile Terminating Access Service*, (*MTAS Final Report*), June 2004, p. 211.

Model indicate that the most efficient cost estimate is at the lower end of the TSLRIC+ range of estimates previously identified by the Commission.[195]

In November 2005, Analysys Consulting Pty Ltd (Analysys) provided advice to the Commission about the FL-LRIC+ estimates for the supply of the MTAS by Optus in Australia from the CRA Model. The cost estimate for the supply of the MTAS based on 2004 data, confirms that without adjustment for higher traffic volumes since that time that are likely to offset any rise in costs, that an estimate of the efficient cost for the supply of MTAS would lie below the conservative upper-bound estimate of 12 cpm established in June 2004 – but is above the rate for the most efficient operator. The WIK Model presents several scenarios that may be referable to the costs of an efficient operator, which has an optimised network design.

5.3. Adjustment path

5.3.1. Parties' views

AAPT submits that a 'glide path' is not appropriate or necessary to protect the legitimate business interests of MNOs particularly as MNOs have 'been able to extract rents in excess of service costs for at least the past 3 years.'[196] Access Economics for the CCC submits that there are strong allocative efficiency grounds for the ACCC not engaging in a further adjustment path when recommending the next indicative price for the MTAS and use a rate of 5.9 cpm over the period 1 July 2007 to 30 June 2009.[197]

Access Economics for the CCC submits that the indicative price for the MTAS is in the range of 5 cpm to 7.3 cpm and that there is no economic justification for an adjustment path from 1 July 2007 as:

- the reduction in the MTAS rates from 1 July 2004 did not result in any apparent upward rebalancing of retail prices by MNOs;

- the adoption of the adjustment path led to a delay in the realisation of substantial gains in allocative efficiency in the market for mobile retail and FTM services; and

- the resultant regulatory distortion particularly affected those service providers that only operate fixed-line networks.[198]

Access Economics thereby submits that any adjustment path from the current rate of 12cpm down to the appropriate TSLRIC estimate, will simply serve to decrease the overall level of efficiency that could otherwise have been achieved in the retail markets where FTM and MTM services are provided, and will represent another lost opportunity to increase competition and consumer welfare.[199]

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[195] Telstra submission, p. 47.

[196] AAPT submission, p. 3.

[197] Access Economics submission for the CCC, p. 17.

[198] ibid., pp. 1-2.

[199] ibid., p. 17.

ATUG submits that 'ATUG's view in 2004 was that initial glide end point should be 8 cpm. Given the detailed analysis of the model some 3 years down the track, a figure around 6 cpm suggested by the WIK Model is a reasonable assessment of costs and should be introduced immediately.'[200]

Vodafone submits that the Commission and the Tribunal accept that the underlying economic principle of price regulation in non-contestable markets is to emulate the outcome achievable in contestably competitive markets. Vodafone notes that the Tribunal considers 'that in general terms the prices in access undertakings should reflect and not exceed the forward looking efficient economic costs' of providing the service.'[201]

Vodafone submits that it does not believe that the Commission should issue explicit pricing guidance in the 2007-09 pricing principles and that explicit pricing guidance removes the ability to engage in commercial negotiations with other carriers.[202]

5.3.2. Commission's view

In the *MTAS Pricing Principles Determination*, the Commission adopted an adjustment path over 30 months to effect a gradual adjustment of the MTAS price from above 21 cpm at 1 July 2004 to a price of 12 cpm by 1 January 2007.[203] The reason as set out in the *MTAS Final Report*, was:

> … mindful that an immediate and significant reduction would give mobile operators little time to adjust their business plans in response … [The] Commission considers that this period allows sufficient time for MNOs to unwind or realise their business decisions made in reliance on the previous regulatory approach …[204]

One of the Commission's key concerns is that of regulatory certainty, particularly as some access providers have developed business plans around existing pricing structures and the previous retail benchmarking pricing principle,[205] and balancing MNOs' ability to recover reasonable costs (inclusive of a normal profit) and the impact a fall in the price of MTAS may have on existing pricing plans for mobile services.[206]

This adjustment path was adopted when the majority of retail mobile plans were post-paid contracts of two years duration.

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[200] ATUG submission, p. 5.

[201] Vodafone submission, p. 10.

[202] ibid., p. 6.

[203] ACCC, *Optus's Undertaking with Resect to the Supply of its Domestic GSM Terminating Access Service (DGTAS) Final Decision*, (*Optus Undertaking Decision*), February 2006, p. 158. The Commission's choice of timeframe for its Pricing Principles is designed, in order to meet the statutory criteria under section 152AH(1) of the Act, to minimise possible disruptions that would harm the legitimate business interests of MNOs.

[204] *Mobile Services Review – Mobile Terminating Access Services: Final Decision on Whether or not the Commission Should Extend, Vary or Revoke its Existing Declaration of the Mobile Terminating Access Service*, (*MTAS Final Report*), June 2004, pp. 220-221.

[205] ibid., p. 216.

[206] ibid.

The Commission notes that even with the experience of arbitrating the 34 notified MTAS disputes it has been difficult for it to discern the extent of any actual disruptions to pricing and business strategies.

If the Commission reverts to market information about the actual nature of these disruptions. there is a dearth of data to show MNOs may have been adversely impacted by lower MTAS prices.

Optus's most recent (31 March 2007 year end) financial results reported: an increase in mobile revenue of 3.5 per cent and a 55 per;[207] subscriber growth. This contributed to the increase from 75 per cent (as at 31 March 2005) to 76 per cent of the Optus's mobiles division proportion of EBITDA margin to Optus's total EBITDA margin in the 2006-07 financial year.[208] Operational EBITDA for the mobiles segment increased by 4.4 per cent, despite as Optus says lower termination rates.[209] In fact in reporting its recent annual results, Optus states that its 'traffic expenses fell by 1.5 per cent due to lower mobile termination rates, partly offset by an increase in mobile traffic.'[210]

Telstra's mobiles revenue has improved from $4,708 million (an increase of 7.9 per cent from the previous year) to $5,007 million between 2004-05 and 2005-06, an increase of 6.4 per cent.[211] During this time mobiles revenue increased as proportion of total income in 2004-05 from 20.97 per cent to 21.73 per cent in 2005-06.[212]

Telstra's EBITDA margins have remained high at over 42 per cent between 2004-05 and 2005-06.[213] Any decline in EBITDA in 2005-06, was attributed to the impact of lower PSTN product revenue.[214]

Hutchison has significantly improved its performance, reducing its large operating losses over time. In 2005, service revenue grew by 45 per cent to $758.2 million.[215] In 2006 total operating revenue increased 22 per cent, largely due to the substantial growth in service revenue for '3', which grew by 75.8 per cent to $848.9 million.[216]

The main drivers for the strong improvements in service revenue for '3' were strong growth in customer numbers and the increased use of non-voice services.[217]

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[207] SingTel, *Singapore Telecommunications Limited and Subsidiary Companies Management Discussion and Analysis of Unaudited Financial Condition, Results of Operations and Cash Flows for the Fourth Quarter and Financial Year Ended 31 March 2007*, May 2007, p. 43.

[208] ibid., pp. 39 and 43.

[209] ibid., pp. 39 and 45.

[210] ibid., p. 51.

[211] Telstra Corporation Limited and Controlled Entities, *Financial Results and Operations Review Half-Year Ended 31 December 2006*, p. 59.

[212] ibid.

[213] Telstra Corporation Limited and Controlled Entities, *Annual Report 2006*, p. 9.

[214] Telstra Corporation Limited and Controlled Entities, *Annual Report 2005*, p. 62.

[215] Hutchison, *Hutchison Telecommunications (Australia) Limited, Annual Report 31 December2005*, p. 4.

[216] Hutchison, *Hutchison Telecommunications (Australia) Limited, Annual Report 31 December2006*, pp. 4-5.

[217] ibid., p. 10.

Hutchison's EBITDA has improved significantly since 2005. EBIDTA losses fell by $230.2 million to $180.1 million in 2005[218] and Hutchison reported a positive EBITDA of $30.2 million for the first time at the end of 2006.[219]

Vodafone's revenue has continued to rise, increasing by 11.4 per cent between 2005 and 2006 to $1,937.5 million[220], with its most recent EBITDA at $365.5 million or 19 per cent.[221]

It was contemplated by the Tribunal that as a consequence of lower MTAS rates, operators in the FTM market – and in particular Telstra – may obtain some degree of windfall gains from lower mobile termination charges. This is not sufficient in itself to justify charges for the supply of the MTAS higher than those based on efficient costs.[222]

However, the continued strong and improved performance is juxtaposed against lower MTAS prices. For some MNOs this has resulted in lower (MTAS) revenues and in spite of lower MTAS prices, the information set out above demonstrated that MNOs have not been adversely impacted by the fall in MTAS prices. In fact for all MNOs, total mobiles revenue has continued to increase and the relative performance (profit) of their mobiles business has been sustained and/or improved over time.

The other significant piece of information from the period 1 July 2004 is it appears that very few retail plans extend beyond a two year period. This is borne out by the change in retail marketing and pricing plans with an increasing share of services in operation (SIOs) comprised of pre-paid contracts. This market trend has reduced the share of longer term customer contracts in the mix of customer plans, which was not common in June 2004, when an adjustment path was considered. For example, Telstra's most recent annual report indicated that the proportion of pre-paid services to total SIOs was 42 per cent compared with post-paid (contract) services of 58 per cent, where pre-paid mobile SIOs increased by 0.8 per cent to 3,597,000 and post-paid mobile SIOs totalled 4,891,000 (an increase of 5.0 per cent).[223] Optus's fourth quarter results for 2006-07 indicated that its number of pre-paid services exceeds its post-paid subscribers,[224] reinforcing that the number of retail plans, which lock in retail prices for longer periods of time, is falling. In this way, MNOs have much more

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[218] Hutchison, *Hutchison Telecommunications (Australia) Limited, Annual Report 31 December2005*, p. 4

[219] Hutchison, *Hutchison Telecommunications (Australia) Limited, Annual Report 31 December2006*, p. 4.

[220] Vodafone, *Vodafone Australia Pty Ltd Annual Financial report for the Financial Year Ended 31 March 2006*, p. 7.

[221] ibid.

[222] *Application by Optus Mobile Pty Limited & Optus Networks Pty Limited*, [2006], ACompT 8, at [89].

[223] Telstra Corporation Limited and Controlled Entities, *Results and Operations Review – Year Ended 30 June 2006*, p. 15.

[224] Prepaid subscribers total 3,797,000 (56 per cent of all services) compared with post paid subscribers totalling 2,940,000 (44 per cent of all services); see SingTel, *Singapore Telecommunications Limited and Subsidiary Companies Management Discussion and Analysis of Unaudited Financial Condition, Results of Operations and Cash Flows for the Fourth Quarter and Financial Year Ended 31 March 2007*, May 2007, p. 44.

flexibility in changing retail pricing plans, which would allow them to more quickly adjust their retail prices for changes in input costs such as the MTAS.

The Commission consider that any further reduction in the MTAS rate below 12 cpm and more closely aligned with an efficient cost estimate for the supply of the MTAS in an Australian context will not adversely impact Australian MNO's legitimate business interests.

5.4.   Proposed price-related terms and conditions

The WIK Model estimates suggest the cost of the supply of the MTAS for an efficient operator unconstrained by an existing network structure in an Australian context. These efficient cost estimates, which when adjusted for traffic and further adjustments to contextualise the WIK Model for Australian conditions as outlined in section 5.1.2 result in a range of 5.2 cpm to 5.5 cpm.

The Commission is cognisant that there are certain constraints that MNOs face that may be appropriate to consider in a policy context to establish indicative prices for the MTAS. The Commission notes that some of these constraints are already reflected in the policy parameters informing the efficient cost estimates derived from the WIK Model.

In these circumstances the Commission has stated, in its Optus Undertaking and Vodafone Undertaking Decisions,[225] that corroborative information arising from alternative model approaches may also be used as reference points if it can be established that the actual costs incurred by an MNO are efficient. The Tribunal has also recognised this principle.[226]

The proposed price-related terms and conditions of 9 cpm for the period 1 July 2007 to 31 December 2008 are applicable to the MTAS service provided on both 2G and 3G networks and reflect a conservative upper-bound estimate of TSLRIC+ for the supply of the MTAS referable to the period after 30 June 2007.

Further, in moving from 12 cpm which has previously been established as the conservative upper-bound estimate of supply of the MTAS from international cost benchmarking analyses (and corroborated by RAF data) to a more referable cost estimate for Australia, the Commission considers there will be no adverse impact on the legitimate business interests of MNO's by moving directly to a price of 9 cpm from 30 June 2007. The Commission will maintain the indicative price of 9 cpm for the period 1 July 2007 to 31 December 2008.

Before considering further reducing the MTAS rate below 9 cpm the Commission will consider any comments in relation to the additional documentation provided with the WIK Model together with other evidence including but not limited to the recently

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[225]   Refer to the discussion about the appropriateness of different model frameworks in ACCC, *Optus's Undertaking with Resect to the Supply of its Domestic GSM Terminating Access Service (DGTAS) Final Decision,* (*Optus Undertaking Decision*), February 2006, pp.29-30., and ACCC, *Assessment of Vodafone's Mobile Terminating Access Service (MTAS) Undertaking, Final Decision, Public Version,* (*Vodafone Undertaking Decision*), March 2006, pp.29-32.

[226]   *Application by Optus Mobile Pty Limited & Optus Networks Pty Limited* [2006] ACompT 8, 22 November 2006, at [116-118].

incurred costs and networks deployed by MNOs in Australia, noting the Tribunal's comments in respect of these issues:

> [The modelling approach adopted by Optus] relieved Optus, to a certain extent, from establishing the efficiency of the costs of the assets used in its network design but it still left open the need to establish the efficiency of the network design and configuration itself.

> The approach taken by Optus to present, through CRA, a top-down model was not controversial. The Commission was content to accept Optus' top-down exercise. It appeared to be accepted, and we accept, that a bottom-up model based upon a hypothetical efficient operator may not, having regard to the time and costs involved, be feasible. The Commission's complaint was that Optus had not adjusted its costs sufficiently, or put forward material, to satisfy the Commission that Optus' costs were costs that an efficient operator would incur, based on TSLRIC or FL-LRIC formulations.

> Although there is merit in the proposition that a firm in a competitive market has an incentive to be efficient and to incur costs efficiently, there is still a need for the Commission (and, on review the Tribunal), to be satisfied, having regards to the matters set out in s 152 AH and the objectives in s 152 AB of the Act that the firm's costs are efficiently incurred. In general terms, an operator in a competitive market should have more of an opportunity to establish the efficiency of its recently incurred costs by reference to its actual costs than a monopolist or dominant operator such as Telstra in *Telstra Corporation Limited* [2004] AcompT4. [227]

For this reason the Commission proposes to include the following price-related terms and conditions in the draft *MTAS Pricing Principles Determination* for the MTAS referable to the period 1 July 2007 to 31 December 2008:

Table 5-2: Proposed price-related terms and conditions

Time period	cpm
1 July 2007 – 31 December 2008	9

To this end the Commission has released a draft pricing principles determination to cover the period 1 July 2007 to 31 December 2008, with further guidance to be provided for the period beyond 31 December 2008, at an appropriate juncture.

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[227]   ibid.

Annexure: WIK Model Outcomes

A.1. Network design and dimensioning

A.1.1. Network resilience and design

A.1.1.1. WIK Model approach

In order for a MNO to have an optimal network it requires information on the areas that have the highest demand for mobile services and the terrain it will be designing the network for. The WIK Model uses the SNPT to estimate the design of optimal network. The following figure illustrates a typical GSM architecture.

Figure A.1-1: GSM network architecture
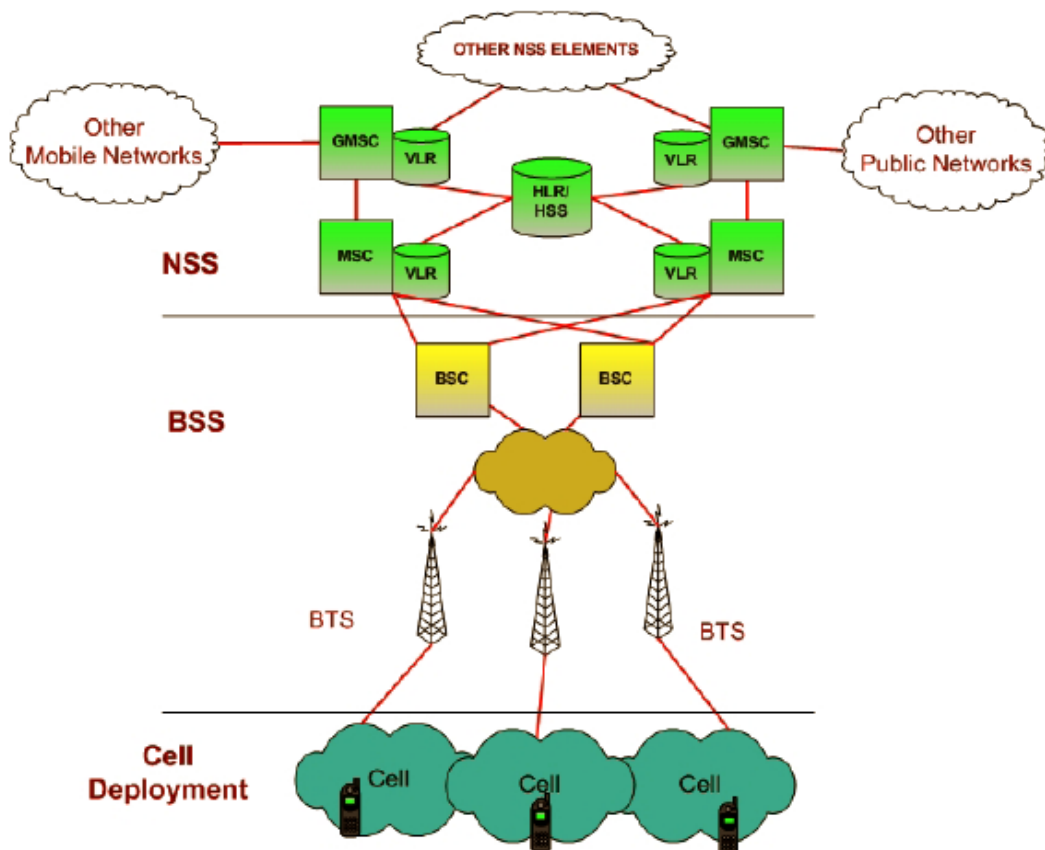
BSS: Base station subsystem

NSS: Network subsystem

BTS: Base transceiver station

MSC: Mobile switching centre

GMSC: Gateway mobile switching centre

VLR: Visitor location register

HLR/HSS: Home location register

Lines: Transmission links

The SNPT achieves the above architecture through the network dimensioning process. The SNPT carries out the following tasks:

- calculates the optimal cell radius and cell deployment for each relevant area;

- determines the network hierarchy; and

- determines the capacity requirements of the link structure.[228]

The WIK Model uses workforce and residential population data to create districts used for cell deployment.

The following table outlines the relevant population densities and aggregation thresholds used in the WIK Model:

Table A.1-1: Aggregation values used in the WIK Model scenarios

Thresholds	Inhabitant density (number/Km^2)	Aggregation distance (Km)
Rural	100	20
Suburban	500	10
Urban	1000	5

Source: WIK, *WIK Report*, p. 61

The iteration process to form these districts may exclude some postal areas (POAs) (based on low population density) or may join POAs to districts containing different density classifications. For example, in the version of the WIK Model used for the *WIK Report*, the postal area for Sydney (2000) which was classified as suburban was aggregated into the Broadway (2007) district which was and still is an urban district.

This population information is overlaid with geographical/topographical information as to whether an area is flat, hilly and mountainous.[229] This completes the base information required as input into the cell deployment process.

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[228] WIK Consult, *Mobile Termination Cost Model for Australia*, (*WIK Report*), January 2007, p. 8.

[229] ibid., p. 103.

The next step in the cell deployment procedure is the estimation of the optimal cell configuration. The WIK Model optimises the configuration of a cell according to coverage and capacity for traffic.

The WIK Model uses propagation criteria and the Okumura-Hata model to calculate the cell radius. First, the SNPT calculates the number of base stations (BTSs) required for a cell based upon the capacity requirements for the amount traffic in the area. Second, the SNPT calculates the number of BTSs within a cell radius to meet coverage requirements. The capacity requirements are then compared to the results for the coverage calculations and the smallest cell radius will be selected.

BTSs represent the basic network building blocks in the WIK Model. BTSs comprise both land and equipment. The WIK Model uses the following types of BTSs:

- Macrocells with a coverage radius of 1.5 to 20 kilometres, mainly installed in rural areas with low traffic;

- Microcells with a coverage radius between 0.5 to 2 kilometres, mainly installed in urban areas with high traffic; and

- Picocells with a coverage radius of up to 0.5 kilometres, mainly used in areas with high traffic or to cover special locations such as shopping centres and airports.

The WIK Model assumes that specific BTS types are deployed within certain areas: picocells in urban areas, microcells in suburban areas, and macrocells for suburban and rural areas.

The Cell Deployment Module calculates the minimum number of 900 MHz BTS sites required to optimally cover the district based upon the technical specifications of BTS types. If 1800 MHz BTSs are required, they are attached to 900 MHz BTS sites. Once the basic BTS layout is determined, the WIK Model identifies the number of BTS elements to estimate BTS costs.

Figure A.1-2: Aggregation network schematic
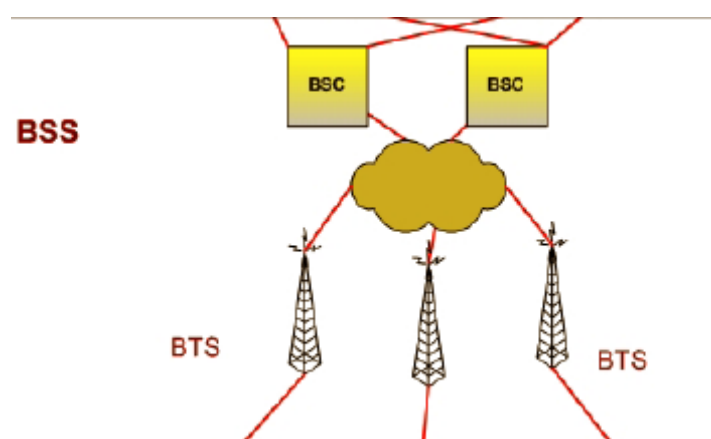
The next step is to determine the number of transceiver (TRX) frames at a BTS that are required to route traffic to other mobile users. Part of this process involves the multiplexing and transportation of traffic through the use of TRX frames to the BTS hub and then to the base station controller (BSC). BTS hubs are used in an optimised

GSM network and are located in the central area of district where traffic is most likely to be aggregated. BTSs are linked to a BTS hub via mini-link microwave system. The traffic at the BTS hub is aggregated from TRXs into E1 digital signalling groups (DSGs) which are then transported to a BSC using either a mini-link microwave system via or leased line.

The relevant link used in any one district will depend on optimising the use of these links against two conflicting/contrary criteria: the length and bandwidth requirements of each BSC tree, and the cost of using each transmission method.

The SNPT selects the BSC location where the most traffic is aggregated subject to a minimum distance threshold requirement between each pair of BSCs. This restriction ensures that the BSCs are spread across Australia so that the average length of BSC trees estimated in the model are minimised.

A second restriction that is placed is that there is a penalty on the number of hops between BTS and the BSC. This affects the design of the BSC tree. The larger the penalty on hops in the aggregation network, the more likely that the BSC tree will diverge from the MST and take the form of a star topology, which is the relevant network design in the WIK Model. Once the form of the BSC trees is determined, the location of the BSCs are finalised in the WIK Model and the aggregation network is completed.

Figure A.1-3: Backhaul network schema
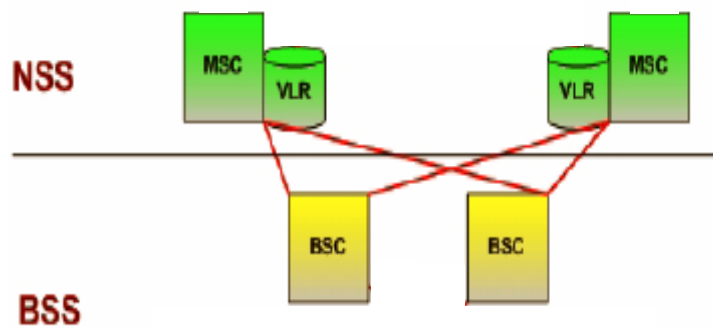
Once the aggregation network has been determined, the SNPT models the backhaul network for the links between the BSC locations and mobile switching centre (MSC) locations.

Network failure is mitigated in the WIK Model by the spatial distribution of BSCs and MSCs and the maintenance assumptions about the network (and commensurate with reasonable maintenance costs). In addition, the SNPT assumes that the MNO applies a combination of multi-path routing and stand-by capacities. To ensure resilience the backhaul network uses a star topology using leased lines. At the physical layer, it is assumed that the leased lines provider uses a Synchronous Digital Hierarchy (SDH) transport infrastructure. The SDH transport infrastructure is routed over ring structures which are protected by the 'self-healing' principle. Network resilience is ensured in the core network by the mesh design used to link MSCs.

Figure A.1-4: Core network schema
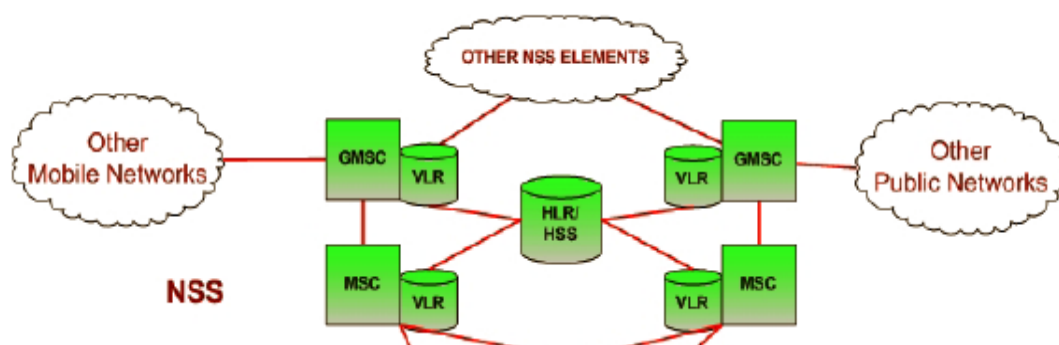
The final stage in the modelling the network in the SNPT is the design of the core network which determines how MSCs are linked. The MSCs are assumed to be located in the larger cities such as Adelaide, Brisbane, Melbourne, Perth and Sydney and contain, in line with best practice, all the equipment required to support interconnection and visitors on the network. A traffic matrix is used in the WIK Model to distribute the traffic aggregated in a particular MSC.

The traffic matrix also recognises time-zone differences such that the busy-hour in the western parts of Australia will be different from the busy-hours in the eastern parts of Australia, where the majority of the traffic flows.

Routing factors are used to determine how traffic travels through the network elements for different mobile services. This is endogenously determined by the WIK Model using the traffic matrix and the network elements required for the delivery of a mobile service.

A.1.1.2.   Parties' views

Cell Deployment Assumptions

Telstra submits that the use of the residential population to derive the population density classification of a POA, and hence a district, appears to be flawed.[230]

Optus submits that the WIK Model 'is not capable of capturing with sufficient accuracy the underlying practical considerations of running a mobile operation in Australia.'[231]

Optus submits that the model in certain areas has taken an 'aggressive' rather than a 'conservative' approach in choosing network parameters and modelling decisions.[232]

Optus submits that it has a number of concerns with the WIK Model's deployment of base stations, including:

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[230] Telstra Corporation Limited, *Submission in Response to the ACCC's Discussion Paper on the WIK Mobile Network and Cost Model to Inform the MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*, (Telstra submission), March 2007, p. 21.

[231] Optus, *Optus Submission to the Australian Competition and Consumer Commission on the WIK Mobile Network and Cost Model for Australia*, (Optus submission), March 2007, p. 4.

[232] ibid.

- the model's radio propagation modelling;

- the restrictions on BTS deployment; and

- the apparent under-deployment of BTSs, which appears likely to have resulted from WIK's failure to take into account the real practical constraints faced by network planners in deploying BTSs.[233]

Optus submits that the Okumura-Hata model is not appropriate for:

- cell ranges of less than 1 kilometre; and

- BTS antenna heights that are less than 30 metres above the height of adjacent buildings.[234]

Optus additionally submits that WIK should have used the more accurate COST-WI model for circumstances found in Australia.[235]

Optus submits that the WIK Model restricts the deployment and characteristics of BTSs and that the deployment characteristics are arbitrary and have not been justified. Optus submits that they should not be applied because:

- macrocells and microcells can be deployed in urban areas;

- picocells are not limited to urban areas and can be used to provide coverage in buildings in suburban and rural areas;

- macrocells are not restricted to 1-2 sectors or 1-2 TRXs, MNOs deploy both 3 and 4 cell sector macrocells (with 3 sector likely being the most common type deployed); microcells are not restricted to 3 sectors or to 1-3 TRX; and

- TRX power does not have to be set at 10 for macrocells, 1 for microcells and 0.25 for picocells.[236]

Optus submits that MNOs are less likely to differentiate between macrocells and microcells in practice.[237] Optus also submits that the number of network elements modelled by WIK differs significantly from the number deployed in Optus's network and that the WIK Model 'results in a substantially higher number of 1800MHz base stations and a smaller number of GSM base stations and sites compared to Optus's actual deployment.'[238]

Optus submits that the WIK Model 'neglects the need for continuous base station coverage along highways and in urban areas with buildings.'[239] Optus further submits that WIK's Model does not appear to take sufficient account of the impact of terrain features.[240] Often quality problems caused by terrain issues such as these can best be

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[233] ibid., pp. 14-16.

[234] ibid., p. 14.

[235] ibid., pp. 14-15.

[236] ibid., pp. 15-16.

[237] ibid., p. 16.

[238] ibid.

[239] ibid., p. 17.

[240] ibid.

managed by additional BTSs (and TRXs).[241] Optus submits that the WIK Model results in fewer base station sites and fewer TRXs than are deployed in reality, since the simple algorithms used by the WIK Model do not reflect real world complexities.[242]

Optus also submits that the WIK Model may not consider the dynamic nature of subscriber demand which is relevant to the degree of optimisation appropriate in network modelling.'[243] Optus submits that it is significant to note that the capacity of the network to handle traffic is as important as, if not more important than, coverage.[244]

Optus submits that in its experience finding suitable locations to install base stations is an extremely complex and time-consuming task.[245]

In this regard, Optus submits that the WIK Model fails to adequately consider planning, commercial, construction and performance constraints and is therefore overly simplistic in modelling the mobile network.[246] Optus submits that '[g]aining approval for base station sites would be more difficult for a new entrant than it has been for the existing players.'[247]

Telstra submits that the model needs to reflect network design issues associated with central city areas and service expectations of users when travelling along major highways or visiting major tourist attractions.[248]

Telstra submits that none of the major capital city central business district (CBD) postcodes are classified as urban in the WIK Model as far as can be ascertained, no Picocells are deployed in these CBD areas.[249]

Telstra submits that the *WIK Report* states that Picocells are deployed at airports, but that the WIK Model classifies some airports as rural areas.[250] This results in no Picocells being deployed at any major Australian airports, despite the *WIK Report* specifically mentioning that these types of BTSs were for airports.[251]

In regard to rural coverage, Telstra submits that it appears from an initial review of the outputs of the WIK Model that the cost of rural coverage is significantly understated.[252]

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[241] ibid.

[242] ibid.

[243] ibid.

[244] ibid., p. 18.

[245] ibid., p. 19.

[246] ibid., pp. 19-20.

[247] ibid., p. 18.

[248] Telstra submission, p. 19-21.

[249] WIK, *WIK Report*, p. 65. cited in Telstra submission, p. 20.

[250] Telstra submission, p. 20

[251] ibid., p. 19.

[252] ibid., p. 22.

Vodafone submits that calibration should take place in regard to network dimensioning and network costs, as without any network dimension calibration the WIK Model will:

- fail to take account of the actual terrain; and

- fail to take account of the geographic, seasonal and time-of-day traffic distribution of traffic, which will depend on the Australian market, and cannot be captured in a few simple parameters such as the percentage of traffic in the busy-hour.[253]

Aggregation Network Assumptions

Optus submits that WIK's assumptions can dramatically affect the level of costs incurred:

- changing the capacity of BSCs from 800 TRX to 512 TRX results in an increase in the capital investment in BSCs from $41.4 million to $61.7 million; and

- changing the number of BSCs from 20 to 40 results in an increase in the capital investment in BSCs from $41.4 million to $66.1 million.[254]

Optus submits that the unfeasibly low number of base stations and TRXs, results in fewer BSCs than would in reality be deployed.[255]

Optus submits that the basis of the BSC minimum distance threshold has not been justified, which means that the number of BSCs determined by the model is calculated using an arbitrary restriction on the minimum distance between BSCs.[256] Optus also submits that BSCs are not spread out in Australian mobile networks are often co-located. WIK's approach is too simplistic as it ignores the increased risk of transmission outage. Further, the star network topology assumed by WIK in this aggregation network is not realistic.[257]

Optus submits that the model does not consider time zone differences between States (e.g. due to daylight savings) and since some mobile services are dependent on the time/date of the call, this consideration makes it appropriate to group BSCs according to State, as is done in the Optus network.[258]

With respect to BSC capacity, Optus submits that the assumption in the WIK Model about the parameter for BSC capacity (800 TRX) appears to be higher than the norm. Optus submits that for reasons of network resilience BSCs are generally not used at greater than 80 per cent capacity.[259]

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[253] Vodafone Australia Limited, *Submission to the Australian Competition and Consumer Commission: WIK Mobile Network and Cost Model and MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*, (Vodafone submission), March 2007, p. 13.

[254] Optus submission, p. 22

[255] ibid., p. 20.

[256] ibid.

[257] ibid., pp. 20-21.

[258] ibid., p. 21.

[259] ibid.

Optus submits that MNOs use internal fibre optic links between BTSs and BSCs combined with limited use of microwave links and existing fibre links tend to follow highways, rather than take a direct route as WIK appears to assume.[260]

Optus considers that a feasible network configuration for the aggregation network for a 25 per cent or 31 per cent MNO would involve substantially more than 20 BSCs.[261]

Telstra submits that WIK understates the number of BTSs per BSC.[262]

Backhaul Network Assumptions

Optus submits that the methodology employed to determine MSC locations is not clear. Optus further submits that the network topology is not realistic and a combination of ring and meshed networks is common as it provides diversity for network resilience.'[263] Optus submits that WIK state in relation to transmission paths that:

> … network operators apply a combination of multi-path routing and stand by capacities. This requires in general a fully meshed transmission network or at least ring topologies excluding tree based topologies. As discussed in the sections on the backhaul and core networks, such topologies are implemented in the modelled network by the SNPT. (*WIK Report*, p. 74)

Optus submits that this statement is inconsistent with the section on the backhaul network at page 71 of the *WIK Report*, in which WIK state that star topologies are the best solution.[264]

Optus further submits that the number of MSCs in the reference case scenarios is too low.[265]

Optus submits that a feasible configuration for the backhaul network would involve more than five MSCs and that such considerations can dramatically affect the level of costs incurred in network construction, increasing the number of MSCs from five to nine leads to an increase in capital investment in MSCs from $15.3 million to $23.9 million.[266]

Vodafone submits that resilience considerations as well as traffic profiling requirements (as noted above the WIK cost model contains no traffic profiling capability) justify the use more than five MSC units. The number and location of MSC units is not dictated simply on utilisation percentages and minimum distance between assets.[267]

Core Network Assumptions

Optus submits that WIK has underestimated the importance of network resilience and that to the extent that WIK's model does not incorporate such resilience features it

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[260] ibid.

[261] ibid., p. 22.

[262] Telstra submission, p. 23.

[263] Optus submission, p. 22.

[264] ibid.

[265] ibid., pp. 22- 23.

[266] ibid., p. 24.

[267] Vodafone submission, p. 26.

would appear that the modelled network may not meet the reliability standards expected of MNOs in Australia.[268]

Optus submits that 'WIK take an overly casual approach to network resilience'[269] and that realistic design of the core network 'may result in significantly more MSCs than are input into the WIK Model.'[270] When the number of MSCs exceeds eight a transit layer may be required to account for network resilience including two tandem switches.[271]

Optus submits that some parameters used in the WIK Model of the core network appear questionable such as the ten per cent traffic reduction factor to reduce busy-hour traffic between Western Australia and the eastern states.[272]

Optus submits that WIK does not appear to have modelled all the key network elements in the core network such as the core signalling transfer points (STP) and mobile number portability (MNP) platforms. The STP system goes beyond the signalling processors located at MSC sites (and modelled by WIK) and is a network element in its own right.[273]

Optus submits that the number of HLRs and other core network registers modelled by WIK is not clear from the materials provided and that in the Optus network HLRs are utilised only to [c-i-c][274] of their theoretical maximum capacity, to allow for further activations of new SIMs. Further, one HLR is kept unused for redundancy purposes.[275]

Vodafone notes that the WIK Model does not address network failure issues[276] and, as such, while Vodafone notes WIK's confidence in the build quality of mobile network vendors, no mobile operator allows their network to have a single point of failure that impacts on the entire network. Vodafone submits that this criticism applies to WIK having only one HLR, one SMSC, and one voice mail system (VMS).[277]

Vodafone submits that the WIK Model does not include VMSs and this is unrealistic as all MNOs provide voicemail services. Vodafone submits that the investment in VMSs is significant and should be allocated across two or three voice services identified by WIK (i.e. on-net and off-net incoming). In this regard Vodafone submits that failure to include a VMS means that the WIK cost model under-estimates the cost of providing MTAS. Vodafone has used the ComVerse Insight™ pricing tool to estimate the current cost of a VMS to be:

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[268] Optus submission, p. 11.

[269] ibid., p. 10.

[270] ibid., p. 23.

[271] ibid., pp. 24-25.

[272] ibid., 24

[273] ibid.

[274] As noted previously, Optus did not provide any commercial-in-confidence material to Commission.

[275] Optus submission, p. 24.

[276] Vodafone submission, p. 25.

[277] ibid., p. 26.

- [c-i-c];[278] and

- [c-i-c].[279]

Network Resilience

Vodafone submits that the WIK Model addresses network resilience through capacity limitations and adopts an unrealistic resilience policy.[280]

A.1.1.3. Commission's view

A.1.1.3.1. Missing or misclassified POAs

As outlined, residential and working population data comprise the basic data used in the SNPT for cell deployment. While Optus submits that the size of postal areas makes them impracticable to use for network planning purposes,[281] it is districts that may comprise several POAs rather than POAs that are used for the network design in the WIK Model.

Telstra submits that the classification of POAs in the WIK Model is incorrect.[282] The following table outlines these POAs and illustrates how they have been aggregated to districts:

Table A.1-2: Postal Areas aggregated into Districts

POA Postal Code	POA Suburb name	Old POA Classification	New POA Classification - June 2007	District Postal Code POA is aggregated to	District POA Suburb name	District Classification - February 2007
2000	Sydney	suburban	**urban**	2007	Broadway	**urban**
3000	Melbourne City	suburban	**urban**	3053	Carlton South	**urban**
4000	Brisbane City	suburban	**urban**	4000	Brisbane City	**urban**
5000	Adelaide City	rural	**urban**	5006	North Adelaide	**urban**
6000	Perth City	suburban	**urban**	6000	Perth City	**urban**
2020	Mascot	rural	**suburban**	2019	Botany	**suburban**
3045	Melbourne Airport	rural	**rural**	3043	Tullamarine	**suburban**
4009	Eagle Farm (Brisbane Airport)	rural	**rural**	4009	Eagle Farm	**rural**
6105	Cloverdale (Perth Airport)	rural	**rural**	6055	Guildford	**suburban**
5032	Brooklyn Park* (Adelaide Airport)	rural	**suburban**	5024	Fulham	**suburban**

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[278] Vodafone provided this commercial-in-confidence material to the Commission in the form of a confidential submission. Details on how interested parties can obtain this information are provided on the ACCC's website.

[279] Vodafone submission, pp. 24-25.

[280] ibid., p. 26.

[281] Optus submission, p. 17.

[282] Telstra submission, pp. 20-21.

| 3693 | Bonegilla Military PO | urban | **urban** | 3693 | Bonegilla Military PO | **urban** |

* Adelaide Airport was excluded from the 2001 Census due to low population count.[283]

The input file for Australian POAs has been updated to classify districts based upon modified population as opposed to the original population.

Where relevant, the WIK Model has been modified to account for POA classifications more reflective of an Australian context by adjustment to the input file: Australia.txt

Table A.1-2 shows that the district classifications into which CBD areas were aggregated was in the main correct in the WIK Model released on 16 February 2007. To better reflect the classification required, the Australia.txt file has also been updated at the POA level (accompanying in the latest WIK Model) so that all CBD areas are now classified as urban.

Other changes to POA classifications are also outlined in the New POA Classification column.

In respect of the airport, large industrial and military base POAs, it is instructive to understand why these POAs were misclassified at the POA level.

Eagle Farm (Brisbane Airport) is an example of a POA where land mass has distorted the relevant district classification. Eagle Farm POA contains large wetlands and some industrial areas. In order to cover the large mass of the Eagle Farm POA the SNPT calculates that only BTS macrocells are required. The WIK Model has in these cases provided for a different mix of BTSs than would be deployed or expected to be deployed in the actual networks of Australian MNOs.

This is a function of how the WIK Model classifies POAs by population density, where population: between 0 and 1,000 is classified as rural; between 1,000 and 5,000 is suburban; and above 5,000 is urban. The assumptions made about BTS deployment in those areas, for example urban areas, will mostly be served by picocells and large sparsely populated rural areas by macrocells.

Although the Commission considers the WIK Model's approach to the classification of POAs and deployment of BTSs is appropriate, there are some adjustments required to provide for a finer calibration of the optimised network. Telstra has correctly identified this as a limitation of the WIK Model as well as the need to adjust the classifications of some POAs.

Using airports as an example, Table A.1-3 below outlines the number of travellers departing and arriving at Australia's seven major airports during peak hours estimated at 24,000 people. Travellers at Australian airports represent 0.12 per cent of Australia's population of 20.4 million used in the WIK Model.

Table A.1-3: Peak-hour Traffic at Australian Airports

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[283] Australian Bureau of Statistics, *2001 Census Community Profile Series: Adelaide Airport (Suburb)*, November 2002,

http://www8.abs.gov.au/censusoutput/abs@CPP.nsf/06de47a62675c04bca25705e0001670d/eb888e759 c09ec97ca25710a001ad771!OpenDocument, viewed on 4 April 2006.

City	Passenger Type	Arriving/ Departing	Number of Passengers in Peak Hour	Total Passengers 2005-2006
Adelaide	International	Arriving	171	205,113
		Departing	195	189,869
	Domestic	Arriving	621	2,488,110
		Departing	837	
Brisbane	International	Arriving	1,419	2,139,778
		Departing	1,104	2,133,835
	Domestic	Arriving	445	
		Departing	400	816,734
Canberra	Domestic	Arriving	984	2,555,846*
		Departing	984	
Darwin	International	Arriving	315	92,800
		Departing	390	890,000
	Domestic	Arriving	678	531,200
		Departing	678	
Melbourne	International	Arriving	1,662	2,272,426
		Departing	1,452	2,183,142
	Domestic	Arriving	1,214	3,333,946
		Departing	1,220	
Perth	International	Arriving	829	1,036,583
		Departing	684	990,640
	Domestic	Arriving	494	667,900
		Departing	460	674,523
Sydney	International	Arriving	2,019	4,917,356
		Departing	2,240	4,922,560
	Domestic	Arriving	1,390	9,634,275
		Departing	1,192	

Source: Data taken from ACCC, *Quality of Service—Price-Monitored Airports 2005-06 – ACCC Monitoring Report*, November 2006, p. 79.

* Reported amount includes international passengers.

As stated in the *WIK Report*, airports, based on the density of travellers present there during the airports' peak times, would be similar to urban areas.[284]

To compensate for the need to increase the number of picocells at Australian airports, smaller POAs near airport POAs are selected and an adjustment is made to the population in these POAs so that the SNPT deploys picocells in these areas. This approach provides for the effect of increasing picocells in airport POAs, without either deploying picocells throughout the entire Airport POA (when picocells are only required in the vicinity of the airport terminal) and without significantly reducing the number of macrocells or microcells deployed. While this is a limitation of the WIK Model assumptions about BTS deployment, POA size and population density, the adjustments made to the text file to accompany the latest version of the WIK Model and the outcomes estimated better reflect reality.

Other POAs are adjusted in the same way to increase density as outlined in Appendix B.

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[284]   WIK, *WIK Report*, p. 65.

Like Eagle Farm (Brisbane Airport) POA, the Bonegilla military facility, is another example of how land mass may distort district classifications. The Bonegilla military facility is a relatively small-sized area, but its density is higher than adjacent rural POAs, so that the WIK Model treats the facility as a separate district. In this POA, the SNPT estimates that BTS picocells are a more efficient means of covering the district rather than a BTS macrocell. This is clearly not an appropriate outcome to either reflect an optimised or actual network.

As a result, to account for this the Australia.txt file has been adjusted to effect a lower population for the Bonegilla POA, which is now reclassified as a rural area. This was achieved by increasing the land mass of the POA. This classification is considered to be appropriate to provide sufficient capacity for military personnel.

A complete list of the adjustments made to account for these anomalous POAs and the impact on BTS type before and after these adjustments is provided in Appendix B. The combined changes to the distribution of the Australian population impact upon 0.34 per cent of Australia's total population used in the WIK Model.

The Commission notes that, even though these adjustments are made to the Australia.txt file to better reflect the actual POA densities in reality, refinement of these POAs has an insignificant impact on cost estimates, as they reflect such a small proportion of the population that underlies traffic.[285] This point is made above in examining the proportion of travellers to the total Australian population in respect of airport-related mobile traffic. Given the change in classifications to mainly urban areas, the cost estimate derived from the latest WIK Model has changed marginally. In the 31 per cent scenario, the changes to the Australia.txt file decrease the cost estimate of the MTAS by 0.02 cpm. In the 25 per cent scenario, the changes to the Australia.txt file increase the cost estimate of the MTAS by 0.04 cpm.

A.1.1.3.2. Other cell deployment issues

Before it considers the other issues raised in parties' submissions on cell deployment the Commission would like to note that Optus has, in providing its submissions on the WIK Model, compared in all cases its own network (which has been deployed and meets the capacity of a market share of around 33 per cent) to the network of a hypothetical with a market share of 25 per cent. The Commission considers that a more relevant scenario to compare its actual network to is the 31 per cent scenario in the WIK Model. This scenario more closely resembles Optus's actual market share and is more likely to reflect Optus's network dimensioning. Optus, in attempting to compare its own cell deployment with the cell deployment of a scenario with almost 10 per cent less market share than its own, has not compared 'like with like' in its submission. Anyone seeking to rely on these representations by Optus, particularly in terms of the quantum of network elements deployed by the WIK Model, will necessarily draw incorrect conclusions. The WIK Model will necessarily deploy lower numbers of network elements under the 25 per cent scenario than the 31 per cent scenario. As a result, there is no surprise that the number of network elements deployed by the 25 per cent scenario will be lower than those deployed in the Optus's actual network.

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[285] The change to airports and other POAs decreases the cent per minute cost of the MTAS by 0.003 cpm in the 31 per cent scenario. In the 25 per cent scenario the cent per minute cost of the MTAS increases by 0.05 cpm.

Turning to the other substantive issues raised about cell deployment in the WIK Model, the Commission considers that many of the submissions provided by interested parties relate to the actual experience of MNOs and their actual networks. As outlined previously, the WIK Model is not intended to reflect the realities of a particular MNO's network. The WIK Model is intended to support regulatory processes that can be applied across Australian MNOs' experience without being specific to one MNO's network or business context.

For example, Optus makes submissions on how the Cell Deployment Module is unable to model a realistic number of BTSs as the WIK Model fails to account for complexities such as buildings.[286] It is the Commission's view that the WIK Model adopts a reasonable approach and only requires a sufficient approximation of Australia's topology. The WIK Model employs a scorched-earth approach and is not designed to generate the exact numbers, types and locations of BTSs specific to an MNO such as Optus or to reflect an actual network of any MNOs operating in Australia.[287] The Commission notes that in terms of publicly available information from the ACMA[288] about the number of BTSs deployed by MNOs, the total number of BTSs generated by the WIK Model (using relevant market share and traffic assumptions) is in excess of the number of BTSs deployed in reality. The following table illustrates this point:

Table A.1-4: Indicative comparison of actual BTS deployment by MNOs to WIK Model BTS deployment[289]

BTS type	Vodafone	17 per cent scenario	Optus	33 per cent scenario	Telstra	44 per cent scenario
Macrocell	1.300	2,639	2,300	3,544	2,800	4,401
Microcell/Picocell	1,850	1,332	3,250	2,266	3,050	3,099
Total	3,150	3,971	5,550	5,810	5,850	7,500

Source: Data sourced from the Australian Communications and Media Authority, *Record of Radiocommunications Licences (RRL)*, ACMA Database, March 2007.

While the exact mix and type of BTSs may not identically align to those deployed in reality by MNOs, the WIK Model results in a reasonable outcome that increases, not decreases, the cost estimate of supply of the MTAS. Note that the number and type of BTSs identified in the table above reflect an approximate number of macrocells and microcell/picocells deployed by MNOs; they may not reflect the exact number and type of BTSs deployed.

If an actual MNO's network was selected, then this would likely lead to comments from other MNOs with respect to the location of that specific MNO's nodes and

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[286] Optus submission, p. 19.

[287] For a detailed discussion of this issue refer to section 4.1.

[288] Australian Communications and Media Authority, *Record of Radiocommunications Licences (RRL)*, ACMA Database, March 2007.

[289] The number of frequency assignments was divided by two, as panels on BTS sites are counted separately in the RRL. Further assumptions were made on the type of BTS based upon parameters in the RRL such as antenna gain, the density of the area of the assignment and the band of the spectrum the device is using.

network design. Further, if a particular MNO's network was selected there would be the question as to whether these nodes reflect an optimised or efficient network or whether an MNO's particular business decisions and legacy issues had impacted the location of nodes this is particularly relevant for the issue of the selection of particular radio frequencies at a given point in time.[290] It is important to note that the location of BTSs may not be confined to technical specification and terrain issues as submitted by some interested parties and may relate to specific operational strategies which may or may not reflect an optimised outcome. This point of differentiation is outlined in sections 4.1 and 4.2. These sections outline that the WIK Model is an optimised network of a hypothetical efficient operator, and do not necessarily reflect the network of an actual operator.

Similarly, the Commission finds that while it may be ideal to account for seasonal variations and coverage fluctuations, as is discussed in a number of submissions,[291] the WIK Model is not intended to reflect these realities. The Commission considers that such seasonal impacts will not materially impact the cell deployment or the cost of the MTAS provided for in the WIK Model. The approach adopted in the WIK Model is not an uncommon approach used in many models developed by other regulators, for example, the bottom-up models used in Sweden, the Netherlands, Norway and the United Kingdom do not explicitly account for these seasonal factors.[292] In addition, such variation in demand in holiday areas generally occurs during holiday seasons or weekends, which is outside the 250 business days covered by the WIK Model. As a result, it is unlikely that seasonal traffic will have a substantive impact on the capacity constraints of a mobile network. If the Commission has erred in this conclusion, then parties are invited to provide evidence of increased network capacity and additional network build in specific areas to reflect these submissions and how this has a statistically significant effect on the costs of the network and delivering the MTAS. In the event of an abnormal or an unusual event such as a sporting or special event, the Commission understands that demand for such occasions is catered for through the use of transportable cell equipment. Again, the Commission considers that these occasions reflect commercial or business decisions of MNOs and do not necessarily accord with an optimised network scenario. Many of these events occur adjacent to high-density or residential areas and occur outside the business days modelled. If these events were factored in, the impact on the cell deployment and more relevantly the MTAS cost would be negligible.

Interested parties made other comments about the:

- restrictions placed upon types of BTS within urban, suburban and rural areas;

- WIK Model's use of the Okamura-Hata model for propagation;

- number of BTSs predicted by the WIK Model; and

- use of dual-band base stations in the WIK Model.[293]

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[290] For example, refer to the discussion on the use of dual-band BTSs.

[291] Telstra submission, p. 21; Vodafone submission, p. 12; and Optus submission, pp. 14-18.

[292] For example, see Analysys Consulting Limited, *Mobile BULRIC Model – OPTA's BULRIC Model Documentation,* June 2006 or Analysys Consulting Limited, *NPT's Mobile LRIC Model Version 4 – Model Documentation,* December 2006.

[293] Optus submission, pp. 14-16 and 20.

The Commission finds that the assumptions made about the restrictions placed on different types of BTSs deployed in the WIK Model is reasonable and consistent with approaches in other models and studies,[294] even though these deployment assumptions may not reflect how different BTSs may be located across an actual network.

The Commission acknowledges that the Okumura-Hata model does have limitations for the prediction of path loss within one kilometre and implications for the microcells and picocells deployed. The main criticism usually made about the Okumura-Hata model is that it overestimates path loss for cell ranges less than one kilometre in urban areas.[295] This will increase the number of BTS microcells and picocells deployed in the network of the hypothetical efficient operator, resulting in higher rather than lower costs for the network which will flow through as a higher cost of the MTAS. In this way, the WIK Model provides for a more reasonable approach to cell deployment.

The Commission has already outlined the difficulty in assessing the submissions made by Optus in relation to the number of network elements deployed in the WIK Model compared to Optus's own network.

For example, Optus makes a submission in relation to the number of TRXs estimated in the WIK Model being different from the number of TRXs deployed by Optus. The reason for the difference between the WIK Model's estimation and Optus's deployed network could be due to one or a combination of the following reasons that may or may not reflect an optimised network:

- Optus provides a higher geographical coverage than in the scenario estimated in the *WIK Report*;

- Optus also counts the TRXs from the BTSs at highways and national roads;

- Optus uses a lower blocking probability; and/or

- Optus has built-in higher capacity than required to meet current traffic demand.

The Commission finds that interested parties incorrectly assume that the WIK Model deploys dual-band sites to an entire district. The Cell Deployment Module is based on an optimisation algorithm which selects the most suitable combination of BTS sites and BTSs to perform the deployment in a specific area. As outlined, the WIK Model calculates the number of BTS sites according to the nature of the area in a district (urban, suburban and rural). If the capacity of a BTS is not sufficient to meet demand within a particular area of a district, another BTS is deployed in the second band at the same BTS site. Therefore, if a dual-band BTS is needed, a BTS site will be provisioned with a dual-band BTS in the WIK Model. If a dual-band BTS is needed within a specific zone of a district (i.e. urban zone) dual-band BTSs may not be used

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[294] For example see Lee, M. 'Wired and Wireless Convergence', *CableLabs Media Briefing 2005*, 25 May 2005, slide 10, accessible from: http://www.cablelabs.com/conferences_public/MB2005/, viewed on 10 May 2007 or Rabanos J. M. H. *Communicaciones Móvile GSM*, Airtel Foundation, Spain, 1999, p. 201.

[295] For example see Graham, R. 'Identification of Suitable Carrier Frequency for Mobile Terrestrial Communication Systems with Low Antenna Heights', *IEEE Military Communications Conference 1998*, Volume 1, Issue 18-21, October 1998, pp. 313-317, and V.S. Abhayawardhana, I.J. Wassell, D. Crosby, M.P. Sellars and M.G. Brown, 'Comparison of Empirical Propagation Path Loss Models for Fixed Wireless Access Systems', *Vehicular Technology Conference 2005*, Volume 1, May 2005, pp. 73-77.

throughout the entire district. Dual band BTSs will only be deployed in zones to provide extra capacity to meet high traffic demand.

The Commission also notes Optus's submission that the WIK Model over provisions for the number of dual-band BTSs.[296] The Commission considers there are two reasons why the WIK Model estimates a higher usage of dual-band BTSs than compared to actual MNOs. Firstly, MNOs are constrained by legacy decisions arising from the fact that spectrum licences in the 1,800 MHz band were not granted for a number of years after the licensing of the PMTS B licences using the 900 MHz band. Secondly, as Optus pointed out in its submission, most of Australia's MNOs do not have Australia-wide access to spectrum in the 1,800 MHz band. Therefore, the Commission has made an allowance for this by using an average cent per minute cost between the single band and dual-band scenarios. These calculations are outlined in Appendix C.

As outlined earlier, the Commission has examined the results in the new version of the WIK Model against the ACMA's Radiocommunications Register of Licences and found that it deploys more BTSs. Refer to Table A.1-4 for details. Therefore the outcomes in the WIK Model result in a reasonable outcome when compared to every MNO than is deployed in reality.

The ACCC also received submissions about the lack of coverage on the highways.[297] The Commission notes that in section 3.10 of the *WIK Report* there is a discussion of Australian subsidy schemes[298] and that those Federal government subsidies have supported increased network coverage along Australia's highways. The Commission is of view that a hypothetical MNO would not provide coverage to highways that are located outside of the areas covered by the WIK Model without being subsidised for such an activity.[299] The Commission further notes that given that many main roads and highways are adjacent to built-up areas in which cells are deployed,[300] not all main roads and highways are neglected by the WIK Model . There are many stretches of highway which are located in areas where BTS cells are deployed to support the surrounding demand.

Interested parties make comments on the 'counter-intuitive' results from the 'terrain coverage' parameter in the Cell Deployment Module.[301] The 'terrain coverage' parameter has been removed as a redundant parameter in the modified WIK Model. The WIK Model accounts for this factor in its exclusion and aggregation parameters.

A.1.1.3.3. Aggregation network

The aggregation network module of the WIK Model determines the location of BSC units based on the demand for mobile services and the type of links (i.e. radio or leased line) between BTS units and BSC locations. Interested parties make comments

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[296] Optus submission, p. 16.

[297] Telstra submission, p. 21; and Optus submission, p. 17.

[298] WIK, *WIK Report*, pp. 56-58.

[299] Areas that are not included for coverage either have no buildings or residential populations, or fall outside the exclusion threshold.

[300] Some examples of districts with major roads covered by the scenarios used in the *WIK Report* are Colac in Victoria, Albury in New South Wales and Toowoomba in Queensland.

[301] Telstra submission, pp. 22-23.

in their submissions in relation to the number of BSCs estimated by the WIK Model.[302]

The Commission considers that the WIK Model has referenced the specifications for the number of BTS units on a reasonable basis from equipment manufacturers,[303] as outlined in the *Cellular Radio Handbook* (the Handbook).[304] This is further confirmed as there seems to be no inherent bias obvious in the WIK Model based on the submissions of interested parties about the number of BTS units per BSC units, for example on the one hand Telstra submits that the WIK Model overestimates this number, while Optus submits by inference that the WIK Model underestimates this number because assuming a capacity of 800 TRXs for each BSC unit is excessive. The Commission reiterates that the purpose of the WIK Model is not to replicate the exact specifications or network elements used by individual MNOs for their aggregation network but to approximate the network elements in use.

The Handbook indicates that MNOs locate BSC units in areas where there is a high concentration of traffic. The Handbook uses an example that the CME 201 BSC from Ericsson allows connection of up to 256 sites with up to 512 cells.[305] A capacity limit of 800 TRXs per BSC unit is reasonable as each cell will provide between one to three TRXs.[306] While the maximum capacity of TRXs is set at 800 per BSC unit, this provides an upper limit for the number of TRXs transported to a BSC unit in the WIK Model, rather than the actual number of TRXs. The following table uses the number TRXs in a BSC unit from the 25 per cent market share scenario in the *WIK Report* and the 800 TRXs per BSC unit cost parameter in the WIK Model to illustrate this point.

Table A.1-5: Examples of BSC locations and number of TRXs

District where BSC Units are Located	Number of BSC Units	Number of TRXs	Number of TRXs to BSC Units	Average use of BSC Units
Broadway	4	2750	687.50	0.86
Carlton South	4	3054	763.50	0.95
Gordon	1	656	656.00	0.82
North Adelaide	3	1721	573.67	0.72
Perth City	3	1953	651.00	0.81
Marong	1	624	624.00	0.78

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[302]   ibid., p. 20.

[303]   For example see Nortel Networks, *GSM Access Network Solutions – Product Brief – Nortel BSC 3000 and TCU 3000*, May 2005, accessible from http://www.nortel.com/solutions/wireless/collateral/66179.13-050505.pdf, viewed on 10 May 2007.

[304]   Boucher, N.J. *The Cellular Radio Handbook: A Reference for Cellular System Operation*, 4th Edition, John Wiley, New York, February 2001, p. 522.

[305]   ibid.

[306]   800 TRXs divided by 512 cells equates to approximately 1.6 TRXs per cell which falls within the specified range of one to three TRXs per cell.

Gravelly Beach	1	502	502.00	0.63
Cessnock	3	2255	751.67	0.94
Tamworth	1	66	66.00	0.08
Kempsey	1	292	292.00	0.37
Coffs Harbour	1	348	348.00	0.44
Lismore	1	332	332.00	0.42
Orange	1	388	388.00	0.49
Dubbo	1	277	277.00	0.35
Seymour	1	770	770.00	0.96
Wodonga Forward	1	264	264.00	0.33
Moe	1	587	587.00	0.73
Beaudesert	3	2104	701.33	0.88
Gympie	1	771	771.00	0.96
Mareeba	1	622	622.00	0.78

The Commission considers that Optus has mistakenly interpreted that the WIK Model assumes that only 20 BSC units are deployed in the model and that no BSC units are co-located. [307] For example, it is clear from the above table that three BSC units are co-located at the one BSC site in the Perth City district. The latest version of the WIK Model more easily produces output files for BSCs thus providing more details about the number of BSCs and BSC sites.[308]

With respect to Telstra's comments on the number of BSC locations, it is the Commission's view that the objective of the WIK Model is to design an optimal network and not replicate any MNO's network. As discussed in other sections and in the Annexure of this report, there are a number of reasons why Telstra may have more BSC locations than estimated in the WIK Model arising from legacy decisions and investment.

The WIK Model's treatment of the minimum distance criterion between BSCs is an important determinant for confirming if the location of BSCs is correct. The WIK Model locates BSCs at the point of highest traffic, and as a result, if the distance criterion was not used, all BSC locations would be located on the Eastern seaboard where population (and demand) is concentrated. If this were the case, all BTS hubs located in Western Australia would be linked to a cluster of BSC locations on the Eastern seaboard; the distance criterion ensures that BSCs units and locations are geographically dispersed and some are located in Western Australia. The following table, using the 25 per cent scenario illustrates this point:

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[307] Optus submission, p. 20-22.

[308] This output is labelled 'View Elements per Node' and is located in the Cost Module of the new version of the WIK Model.

Table A.1-6: Minimum distance between BSCs and the cost of the MTAS in the 25 per cent scenario

Minimum distance between BSCs (km)	Average distance between BTS hubs and BSCs (km)	Cent per minute cost of MTAS
25	576.5	5.58
50	519.1	5.76
75	510.1	5.74
80	**189.7**	**5.85**
100	184.1	5.99

Note that a change in the minimum distance threshold from 75 kilometres to 80 kilometres reduces the average distance between a BTS hub and a BSC location by over 50 per cent. It is at the 80 kilometre threshold that traffic from mobile users in Western Australia is no longer being transported across to Eastern Australia. The distance criterion designs an optimised network to reflect Australia's geographic conditions that does not result in all BSC units being located in Eastern Australia.

It is the Commission's view that Optus's comment in relation to links between BTSs and BSCs according to the state in which the sites are located[309] is more likely founded in business decisions made by Optus in respect of its actual network than an issue relevant for an optimised network. The WIK Model is designed to estimate the costs of a mobile network and not replicate the architecture of Optus's network. Further it is unlikely that changing the positioning of a small proportion of the links between BTS hubs and BSCs will have a material impact on the cent per minute cost estimate of the MTAS.

The Commission finds that Optus's comments with respect to the network resilience and the use of a star structure for the aggregation network[310] are incorrect. This is because Optus does not recognise that more than one BSC unit can be located at BSC site. Therefore if one BSC unit fails at a BSC location with a large amount of traffic another BSC unit can be used. Further, the WIK Model uses a tree structure for the connections between the BTSs, the BTS hubs and their corresponding BSC locations not a star structure as submitted by Optus.[311]

The Commission considers that the exclusive use of microwave links for a hypothetical non-integrated MNO is a reasonable approach. There are two reasons why a MNO might use a majority of fibre links in its aggregation network. First, if as is the case for two of the four MNOs, it is an integrated MNO, it already has fibre links built for its fixed-line network. Second, use of microwave links in the WIK Model provides a reasonable approach to the cost of links as the use of fibre is relatively cheaper than the alternative.

With respect to submissions about the reasonableness of the number of channels used per E1 group, the Commission considers that this is an empirical one. As a result, if

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[309] Optus submission, p. 21.

[310] ibid., pp. 20-21.

[311] ibid., p. 22.

MNOs have evidence to the contrary that the WIK Model assumptions are not appropriate in an Australian context, then they should provide this information to the Commission in a verifiable form so that the WIK Model may be more finely calibrated for Australian conditions. The WIK Model assumes that 28 from a maximum of 32 channels are used which results in an over-engineering of ten per cent in the number of links between a BSC location and a BTS hub. In this respect, without verifiable evidence to the contrary it is the Commission's view that the assumptions made about the number of channels per E1 group in the WIK Model is reasonable and further that any departure from these assumptions in an actual MNO's network may reflect optimised engineering solutions.

A.1.1.3.4. Backhaul network

As outlined, the backhaul network determines the number and location of MSC units, as well as how these MSC locations will be linked to BSC locations. Interested parties raise two issues with respect to the backhaul network. First, the number of MSC units used in the WIK Model,[312] in particular that the number of five MSC units are much lower than those deployed in actual mobile networks. Second, the use of a star topology for a backhaul network is not practical for the purposes of network resilience.[313]

It is the Commission's view that the interested parties may have confused the parameters used to adjust the number of MSC units with the number of MSC locations in the WIK Model. Irrespective of this it is an important issue and as a result the Commission will outline the process of dimensioning and allocating MSC equipment in the WIK Model.

Firstly, MSC units relate to the equipment that is located at an MSC site. MSC units comprise a switching machine, a central processor and a signalling processor. For example, in the 31 per cent scenario in the *WIK Report*, the WIK Model estimates that the hypothetical mobile network requires five switching machines, 14 central processors and 21 signalling processors.

In the circumstances where 20 BSC locations and five MSC locations, this means on average, three BSC locations must be connected to one MSC location in the WIK Model. The parameter that determines which BSC locations are assigned to a MSC site is the maximum number of aggregated users. The SNPT assumes that one of the three BSC locations is co-located with a MSC location. This assumption is considered a reasonable assumption that mirrors what happens in reality. A distance threshold parameter ensures that the MSC locations are not clustered together. For example if the distance threshold is set to zero in the 25 per cent scenario then two MSC sites are located in New South Wales, one site is in Victoria, Queensland and Western Australia.

Once the WIK Model has deployed the MSC sites, the model estimates the number of busy-hour call attempts that are aggregated to each MSC site. If the number of busy-hour call attempts exceeds 270,000 more than one signalling and central processor will be required at the MSC site.

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[312] Optus submission, pp. 22-24; and Vodafone submission, p. 26.

[313] Optus submission, p. 22.

Given parties' submissions and the Commission's view about the importance of switching machines located at the MSC for connecting a large number of mobile users, the Commission has increased the number of switching machines from five to nine for both the 25 per cent and 31 per cent scenarios used as reference cases. In order for the WIK Model to deploy nine switching machines, the number of ports per switching machine was decreased to 1,054 for the 31 per cent scenario and 942 for the 25 per cent scenario.[314] Of course the number of switching machines at an MSC site will depend on the scenario selected.[315] However, when the number of switching machines are increased to nine, both Victoria and New South Wales have at least two switching machines. The Commission understands that this may be more reflective of an Australian context.

Optus makes a number of comments with respect to the WIK Model's approach to the lack of resilience of the backhaul network.[316] It is the Commission's view that the WIK Model addresses resilience in the backhaul network in two ways. First, in linking BSC sites to MSC sites, the SNPT assumes that the physical infrastructure in the physical layer uses DSGs limited to STM-1 groups leased from a fixed network operator. The DSGs using STM-1 groups provide the required capacity for transporting traffic from one BSC site to a linked MSC site. This assumption is valid because the BSC sites are located in places where access to a fibre infrastructure is readily available, which is confirmed by Optus.[317] In making these assumptions about the type of links between BSC locations and MSC locations, the WIK Model topology results in a star structure for the physical layer of the network. The WIK Model provides for a reasonable assumption of normal protection over the leased line link which guarantees annual average availability of 99.99 per cent.[318]

Second, Optus has confused the structure of fibre cables with how leased lines are structured. The WIK Model assumes that the physical layer of leased lines in the network is divided into sub-layers using a SDH. The first sub-layer is the structure of the digital signals (STM-1) to be multiplexed. These digital signals are transported through the use of high bandwidth transmission systems or the second sub-layer. The high bandwidth transmission systems are implemented over fibre sections or the third sub-layer. The fibre sections are provided by cable sections or the fourth sub-layer. The cable sections are installed in ducts or trenches or the final sub-layer. While the topology of the fibre and cable ducts is the same, the structure of the sub-layers is quite different as leased lines follow a SDH which uses ring structures which are protected by the 'self-healing' principle.[319] As a result, the sub-layers as provided by leased lines do not follow a star topology.

A.1.1.3.5. Core network

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[314] These are averages of the number of ports per MSC between the single-band and dual-band scenarios. For more information refer to Appendix C.

[315] Refer to the WIK Model Annexure A.1.1.3.7.

[316] Optus submission., p. 22.

[317] ibid., p. 21.

[318] WIK Consult, *Specification of the Strategic Network Planning Tool GSM-CONNECT for Implementing the WIK-MNCM*, (*WIK Report*), May 2007, p. 3.

[319] WIK, *WIK Report*, pp. 73-74.

The core network comprises the links between the MSC sites and the different equipment located at each MSC site for the purpose of routing traffic from the MNO's network users to its intended destination and vice versa. A number of comments are made in relation to the nature and amount of equipment deployed in the core network including: the need for STP, a MNP platform, an increase in the number of HLRs and another SMSC.[320]

The WIK Model has implicitly accounted for STPs and the MNP platform. First, the WIK Model provides for the capacity required for signalling by reserving one or two slots in the TRX frame to account for such network elements.[321] Second, the costs for the signalling processor account for the different signalling functions performed by both the STP and MNP platform. Subsuming the cost for the signalling functions as part of the cost of the signalling processor avoids the introduction of a number of additional parameters in the WIK Model. Introducing additional parameters for signalling would unnecessarily increase the complexity of the WIK Model with little or no additional change in the overall network deployed or the cost of that network. In this way, the additional complexity would reduce, rather than improve, transparency of the WIK Model without any significant benefits.

With respect to mobile number portability there are two approaches that can be implemented for telecommunications networks: a centralised approach using intelligent network (IN) facilities; or a STP integrated approach integrating the mobile number portability into the signalling network and the HLR. The first approach is mainly used in fixed networks while the second approach is used for mobile networks. As discussed above, the WIK Model does not explicitly consider the cost of the signalling platform for mobile number portability. The mobile number portability is indirectly included in the cost for the signalling processor.

In relation to the number of HLRs and SMSCs, the WIK Model released on 16 February 2007 provided for a minimum of two HLRs and one SMSC as a parameter. The Commission firstly notes that these network elements account for minor incremental costs in the estimation of the cost of the supply of the MTAS. Secondly, the specification of setting a minimum number of HLRs and SMSCs, does not restrict the number of HLRs or SMSCs deployed in the WIK Model, based on relevant demand, market penetration and coverage assumptions. For example, the 25 per cent scenario in the WIK Model estimates that there are six HLRs and one SMSC and the WIK Model uses eight HLRs in the 31 per cent scenario and two SMSCs. That said, in the latest version of the WIK Model, accompanying this report, the minimum number of HLRs allowed has been maintained at two and the minimum number of SMSCs is increased to two to address the concerns raised by interested parties.

The Commission finds that including a VMS and a voice mail service would have an immaterial impact on the cost of the MTAS. By including a voicemail service, traffic in the WIK Model would increase and through economies of scale the cost of the MTAS would decrease. The Commission notes that in its assessment of Vodafone's 2004 undertaking for the MTAS that access to voicemail may be routed through

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[320] Optus submission, pp. 24-25; and Vodafone submission, pp. 25-26.

[321] Slots are used to transport traffic between the BTS and BSC, and there are eight 16 Kbps slots per TRX frame (located at the BTS). From the BSC to the MSC, 64 Kbps slots are used. For cells with large traffic volumes two slots are provided in the TRX.

termination and on-net traffic.[322] However, the Commission also noted at the time that mobile users were willing to pay for this service to compensate for any additional costs incurred and that the impact of voicemail on traffic and routing was an empirical question for Vodafone to answer. It is therefore unlikely that including voicemail in the model would have a material impact on the cost of the MTAS and it therefore still remains an empirical question for the interested parties to answer.

A.1.1.3.6. Network resilience

Network resilience relates to the robustness and reliance of the network which is dependent on the architecture of the network, the quality of equipment capacity limits, nature and number of links between different network elements, failure specifications, additional or reserve network elements and procedures such as regular maintenance programmes to mitigate the risk of network failure. A number of comments are made by the interested parties with respect to network resilience in the WIK Model.[323]

The Commission notes Vodafone's submission that the WIK Model only addresses network resilience through assumptions about capacity limitations.[324] However, this is not the only way that the WIK Model ensures network resilience. For example, the SNPT optimises the network topology by limiting the number of BTS hubs in the path between a specific BTS hub to a BSC location to reduce the number of links or hops between a BTS hub and a BSC location, which would adversely impact network resilience. This is achieved with the use of a penalty factor. The choice of links between BSC locations and MSC locations is another resilience feature of the WIK Model. Digital leased lines that are considered to have a high level of resilience compared with other links, due to the usage of a SDH.[325] The resilience of connections between MSC locations is further enhanced via a mesh topology using digital leased lines, which provides more resilience than a non-meshed structure particularly given the limited number of MSC locations deployed in the WIK Model.

Notwithstanding incorrect information provided about actual value of operating expenditure (OPEX) made by Vodafone,[326] the estimated OPEX in the WIK Model is much higher level of maintenance costs than is incurred by this MNO (refer to the WIK Model Annexure A.2.3 for further details). The WIK Model also allocates costs to network support assets which are also used to maintain the network.

Further, it is the Commission's view that another factor that could be used to indicate network resilience is the quality of equipment deployed. A proxy for quality of equipment is the price paid for equipment. WIK also assumes that network resilience is not only achieved by stand-by capacities but also regular inspections and maintenance programmes.[327] Again despite one submission that equipment prices are underestimated in the WIK Model and that this 'is not justified based on Australian-

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[322] ACCC, *Assessment of Vodafone's Mobile Terminating Access Service (MTAS) – Final Decision (Public Version)*, (*Vodafone Undertaking Decision*), March 2006, pp. 57-58.

[323] Optus submission, pp. 10, 20-21, and 24-25; and Vodafone submission, p. 25.

[324] Vodafone submission, pp. 25-26.

[325] Refer to the WIK Model Annexure A.1.3.4 for a discussion on the resilience of digital leased lines.

[326] Vodafone submission, pp. 26-28.

[327] WIK, *WIK Report*, p. 73.

specific factors,'[328] interested parties have largely remained silent on the reasonableness of equipment prices used in the WIK Model or provided references to studies in other jurisdictions (which as in shown in the WIK Model Annexure A.2.1.3 may be higher priced jurisdictions than Australia)[329] rather than provide detail about the equipment prices they incur or can directly reference from their suppliers. In the absence of verifiable evidence of the actual prices paid by MNOs for equipment, the Commission considers the price of equipment used in the WIK Model is reasonable, which would indicate deployment of quality rather inferior equipment in the WIK Model

Further, the Commission notes that Optus has made a submission about the lack of network resilience in the WIK Model by reference to the number of BSCs. The WIK Model determines the number of BSC units by the total number of TRXs transported to the BSC location divided by the maximum number of TRXs allowed per BSC unit as a means of ensuring network resilience. In making its submission, Optus seems to have confused the number of BSC locations with the number of BSC units estimated by the WIK Model. Table A.1-5 in this report shows that this is not the case. In BSC locations where demand or traffic is high, such as the district comprising Broadway in NSW (which includes the Sydney CBD POA), the WIK Model estimates that there are four BSC units at the relevant BSC location for Broadway. And more generally, the number of BSC units generated by the WIK Model seems to be reasonable to account for network resilience.

Together these factors outlined above that contribute to the reliability and robustness of the network provide for a reasonable approach to network resilience in the WIK Model.

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[328]   Vodafone submission, p. 21.

[329]   See also: See World Bank data on purchasing power parity at: http://devdata.worldbank.org/wdi2006/contents/Table4_14.htm, viewed on 17 May 2007; and International Monetary Fund data on purchasing power parity available at: http://imf.org/external/pubs/ft/weo/2007/01/data/weoselgr.aspx, viewed on 17 May 2007.

A.2 Cost Module

A.2.1. Estimation of the cost of network and other assets

A.2.1.1. WIK Model approach

Network assets are one of the key inputs in the WIK Model. After the optimal network has been designed by the SNPT, the estimated quantities of network elements are multiplied by the network asset prices and other factors to obtain the total investment required for building a hypothetical network.[330] Once the total investment is calculated, this amount is used to calculate annual costs that subsequently are used to estimate the costs of providing specific mobile services.

The WIK Model uses current replacement values for the network assets.[331] Equipment prices are derived using European cost benchmarks employed in costing models used in the United Kingdom, the Netherlands, Sweden and Germany.[332] In the *WIK Report*, network assets comprise:

- Base station transceivers (BTS);

- Links between the BTS and BTS hub;

- Links between the BTS and base station controller (BSC);

- Links between the MSCs;

- Links between the BSC and mobile switching centre (MSC);

- BSCs;

- MSC;

- Home location register (HLR);

- SMS centre (SMSC); and

- Network support asset investment.

The following table summarises the network assets, how prices were sourced and where the network assets are referred to in the *WIK Report*.

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[330] Other factors include sharing factors, network support investment, etc.

[331] WIK Consult, *Mobile Termination Cost Model for Australia*, (*WIK Report*), January 2007, p. 76.

[332] ibid., p. 115. See also: Analysys Consulting Limited, *Mobile BULRIC Model – OPTA's BULRIC Model Documentation,* June 2006; Analysys Consulting Limited, *NPT's Mobile LRIC Model Version 4 – Model Documentation,* December 2006; and Analysys Consulting Limited, *LRIC Model of UK Mobile Termination*, April 2002.

Table A.2-1: Calculation of productive network assets

Network asset	Data sources for network asset prices	Relevant *WIK Report* Page Number (s)
BTS sites	Varies according to BTS site type. ABS data and European land values.	76
BTS system equipment	Varies according to BTS type and number of sectors. European cost benchmarks used.	76 and 115
Transceivers (TRXs)	European cost benchmarks used.	78 and 115
Links between BTSs and BTS hubs, between BTS hubs and BSCs, between BSCs and MSCs, and between MSCs.	Initial one off charge used for leased lines European cost benchmarks used for radio equipment Radio licence fees from ACMA.	78 to 83, and 115 to 116
BSC sites	ABS data and European land values.	80
BSC equipment	European cost benchmarks used.	80 and 115
MSC sites	ABS data and European land values.	81
MSC equipment (TRAU, MSC hardware and software, CPU and SP)	European cost benchmarks used.	81 to 82, and 115

BTS assets are comprised of BTS sites, BTS system equipment and TRXs. BTS site values in the WIK Model include site acquisition costs, planning costs, land acquisition and construction costs. The type of BTS (macrocell, microcell or picocell) installed at a site has a direct bearing on the investment value of a BTS site. WIK uses ABS data and European land values to determine site values.[333] As with BTS site values, most BTS equipment values vary according to the type of BTS installed on the site and the number of sectors the BTS is serving. However, the unit price of a TRX which is also located at the BTS site does not vary with the type of BTS located on that site.

Like BTS sites, investment in other sites for repeaters, BSCs and MSCs include site acquisition costs, planning costs, land acquisition and construction costs.

As outlined previously, the links between different BTSs, repeater sites and BTSs and BSCs are achieved either via a radio system or a leased line link. Leased line prices contain an initial (once-off) charge and a series of annual payments. The WIK Model includes the up-front initial charge as an investment value for the network element and the annual payment as a direct cost. Links between the BSC and the MSC, and between the MSCs are assumed to use leased lines with a bandwidth of 155 Mbps. The higher bandwidth lines attract higher initial charges than the other links.[334] There are two charges, an upfront or initial one-off payment, considered as a network asset or investment price in the model and an annual payment which is treated as a direct (annual) cost.

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[333] WIK, *WIK Report*, pp. 76-77.

[334] ibid., p. 116.

Different equipment prices are used for radio systems based on the amount of bandwidth carried (2 Mbps, 8 Mbps, 34 Mbps or 155 Mbps) by links between BTS sites and BSC sites. Spectrum fees that apply to point-to-point licences in Australia are added on a per link basis and are included as a part of the radio system investment.

Repeaters are used to compensate for short radio links.[335] The price of repeaters comprises repeater sites and equipment. The price of repeater equipment located at repeater sites is also based on the bandwidth of the signal carried between a BTS site and BSC site.

BSC assets comprise the BSC site and BSC equipment. The BSC equipment comprises hardware and software.

MSC assets comprise MSC sites, MSC equipment, a transcoder rate adaption unit (TRAU) and 2 Mbps ports.[336]

MSC equipment is segregated into hardware for the switching machine, software for the switching machine, the central processor, and the signalling processor. The HLR is located at the MSC site and stores information about a MNO's subscribers. The SMSC routes SMS traffic to the MNO's subscribers. The number of HLRs and SMSCs is driven by the number of subscribers on a network, and a pre-defined capacity limit and utilisation ratio.

Current replacement equipment prices are used to establish the asset values of equipment located at BTS sites, equipment at BSC locations, equipment at MSC locations, TRAUs, HLRs and the SMSCs. These prices are based on European benchmarks for equipment. Site values are based on empirical data for Australian and European land values.

After calculating the value of the productive network investment (which is derived from the number and price the network elements outlined above) an annualised cost of the direct costs of these productive network assets is derived. The WIK Model uses a tilted annuity method by multiplying the productive network investment by the tilted annuity factor to estimate the annual or direct costs of these assets. The tilted annuity formula used in the WIK Model is:[337]

$$A = (r-\Delta p-g-\Delta p * g) / \{1- [(1+\Delta p)*(1+g)/(1+r)]^n\}$$

Where A is the tilted annuity, Δp is the expected change in the annual price of the network asset, g is the expected annual growth of services, r is the weighted average cost of capital (WACC) and n is the life of asset expressed in years.

If the annuity factor is not adjusted for price changes or growth in the usage of network elements, the required return on total productive network investment will remain constant each year over the life of the investment (i.e. straight line depreciation). However, it is unlikely that either prices or the growth in services will have a value of zero over time. First, equipment prices that inform the value of

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[335]   This does not apply for links between BTSs and BTS hubs, as the distance is too short.

[336]   The TRAU can either be assumed to be located at the BSC or MSC, WIK assumes that it is located at the MSC.

[337]   WIK, *WIK Report*, p. 39.

network assets tend to change over time due to demand factors and technological progress. Second, based on recent Australian experience, network services which are delivered by the productive network has and is expected to grow over time for the foreseeable future.

The value for p in the WIK Model[338] is informed by ABS indexes about price changes;[339] g is a little more difficult to determine with certainty by the WIK Model relies on information from other regulatory proceedings that used bottom-up modelling.[340]

The WIK Model also includes a value for assets that are named network support assets. These assets complement the productive network assets in the WIK Model and comprise:

- Motor vehicles;

- Workshop tools and small items;

- Office equipment;

- Network related IT and computers;

- Network management systems; and

- Buildings for network support equipment.

The WIK Model identifies the value for these assets as a proportion or mark-up of the underlying productive network assets. Different mark-ups are applied to each productive network element to derive the value of the network support assets used in the WIK Model. For example, WIK applies a one per cent mark-up for motor vehicles used for BTSs and a three per cent mark-up for motor vehicles used for links. The following diagram illustrates how WIK assigns mark-ups to the productive network elements, such as BTSs.[341]
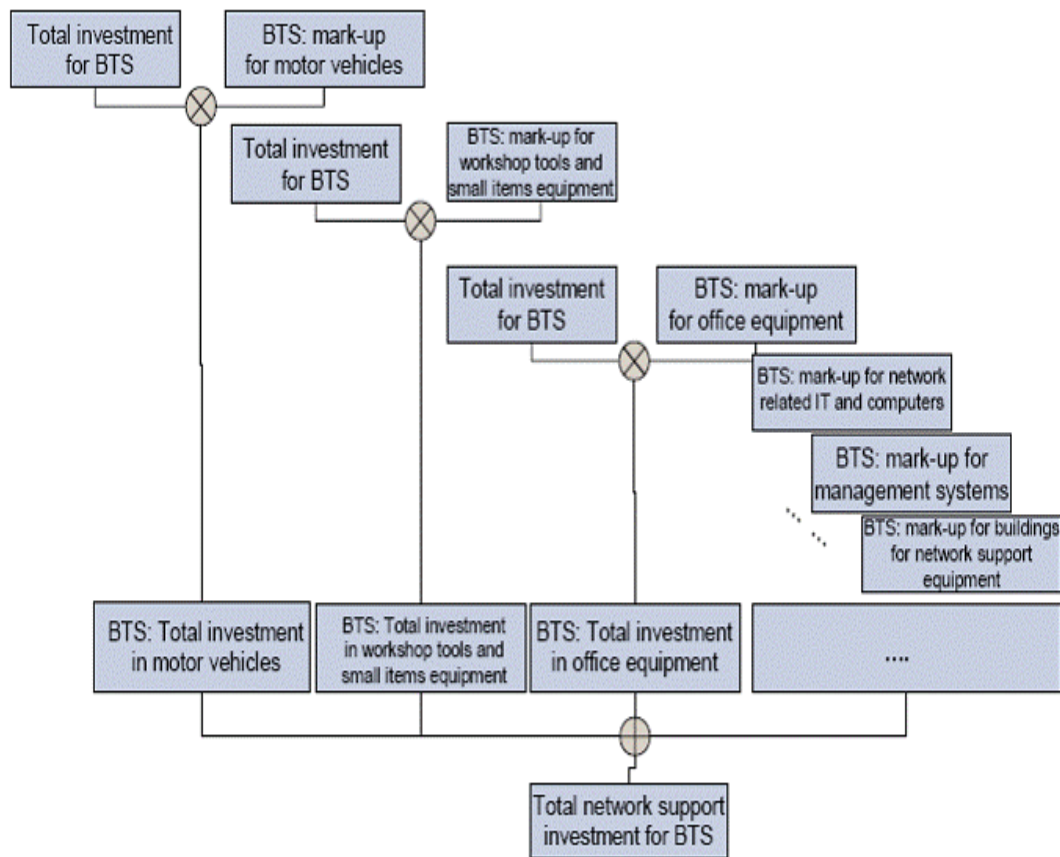
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[338] ibid., p. 116.

[339] Australian Bureau of Statistics (ABS) *Australian System of National Accounts*, Canberra, November 2005.

[340] WIK, *WIK Report*, p. 117.

[341] ibid., pp. 151-53.

Figure A.2-1: Calculation of network support assets

Source: WIK, *WIK Report*, p. 85.

The mark-up values used for network support assets are based on information used in other modelling applications.[342]

A.2.1.2. Parties' views

Optus submits that the international benchmarks used by WIK for equipment prices cannot be relied upon as equipment prices are determined in large part by local factors such as land prices and labour costs. Optus observes that the cost figures used in the model are in many cases substantially lower than actual prices faced by MNOs in Australia.[343]

Optus submits that it has concerns with price trends derived from international sources as cost trends can be difficult to estimate accurately without taking into account local factors, such as increased demand for sites or saturation of readily available radio mast sites.[344]

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[342] ibid., p. 116.

[343] Optus, *Optus Submission to the Australian Competition and Consumer Commission on the WIK Mobile Network and Cost Model for Australia*, (Optus submission), March 2007, p. 31.

[344] ibid.

Optus submits that to capture the full cost of working capital the WIK Model should consider the actual time difference between cash payments for inputs and cash receipts for output on account of current operations, and calculate the opportunity cost based on a relevant interest rate.[345]

In regard to the tilted annuity approach Optus submits that:

> WIK appears to have chosen this method without due consideration of alternative commonly applied depreciation methods such as economic depreciation or tilted straight line depreciation.[346]

Optus submits that the tilted annuity depreciation method has been applied incorrectly in the model. WIK has incorporated an output 'tilt' as well as a price tilt into its calculations. Optus submits that 'in principle, there is nothing wrong with this' but that:

> WIK has used an output tilt that reflects the expected growth of service output. This is incorrect. What matters is output per piece of network equipment. If service output is growing, the volume of network equipment will also be growing although not necessarily at the same rate. By ignoring the growth of the asset base, WIK is assuming that existing assets are catering for all the increase in demand which is clearly not the case. By making this assumption, WIK is exaggerating the future rate of increase of equipment utilisation and hence understating depreciation;
>
> At the same time, if equipment utilisation (output per unit of equipment) is increasing over time, it is necessary for the utilisation factors in the model to reflect this. WIK does not appear to have taken this into account and consequently has applied equipment utilisation and tilted annuity factors that are mutually inconsistent.[347]

Optus submits that if WIK is going to introduce an output tilt, it should also add a tilt to allow for the fact that the cost of operating existing equipment tends to increase over time thereby reducing the cash flows for recovering depreciation towards the end of an asset's life.[348]

In addition, Optus submits that the network planning horizon does not appear to have been adequately taken into account in the model. Optus submits that there is an inherent lead time required in provisioning of network equipment (especially for base stations where planning permission is usually required), which means that the predicted future demand placed on a network element needs to be factored into its provisioning.[349]

Telstra submits that the WIK Model should include assessment of the impact of sensitivity analysis applied to key input parameters, including parameter values for the tilted annuity formula (this effectively addresses both the return of capital and return on capital issues as well as taxation impacts):

- demand growth rates; and

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[345] ibid., p. 34.

[346] ibid., pp. 31-32.

[347] ibid., p. 32.

[348] ibid.

[349] ibid., pp. 32-33.

- change in unit asset values – on average, the impact of a material change in the change in value of component assets.[350]

Telstra submits that unit asset values are critical to the establishing the robustness of the model and need to be better understood. Telstra questions whether the model fully incorporates interest during construction and the impact of recent capital cost increases and the nature of the impact of the additional capital cost changes.[351]

Telstra submits that future network costs on average may in fact be increasing given the impact of construction costs, leasing and land related costs. Telstra submits that it 'is increasingly of the view that the combined impact of changes in the key parameter values for the tilted annuity formula may mean that the appropriate profile for the recovery of the annuity is no longer so front loaded.'[352] Telstra submits that this is especially critical in the context of the WIK Model given the concerns over the approach used to establish the WACC.[353]

Vodafone submits that it is difficult to give an accurate replacement value of the core network assets included in the WIK cost model.[354]

Vodafone submits that its own deployment team confirmed that the assumed asset replacement cost for BTS investment differs significantly with respect to BTS macrocell site construction, omni sector macrocell equipment and 3-sector microcell equipment:

- the average cost to Vodafone of its most recent macrocell site constructions demonstrate that the cost of construction is [c-i-c];

- the average replacement cost for omni-sector macrocell equipment is [c-i-c]; and

- the average replacement cost for three-sector microcell equipment is [c-i-c].[355]

Vodafone submits that changing the WIK assumption to match the realities of replacing those radio assets in Australia results in an increase in the mobile termination rate of around 0.68 cpm.[356] Vodafone submits that, in the absence of vendor specific replacement costs, the WIK cost model pay due regard to the cost estimates used in comparable European studies.[357]

Vodafone submits that other regulators utilise bottom-up cost model (Sweden, UK and Greece) which also incorporate the number of BTSs in real world networks.[358]

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[350] Telstra Corporation Limited, *Submission in Response to the ACCC's Discussion Paper on the WIK Mobile Network and Cost Model to Inform the MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*, (Telstra submission), March 2007, p. 47.

[351] ibid., pp. 47-48.

[352] ibid., p. 48.

[353] ibid.

[354] Vodafone Australia Limited, *Submission to the Australian Competition and Consumer Commission: WIK Mobile Network and Cost Model and MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*, (Vodafone submission), March 2007, p. 20.

[355] ibid., p. 20-21.

[356] ibid., p. 21.

[357] ibid.

[358] ibid. p. 14.

Vodafone submits that:

> The WIK cost model significantly underestimates the CAPEX of both macrocell, microcell site preparation compared to the UK cost model, and underestimates the cost of macrocell, microcell and picocell equipment compared to both the UK and Sweden cost models. In addition, the WIK cost model underestimates BSC site costs. Vodafone's experiences in Australia and Europe indicate that such underestimation is not justified based on Australian-specific factors.

> Vodafone also notes that the BSC and MSC hardware costs are between 20 to 30 per cent cheaper in the WIK cost model than the average of the costs adopted in the UK, Netherlands and Sweden cost models.[359]

Vodafone further submits that the most significant variance in the cost arises from BSC and MSC software. Vodafone submits that the cost of software for both the MSC and BSC is typically equal to the cost of hardware. The cost of software for the HLR is, based on Vodafone's worldwide experience, twice the cost of hardware.[360]

Vodafone also submits that the asset lifetime of software should be two years, as two years 'reflects the reality experienced by Vodafone Australia and Vodafone Group of the expected lifetime of software, given the constant upgrading demanding by vendors.'[361] Vodafone subsequently submits that:

- Adopting the average European costs increases the MTAS from 7.3 cpm to 9.8 cpm — an increase of 2.5 cpm.

- Replacing the average EU costs with the actual observed recent costs of BTS site construction, omni-sector macrocell and three-sector microcell increases the cost of MTAS by 6.8 cpm.

- Correcting for incorrect asset lifetime of software (moving from five to two years) results in an increase in the cost of MTAS by an additional 2 cpm.'[362]

A.2.1.3.   Commission's view

The Commission considers that network asset values used in the WIK Model reflect a reasonable estimate of costs in the Australian market.

Asset lives

The Commission considers that there has been significant engagement with industry in respect of asset lives in assessment of the Vodafone undertaking and there is broad industry consensus on the asset lives assumptions used in the WIK Model. This is confirmed by the fact that only Vodafone has made a submission on this issue.

The Commission notes Vodafone's submission that the economic lifetime of software should be two years, not five years as used in the WIK Model.[363] In reliance on its submission about asset lifetimes, Vodafone submits that the MTAS cost estimate should increase by 2 cpm. However, Vodafone's submission on the relevant economic life of software is contradicted by several Vodafone sources.

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[359] ibid., p. 21.

[360] ibid.,

[361] ibid., p. 22.

[362] ibid.

[363] ibid.

Firstly, this submission is not consistent with Vodafone's own accounting policy as outlined in its statutory accounts, which provides for a range for the asset lives it applies under accounting standards of between three years and ten years across all its asset classes (including software).[364]

Secondly, it is inconsistent with the economic lifetime used by the Vodafone Group for general software of three years to five years and software integral to related hardware equipment which has an economic life of three years to ten years.[365]

What this means is that Vodafone has submitted an asset life for software that does not reflect an asset life that its own external auditors accept as appropriate.

Further, the Commission has at its disposal another referable source of asset lives specific to Vodafone to test the accuracy of Vodafone's submission that the asset life of software should be two years. In support of the Vodafone Undertaking, PwC developed a model, which included among other network elements, software. In review of the asset life used in the PwC Model, the Commission notes that the WIK Model provides for a much shorter asset life for software than used by the PwC Model used in an Australian context.

While the Commission considers that asset prices may change over time, the Commission is not aware of any significant change in technology that would warrant such a major change in asset lives since the PwC model was developed.

In respect of the submission made by Vodafone, the Commission can find no support for the use of an asset life of two years referable to and used by Vodafone in its Australian operations.

The Commission is concerned about the information provided by Vodafone about asset lives for software.

All other supporting information, directly referenced to Vodafone, suggests that a longer-than two-year asset life is appropriate for software.

Consequently, the Commission concludes that the WIK Model estimate provides for a reasonable asset life for software and therefore a reasonable estimate for the supply of the MTAS. Further, if the Commission was to use the PwC Model asset life for

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[364] Vodafone Australia Limited, *Annual Financial Report for the Financial Year Ended 31 March 2006*, p. 14. The report states that 'the following estimated useful lives are used in the calculation of depreciation for plant and equipment: Equipment fixtures and fittings: 3-10 years.'

[365] Vodafone Group Plc, *Annual Report for the Year Ended 31 March 2006*, p. 76. The report states that:

> Computer software licences are capitalised on the basis of the costs incurred to acquire and bring into use the specific software. These costs are amortised over their estimated useful lives, being 3 to 5 years…

> Software integral to a related item of hardware equipment is accounted for as property, plant and equipment.

> …[the estimated useful economic lives of plant and equipment are:]

> - Equipment, fixtures and fittings 3 - 10 years

> - Network infrastructure 3 - 25 years

software that *ceteris paribus* a decrement rather than an increment in the estimate of the cost of the supply of the MTAS would result.

The Commission also considers that the methodology employed by Vodafone in illustrating the 'Effect of individual corrections to the WIK cost model,'[366] results in double counting the impact of asset lives in arriving at its 44.8 cpm estimate and uses the inappropriate population coverage and market penetration assumptions.

Vodafone has not shown how it first eliminates the effect of the current asset life for software in the WIK Model of five years of 0.2 cpm and simply adds any increment it obtain to this original effect. The Commission considers that Vodafone has employed flawed methodology in arriving at the 44.8 cpm value for the MTAS and therefore it cannot rely on the submission provided by Vodafone in this respect.

In addition, the Commission notes that Vodafone has arrived at the figure of 2 cpm by making additional adjustments to other cost parameters. This has resulted in a cost increase which is attributable to cumulative, rather than incremental, adjustments to costs. The Commission consequently considers that the 2 cpm cost increase submitted by Vodafone cannot be solely attributed to an adjustment in asset lives. The Commission notes that if only the software asset lives are adjusted to Vodafone's proposed 2 years (i.e. without an adjustment to costs and market penetration), the increase to MTAS costs is only 0.2 cpm.

Equipment prices

The WIK Model has derived equipment prices from benchmarking analyses of cost models in the UK, the Netherlands, Sweden, and Germany.[367] The Commission notes submissions that the international benchmarks used by the WIK Model for equipment prices cannot be relied on to produce an accurate estimate of asset costs in Australia.[368]

The Commission understands that the global market for the supply of telecommunications equipment is an extremely competitive one, and reference to international or European prices is entirely appropriate. Further, except for conversion of European or other currencies to Australian dollars, the Commission understands that the international benchmarks for equipment prices would be reflective of the prices faced by Australian MNOs.

The Commission notes that three of the four MNOs in Australia are subsidiaries within international telecommunications groups with extensive global operations. In general, these global groups would be expected to exert substantial bargaining power in purchasing arrangements with global suppliers that provide the majority of the specialised equipment that are deployed in Australian mobile networks.

Australian MNOs that form part of a global group may purchase equipment in one of two ways:

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[366] Vodafone submission, p. 29. See also: Analysys Consulting Limited, *Mobile BULRIC Model – OPTA's BULRIC Model Documentation,* June 2006, Analysys Consulting Limited, *NPT's Mobile LRIC Model Version 4 – Model Documentation,* December 2006, Analysys Consulting Limited, *LRIC Model of UK Mobile Termination*, April 2002.

[367] WIK, *WIK Report*, p. 115.

[368] Optus submission, p. 31; and Vodafone submission, pp. 20-23.

- directly from the global supplier under circumstances through global purchasing agreements, which are generally arranged offshore at a price negotiated at a group level; and/or

- directly or indirectly through an offshore related party, which has benefited from these group buying arrangements.

Vodafone alludes to the existence of these types of arrangements in referencing global book values and use of these global book values in its undertaking.[369] The Commission notes that these global books, while a useful source of information, may also have other purposes within a global organisation, which may or may not yield efficient prices.

The Commission considers that given these arrangements, the European benchmark prices used in the WIK Model may likely overstate the cost of equipment that Australian MNOs may incur given the advantages arising from global purchasing arrangements (notwithstanding the possibility of pricing between Australian subsidiaries and their global groups which may distort the prices which equipment is sold onshore to Australian MNOs).

While these comments are made directly in relation to Hutchison, Optus and Vodafone, the Commission understands that Telstra can command equally significant bargaining power as the single largest fixed-line and mobile-network (integrated) operator in Australia.

The Commission considers that the question of equipment prices is largely an empirical one that is easily verifiable by reference to an MNO's own equipment prices or supplier prices. Despite protestations about the inappropriateness of the use of European Benchmarks, no interested party has provided evidence that the equipment costs used in the WIK Model are inappropriate in an Australian context or diverge materially from the equipment costs incurred.

Further, the Commission has previously invited MNOs to provide any non-confidential information about relevant equipment prices, which could be in the form of, for example, global price lists from suppliers (which does not reflect any commercial-in-confidence material).

That said, the Commission notes that Vodafone has referenced three European regulators and prices used in cost models in the United Kingdom, the Netherlands and Sweden.[370] The Commission considers that the analysis proffered by Vodafone, while partial and selective, is nonetheless instructive, in that there does not seem to be any particular bias in the equipment prices used in the WIK Model; equipment prices are both higher and lower across different types of equipment except, as expected, for the United Kingdom where almost all the prices for equipment are higher than is used in the WIK Model. The equipment prices used in the Ofcom (United Kingdom) model

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[369] ACCC, *Assessment of Vodafone's Mobile Terminating Access Service (MTAS) Undertaking, Final Decision, Public Version*, (*Vodafone Undertaking Decision*), March 2006, pp. 46-47. The Commission also notes Vodafone's submission on the Commission's draft decision to reject its undertaking that: 'Given Vodafone Group's global scale, it would be expected that Vodafone's pricing for equipment would be lower than the average of what might be assumed in a generic Australian bottom up model' – see Vodafone Australia Limited, *Submission to the Australian Competition and Consumer Commission – Response to the Draft Decision on Vodafone's MTAS Undertaking (public version)*, p. 32.

[370] Vodafone submission, p. 21.

are also generally higher than those used in the Swedish and the Netherlands models. Notwithstanding the competitive nature of the global equipment market, these data confirm that the United Kingdom may not be an appropriate efficient cost benchmark in isolation for sourcing equipment prices as it is a high-priced jurisdiction (see discussion below on site values).[371] If, as some interested parties submitted, the WIK Model was aggressive in approach[372] then one would expect that the WIK Model equipment prices would be lower across all the equipment classes and particularly the highest priced equipment. This is not the case.

The Commission also notes that in Vodafone's submission, it discusses how equipment prices (which Vodafone terms interchangeably as 'asset prices' and CAPEX) in the Netherlands cost model is lower than in the Australian model due to the geographical features of the Netherlands.[373] Optus likewise submits that international benchmarks used by WIK for equipment prices are determined in large part by local factors such as land prices and labour costs.[374] However, both of these submissions fail to recognise that equipment prices have nothing to do with geographical features of a country.

The Commission considers that in the absence of benchmark Australian data the European benchmarks used in the WIK Model provide a reasonable approach to estimating equipment prices for an Australian in the absence of other data. Even though the data submitted by Vodafone from overseas jurisdictions may be selective, the equipment price information from these sources does not suggest an inherent bias in equipment prices used in the WIK Model.

Consequently, the Commission considers that the equipment prices that inform the productive network asset values used in the WIK Model are reasonable in the Australian market context.

Site values

The site values used in the WIK Model incorporate land and construction costs derived from Australian and European data. As with equipment prices, the Commission considers that Vodafone's submission on site values demonstrates that there does not appear to be any particular bias in the site values used in the WIK Model: the values for macrocell, microcell and picocell sites are higher than the cost figures submitted by Vodafone for both the Netherlands and Sweden, but lower than for the United Kingdom.

Land costs comprise a substantial component of site values, particularly for macrocells. The average land values per hectare in Australia's urban areas is $3,178,855[375] as at the December quarter 2006 compared to $6,885,164[376] for the

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[371] See also: See World Bank data on purchasing power parity at: http://devdata.worldbank.org/wdi2006/contents/Table4_14.htm, viewed on 17 May 2007; and International Monetary Fund data on purchasing power parity available at: http://imf.org/external/pubs/ft/weo/2007/01/data/weoselgr.aspx, viewed on 17 May 2007.

[372] Optus submission, p. 6.

[373] Vodafone submission, p. 21.

[374] Optus submission, p. 31.

[375] Calculated average of 2006 urban land prices per square metre block converted to hectares. See Housing Industry Association of Australia data on land prices available at: http://hia.com.au/Latest%20News/Article.aspx?CID=&RID=%7B42CB0DD2-F51C-4278-89F8-

United Kingdom (excluding inner London, where it is even higher) as at July 2006. Similarly, the average rural land value per hectare in Australia is approximately $2,906[377], compared to approximately $14,832[378] for the United Kingdom. While these precise land values are not explicitly adopted in the WIK Model, they nevertheless indicate that higher site costs in the UK can be explained by the material difference in the cost of land between Australia and the UK.

These relative higher costs in the UK compared with Australia are also referable to purchasing power party data.[379]

The analysis for land values could also be used to support the relative value of construction and labour costs as raised in Optus's and Vodafone's submissions.[380]

Consequently, the Commission considers that the site values used in the WIK Model are reasonable in the Australian market context.

Working capital

The Commission considers that there is broad consensus on the WIK Model approach to working capital as only one party has raised concerns on this issue.

The WIK Model assumes that an efficient operator would not face a demand for working capital because it would organise its business processes such that there are no timing differences between cash payments for inputs and cash receipts for output on account of current operations.[381] That said, working capital is accounted for in the WIK Model as a component of organisational-level costs.

Given that the WIK Model provides for a 10 per cent mark-up for common organisational-level costs (see the WIK Model Annexure A.2.4), the Commission considers that this approach is reasonable to account for the relevant amount of working capital.

Tilted annuity

The Commission notes Optus's submission that the tilted annuity approach has been incorrectly applied in the WIK Model as it has incorporated an output tilt as well as a

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6A59809FCEF1%7D&yearmonth=200607&title=July%202006&AID=%7B717AA037-F30B-4FDB-B988-20CF5DE1E204%7D, viewed on 17 May 2007; and http://economics.hia.com.au/media/HIA%20Land%20Monitor%20-%20December%202006%20Quarter.pdf, viewed on 17 May 2007.

[376] Valuation Office Agency, *Property Market Report – July 2006*, p. 33. Calculated on an average of recorded prices for UK small sites per hectare (excluding figures for inner London and average for England and Wales) and based on exchange rate of AU$1 to 0.42 GBP.

[377] Calculated based on average of grazing and wheat properties reported at: http://www.lands.nsw.gov.au/valuation/nsw_land_values, viewed on 17 May 2007.

[378] Valuation Office Agency, *Property Market Report – July 2006*, p. 18. Calculated on an average of recorded prices for arable, dairy, mixed and hilly land per hectare (excluding the average figure for England and Wales) and based on exchange rate of AU$1 to 0.42 GBP.

[379] See World Bank data on purchasing power parity at: http://devdata.worldbank.org/wdi2006/contents/Table4_14.htm, viewed on 17 May 2007; and International Monetary Fund data on purchasing power parity available at: http://imf.org/external/pubs/ft/weo/2007/01/data/weoselgr.aspx, viewed on 17 May 2007.

[380] Optus submission, p. 31; and Vodafone submission pp. 20-23

[381] WIK, *WIK Report*, p. 44.

price tilt into its calculations.[382] The Commission refers interested parties to the *WIK Report* for details as to the reasoning for the application of an output tilt in the annuity formula.[383] The basis for determining the value for g is discussed below.

In relation to a value for p, the Commission considers that over time, factoring in the impact of technology and improved efficiencies in manufacturing processes, the price of manufactured goods such as telecommunications equipment are decreasing and not increasing. The value for p in the WIK Model reflects these trends and is supported by Australian empirical data derived from the ABS.[384]

The Commission also notes Optus's submission that the model does not adequately take into account network planning.[385] Optus makes this submission in relation to the growth in demand for services over time which is reflected in the value g in the WIK Model. The Commission recognises that MNOs are in the best position to provide information about expected demand and what value is appropriate for g. Given that population growth rates have been at historically low values,[386] the Commission considers that a much more referable source of information for the value of g reflects the growth of mobile services in particular the growth of voice traffic in recent years. The Commission notes that in this respect that the traffic growth of voice services in recent years has been in excess of 10 per cent for both Optus[387] and Telstra.[388]

The Commission considers that based on this information that the use of a five per cent growth factor per annum or a value of five for g in the tilted annuity formula is appropriate and reasonable given the growth in traffic services for voice services. The Commission also notes that the 2G network also supports some data services, which have been growing at an even faster rate than voice services, further verifying the reasonable value of g used in the WIK Model.

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[382] Optus submission, p. 32.

[383] WIK, *WIK Report*, pp. 35-39.

[384] ABS, *Australian Demographic Statistics*, (Catalogue 3101), December 2005, p. 13.

[385] Optus submission, pp. 32-33.

[386] The ABS reports that Australia's population has grown at approximately 1.2 to 1.3 per cent per year since the early 1990s. Furthermore, the growth rate is projected to decline to approximately 1 per cent over the next ten years. See: Australian Bureau of Statistics (ABS), *Australian Demographic Statistics*, (Catalogue 3101), December 2005, pp. 32-33.

[387] Singapore Telecommunications Limited and Subsidiary Companies, *Management Discussion and Analysis of Financial Condition, Results of Operations and Cash Flows for the Fourth Quarter and Financial Year Ended 31 March 2007*, p. 44; and Singapore Telecommunications Limited and Subsidiary Companies, *Management Discussion and Analysis of Financial Condition, Results of Operations and Cash Flows for the Fourth Quarter and Financial Year Ended 31 March 2006*, p. 43.

[388] Telstra Corporation Limited and Controlled Entities, *Half-Year Report for the Half-Year Ended 31 December 2006*, p. 10; and Telstra Corporation Limited and Controlled Entities, *Half-Year Report for the Half-Year Ended 31 December 2005*, p. 8.

A.2.2. Weighted Average Cost of Capital

A.2.2.1. WIK Model approach

The WIK Model adopts a 'vanilla' form of the WACC in which the firm's return on equity capital and the return on debt capital are weighted by their shares in the capital structure and summed.

The WIK Model uses international benchmarks for WACC parameters as outlined below.

Table A.2-2: Parameter values for the WACC

Parameter	Values
Risk-free interest rate (r_f) (%)	4.434
Market risk premium (r_m) (%)	4.5
Equity beta (β_e)	1.32
Market debt share (D) (%)	17.2
Debt premium (%)	1.02
Debt issuance cost (per cent)	0.083

Source: WIK, *WIK Report*, pp. 31 and 35.

The WIK Model calculates a vanilla WACC of 9.53 per cent and a WACC before taxes of 11.68 per cent.

The *WIK Report* states that these values reflect the upper-bound of a range of estimates drawn from international benchmarks and extensive studies.[389]

A.2.2.2. Parties' views

Access Economics for the CCC, Optus, Telstra and Vodafone made submissions on the WACC. Access Economics for the CCC submits that WIK's central estimate of the WACC of 11.68 per cent is near the centre of the range of estimates calculated by Access Economics which runs from around 10 per cent to 14 per cent[390] and that 'the impact of changes in the estimated WACC of such a scale on the TSLRIC+ based MTAS would be minimal.'[391]

Optus submits that it has not given substantial consideration to an appropriate value for the WACC at this stage, but notes:

- it appears low compared to values used in other jurisdictions; and

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[389] WIK, *WIK Report*, pp. 31-35.

[390] Access Economics submission for the CCC, *Response to the ACCC MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009, Submission by Access Economics Pty Limited for the Competitive Carriers' Coalition (CCC)*, (Access Economics Submission for the CCC), 16 March 2007, p. 2.

[391] ibid.

- the Tribunal concluded that Vodafone's WACC was a reasonable figure.[392]

Vodafone submits that the WIK Model 'under-estimates the WACC, due to the use of unrealistically low WACC elements, including the risk-free rate and the market risk premium.'[393]

Capital Access Pricing Model

Telstra submits that using an international CAPM means that:

- the risk-free rate is based on an assumed proxy for the 'global' risk-free rate, as is the cost of raising corporate debt which is used to determine the debt margin;

- the market risk premium is estimated by comparing the global risk-free rate with the return on a global share market index; and

- beta is estimated by regressing the return on the firm's shares against the returns on that same global share market index.[394]

Telstra submits that the international CAPM is difficult to implement in practice and there is no consensus view as to which version to apply. Telstra notes that for these reasons the international CAPM is not widely used[395] and that:

> it is not clear which method has been adopted by WIK. For example, the single factor ICAPM has been shown to not work well due to the concerns with incorporating foreign exchange (FX) issues, which more complex models include. The key point is that we do not have any idea of the approach that has been adopted here or how the methodological concerns of the ICAPM (particularly relating to uncertainty over parameters and FX issues) have been addressed.[396]

Vodafone submits that the market risk premium assumed by WIK underestimates the market risk premium that should be applied to the mobile industry.[397]

Vodafone notes that the Commission accepted the use of the 10-year Australian government bond rate in determining the risk-free interest rate for the recent Telstra PSTN undertaking and that this approach was adopted by Vodafone in its 2005-06 RAF Report. Vodafone notes that this rate equates to 5.65 per cent and that the 4.34 per cent rate adopted by WIK underestimates the rate that has been accepted as reasonable by the Commission.[398]

Vodafone subsequently submits that an efficient new entrant would face the same cost of capital as those companies currently engaged in supplying mobile services in Australia.[399]

Vodafone submits that inputting a WACC value as used in its 2005-06 RAF Report, results in an increase in the price [sic] of the MTAS of around 0.5 cpm.[400]

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[392] Optus submission, p. 34.

[393] Vodafone submission, p. 19.

[394] Telstra submission, p. 24.

[395] ibid.

[396] ibid.., pp. 24-25.

[397] Vodafone submission, p. 19.

[398] ibid.

[399] ibid.

Risk free rate

Access Economics for the CCC submits that the risk-free rate should be based on a measure of the Australian risk-free rate, taken to be rates on ten-year Commonwealth bonds or weighted average of world rates (possibly along the lines of the WIK calculations), hedged back into Australian dollars. It also submits that the most recently quoted interest rate for a ten-year Australian government bond (obtained from Bloomberg on 15th March 2007) is 5.7 per cent.[401]

Telstra submits that WIK's long historical averaging period for the risk-free rate (eight year) based on a hypothetical risk free security comprising UK, US, Singapore and Australian government bonds is unprecedented and unsupported by finance theory.[402]

Telstra submits that the risk-free rate should be based on standard regulatory practice, 'which is a short-term average of the ten-year Commonwealth Government bond rate.'[403]

Market risk premium

Access Economics for the CCC submits that WIK's assumptions can be defended even though the market risk premium is lower than that generally adopted by regulators.[404]

Telstra submits that the market risk premium should also be respecified based on Australian market data. The long-term estimate for the market risk premium ranges between 6 per cent and 8 per cent and further the value of 6 per cent has become regulatory precedent.[405]

Equity Beta

Access Economics for the CCC submits that the estimates for the equity beta may be at the upper end of reasonable estimates and its estimate for the debt share may be at the lower end of reasonable estimates.[406] But it notes that there is a degree of uncertainty that makes it difficult to provide a definitive number.[407]

Telstra submits that details of the methodology that has been applied should be provided. Telstra also notes that WIK uses the effective tax rate for the de-levering of equity betas. Telstra submits that 'this is despite some of those rates looking decidedly low.' Telstra submits that 'it is wrong to bias the calculation of betas by including once-off or unusual tax effects as the investor is interested in the likely tax burden over the investment horizon and this should educate the tax rate relevant in de-levering.'[408]

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[400] ibid.

[401] Access Economics submission for the CCC, p. 26.

[402] Telstra submission, p. 27.

[403] ibid., p. 28.

[404] Access Economics submission for the CCC, p. 2.

[405] Telstra submission, p. 28.

[406] ibid.

[407] ibid.

[408] ibid. p. 29.

Debt Share

Access Economics for the CCC submits that the figure for the debt share 'is simply an average of estimates used previously by overseas regulatory authorities and tends to be a little higher than the gearing levels observed for MNOs in the international marketplace.'[409]

It also submits that a range for the WACC of between 10 per cent and 14 per cent is quite reasonable and that the impact of changes in the estimated WACC of such a scale on the TSLRIC+-based MTAS price would be minimal.[410]

Optus submits that it has not given substantial consideration to an appropriate value for the WACC at this stage. Optus submits, however that the WACC presented in the model appears low compared to values used in other jurisdictions which range from 13.5 per cent to 13.7 per cent.[411] Optus further submits that the Tribunal concluded that Vodafone's WACC was a reasonable figure.[412]

Telstra submits that 'WIK's assumption of 17.2 per cent implies an unrealistic level of precision that cannot be prescribed.'[413]

A.2.2.3.   Commission's view

Access Economics for the CCC and Telstra provided the only comprehensive submission on WACC and its component parts. Access Economics for the CCC concludes that the WACC of 11.68 per cent is for the most part reasonable, but that it has concerns with the risk-free rate and the uncertainty of all estimates.[414] Optus submits that it has not closely considered this matter but observes ranges of 13.5 per cent to 13.7 per cent in other regulatory decisions globally, indicating that it considers a WACC of 11.68 per cent as presented in the WIK Model as low.[415] The Commission also notes both Vodafone's and Optus's submissions that the WACC used in Vodafone's Undertaking was affirmed as reasonable by the Tribunal.[416]

Before concluding on the appropriateness of the overall WACC that it considers is appropriate, the Commission will discuss relevant component parts of the WACC as common to most parties' submissions:

1.   Risk-free rate

2.   Market risk premium

3.   Equity beta and

4.   Gearing level

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[409]   Access Economics submission for the CCC, p. 28.

[410]   ibid., p. 28.

[411]   Optus submission, p. 34.

[412]   ibid.

[413]   Telstra submission, p. 30.

[414]   Access Economics submission for the CCC, p. 28.

[415]   Optus submission, p. 34.

[416]   Optus submission, p. 34; and Vodafone's submission, p. 19.

Risk free rate

The WIK Model uses a risk-free rate of 4.43 per cent. Parties have submitted that the approach used in the WIK Model is 'unorthodox' and is not consistent with the Commission's usual approach to WACC. There is general consensus that the ten-year Commonwealth bond rate should be adopted as an appropriate reference point. There is a difference of view as to whether this rate should be averaged over time or should reflect the most current quoted rate (as a measure of investors' current expectations for the long term risk-free rate).[417]

The Commission's view is that the WIK Model's approach provides an alternative and novel basis to consider the interest rates used. This is particularly the case if the global financial market is a source of funds for mobile network operators and other telecommunication service providers rather than Australian-sourced finance. However, in keeping with previous regulatory decisions the Commission considers that reference to an Australian interest rate such as the Commonwealth ten-year bond rate is appropriate.

In this respect a range of rates from 5.5 per cent to 5.7 per cent are appropriate reference points for a risk-free rate.

Market risk premium

WIK has adopted a market risk premium of 4.5 per cent. Access Economics submits that using a global estimate provides for lower estimates than those generated in an Australian context, but it acknowledges that a reasonable range is between three per cent to seven per cent.[418] Other submissions provided for ranges between six per cent and eight per cent, with regulatory decisions or precedent being set at six per cent.[419]

The Commission notes that the regulatory decisions referenced relate to services provided by fixed-line networks which may or may not be a relevant reference point to services such as the MTAS provided on mobile networks. The Commission considers that with reference to global experience a market risk premium of less than six per cent may be appropriate and that WIK has selected a market risk premium citing a study which Access Economics indicates is at the arithmetic mean.[420] Other submissions indicated that a value of six per cent for the market risk premium is the lower bound of a reasonable range.[421]

The Commission considers that a market risk premium of around six per cent is reasonable.

Equity beta

The WIK Model uses an equity beta of 1.32 from a range of equity betas for global mobile telecommunications companies. The Commission notes that the WACC is highly sensitive to equity and asset beta values.

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[417] Telstra submission, p. 28.

[418] Access Economics submission for the CCC, p. 27.

[419] Telstra submission, p. 28; and Vodafone submission, p. 19.

[420] Access Economics submission for the CCC, p. 26.

[421] Telstra submission, p. 28.

An alternative equity beta of 1.10 (upper bound of the range) is provided by Access Economics as appropriate for the telecommunications industry.[422] This provides for a large range of equity betas and differences in position about what equity beta is appropriate.

The Commission notes that the equity and asset betas used in its fixed-line decisions may not be an appropriate reference point for equity betas for mobile services such as the MTAS, due to the nature of the service and the relative systematic risk of the entity under assessment.

The Commission considers that WIK has taken a reasonable approach to the equity beta used in the model. The Commission is of the view that an equity beta somewhere in the range of 1.10 to 1.32 may be appropriate.

Gearing level

WIK adopts a gearing level of 17.2 per cent based on the experience of overseas regulators. Interested parties have submitted that notwithstanding the level of precision, which may be inappropriate,[423] this level of gearing may be too low in an Australian context.[424]

The Commission has consistently used a gearing ratio of 40 per cent in its decisions on fixed-line services.[425] The Commission considers that this is a reasonable assumption.

Overall WACC outcome

The Commission considers that there are many variables which influence the value of the WACC and that these values are themselves subjective and prone to a level of imprecision in estimation. The main discrepancy identified by interested parties in their submissions was the value of the equity beta. The Commission considers that given the large discrepancy in equity betas, which is subject to a level of imprecision in estimation, that it need not be definitive in its approach to a point estimate for WACC.

Further, the Commission notes that there is a variety of debt structures relevant for Australian MNOs, which may be difficult to discern from publicly-reported data by MNOs particularly with the increasing sophistication of corporate structures and debt and equity instruments.

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[422]   Access Economics submission for the CCC, p. 28.

[423]   Telstra submission, p. 30.

[424]   Access Economics submission for the CCC, p. 28

[425]   ACCC, *Assessment of Telstra's ULLS Monthly Charge Undertaking – Final Decision (Public Version)*, August 2006, p. 102; ACCC, *Assessment of Telstra's PSTN and LCS Undertaking – Final Decision (Public Version)*, 29 November 2006, p. 77.

Table A.2-3: WACC assumptions

Input Parameter	Range of reasonable values derived from previous Regulatory Decision Parameter values and WIK sources
Gearing	40 per cent
Risk free rate	5.5 per cent to 5.7 per cent
Market risk premium	6 per cent
Equity beta	1.1 to 1.3
Effective tax rate	20 per cent
Debt premium	1.02 per cent
Debt issuance costs	0.083 per cent

If the input parameters developed in earlier regulatory decisions are considered as reasonable along with other parameters submitted by interested parties, as outlined above then a WACC of between 10.7 per cent and 11.8 per cent is estimated. In this respect the Commission notes that, the WACC of 11.68 per cent used in the WIK Model is at the higher end of the WACC range estimated using the Australian-contextualised parameters. Refer to Appendix D for a complete list of parameters and outcomes informing this WACC range.

In the circumstances when a specific MNO's debt structure is not being assessed, the Commission considers it is prudent in the formulation of price-related terms and conditions for the draft pricing principles determination to provide a more conservative approach to WACC that can account for different gearing levels and betas.

As a result, the Commission considers, that while the WACC of 11.68 is reasonable and even appropriate in an Australian context, it has discretion as to the WACC it can apply in a policy context and considers that 13.0 per cent is a reasonable approach to parameterisation of the WACC in the WIK Model.

A.2.3. Operating expenditure

A.2.3.1.   WIK Model approach

Operating expense (OPEX) covers the operation and maintenance costs of a whole network and its network elements.[426] OPEX typically includes labour costs, leased facilities and other recurring annual costs relating to operation and maintenance. In a bottom-up model OPEX is commonly expressed as a percentage mark-up on investment value of network elements.

The *WIK Report* states that the mark-ups for OPEX are applied to the investment values for productive network and network support assets to derive the relevant OPEX relating to those assets.[427]

In the WIK Model the OPEX is a percentage mark-up on the investment of productive network and network support assets. As indicated in Annex A of the *WIK Report*, these mark-ups are in the range of 5 per cent to 30 per cent but are mostly 11 per cent.
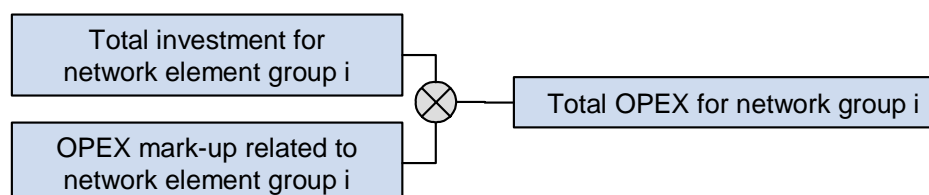
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[426] WIK, *WIK Report*, p. 88.

[427] ibid.

These mark-ups 'are based on information from other regulatory proceedings in bottom-up modelling of mobile and fixed networks.'[428]

The WIK Model calculates OPEX using an approach illustrated in the figure below.

Figure A.2-2: Calculation of OPEX as a mark-up on investment

Groups of network elements: BTSs, BSCs, MSCs; BTS-BSC links, BSC-MSC links, MSC-MSC links; SMSC, HLR

Source: WIK, *WIK Report*, p. 88.

A.2.3.2.   Parties' views

Optus submits that WIK allocates the licence fee of $1.944 million to network services (one third) and to retail (two thirds). Optus considers that this allocation is inappropriate. Optus submits that a MNO would not be able to operate a network if it did not pay a licence fee, but it would be able to offer retail services, which do not depend on possession of a network licence. Consequently, Optus submits that the entire licence fee should be allocated to network services.[429]

Optus also submits that little justification is given for the OPEX mark-ups used to determine the operational expenditure and common costs in the model as these are estimates. Optus considers that these mark-ups should incorporate information from the actual experience of MNOs in Australia.[430] Vodafone submits that the OPEX mark-ups underestimate the costs incurred by MNOs in Australia. In addition, Vodafone submits that WIK 'also under-estimates the average mark-ups adopted in European cost models – except for SMSC-related OPEX.'[431] In this regard, Vodafone submits that its 2005-06 RAF data indicate that its network-related OPEX was higher than the percentage mark-up used in the WIK Model and that adjusting the OPEX mark-up accordingly increases the cost of the MTAS by around 9 cpm.[432]

A.2.3.3.   Commission's view

The Commission notes that OPEX refers to recurring annual costs relating to operation and maintenance of a whole network and its network elements.

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[428] ibid., p. 116.

[429] Optus submission, p. 35.

[430] ibid., p. 34.

[431] Vodafone submission, p. 26.

[432] ibid., p. 28.

In this regard, the Commission notes Vodafone's submission that its own proposed OPEX mark-up is not too high as 'it is reasonably expected that an efficient new entrant would not be able to secure OPEX expenditure [sic] at a lower level'[433] and that adjusting the OPEX accordingly will increase the cost of the MTAS by approximately nine cpm.

The RAF reporting regime requires Optus, Telstra and Vodafone to report in a capital adjusted profit and loss statement relevant revenue and expenses for different access services.

The relevant reporting statement for the MTAS is the External Wholesale GSM origination and termination service.

This current reporting structure in itself causes a problem because different MNOs may not only report termination revenues and expenses for GSM but in some cases may also include: termination costs relevant for 3G networks; termination costs that do not relate to a wholesale service; and activities of resellers which is not a relevant activity to report against a wholesale service such as the MTAS.

In this respect any information about GSM termination costs submitted by MNOs based on the RAF data requires corroborating information for these submissions to provide a meaningful contribution as input into the relevant costs for supplying the MTAS. The Commission is cognisant that in the past it was able to more reliably use the information contained in the External Wholesale GSM origination and termination service, but since the end of 2005 and particularly from 2006, this has become increasingly difficult as the financial data in this account may not necessarily relate to a GSM termination service.

That said it is instructive to consider how limited these data provided by MNOs can be.

The capital adjusted profit and loss statement for External Wholesale GSM origination and termination service comprises three broad cost categories:

1. Organisational costs include general administration, information technology, accommodation and property, other non-communications assets costs, other organisational costs and other product expenses;

2. Product and Customer costs comprise installation, marketing, sales, operator services, customer support, billing, bad debt expenses, interconnection costs, international settlement costs, USO payments and other product expenses; and

3. Network costs typically include all costs associated with network assets of which the single most important equipment is mobile and terminal equipment.

Within the 'network costs' category costs can be further disaggregated for each class of network asset reported into: depreciation (which represents an annualised cost of the asset excluding the cost of capital); maintenance costs; and other expenses.

The Commission, even without the inclusion of the cost of capital, observes that, as would be expected, depreciation represents the most significant cost within the network cost category reported under the RAF for all network operators.

While it is difficult to discern with a level of precision what costs Vodafone reports under the RAF against network costs, the Commission has assumed, based on its

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[433] ibid., pp. 27-28.

submission, that Vodafone considers there is some level of comparability between the 'network costs' it reports under the RAF and OPEX as defined by WIK in the WIK Model. The Commission does not disagree that a comparison may be warranted and that this comparison may provide an indication of the actual operating expenses as an upper-bound value for the relevant level of OPEX in providing the MTAS.

However, the Commission does not consider that the value of operating expenses for any MNO actually incurred and reported under the RAF is necessarily the cost benchmark it seeks to employ in a regulatory context or indeed as an efficient cost estimate.

With this background, and returning to Vodafone's submission about the value of operating expenses it incurs as reported under the RAF, the Commission has serious misgivings about this submission and the reliance it should place on this information. In stating this, the Commission observes that it is difficult, without detailed descriptions of what is contained in each asset category, that what is reported under 'network costs' as depreciation is actually depreciation and likewise what is reported as maintenance and other expenses is of the nature maintenance and other expenses. In particular, the Commission has assumed without further detailed information that the cost descriptions contained in the RAF report relate to the costs reported, and in particular that depreciation is as stated an annualised cost of the asset rather than an operating cost associated with the maintenance or operation of that asset as defined in the WIK Model. For reference, the *WIK Report* states that OPEX 'covers the operation and maintenance costs of the whole network and its network elements. Costs which are related to operation and maintenance are typically labour costs, leased facilities and other recurring annual costs.'[434] The *WIK Report* distinguishes OPEX (maintenance and operational costs) from depreciation (a part of the annual costs or owning a network).

The Commission has reviewed the OPEX RAF data as submitted by Vodafone and is concerned as to whether these data have accurately portrayed the value of Vodafone's operating costs actually incurred or reported it incurred under the RAF.

Again, given the caveats provided above about the lack of precision and detail in respect to RAF reporting and details provided in the Regulatory Accounting Procedure Manual (RAPM), Vodafone seems to have provided a value for OPEX that is larger than it reports under the RAF for the purposes of its submissions for the WIK Model. The Commission considers that, based on the data before it, the value submitted by Vodafone as its OPEX under RAF is exaggerated, and notwithstanding potential definitional issues that may exist, the Commission does not consider that it is appropriate to classify and represent depreciation (in the Commissions experience the largest network cost) as an operating expense for the purposes of Vodafone's WIK Model submission, as Vodafone seems to do. The Commission concedes that this could be a definitional issue, but it is unlikely that all the costs represented as depreciation under network assets could be considered OPEX.

Further, the operating expenses associated with the supply of the MTAS of $51.2 million generated by the WIK Model under the Vodafone scenario as outlined in Appendix E is much higher than the actual operating costs (defined by the Commission as maintenance and other operating expenses reported in Vodafone's

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[434] WIK, *WIK Report*, p. 88.

2005-06 RAF under 'network costs') incurred by Vodafone under GSM Termination/Origination activity in the External Wholesale segment.

Based on examination of this corroborating information, the Commission cannot rely on the accuracy of Vodafone's submission that its OPEX as derived from its RAF data for 2005-06 would increase the cost of the supply of the MTAS by 9 cpm. In isolation and with the information before it the Commission would consider that rather than any increment, that a decrement would be more relevant to reflect the actual operating expenditure incurred by Vodafone in supplying the MTAS.

The Commission notes that the increment of 9 cpm relevant to the OPEX as submitted by Vodafone represents the single largest increment that Vodafone applies to the WIK Model cost estimate. The Commission considers given Vodafone's actual cost of supplying the MTAS as derived from its own RAF data for 2005-06 compared with inflated value represented as operating expenses from this same source to support the 9 cpm increment proposed by Vodafone, is not reliable in contributing to the 'effect of the individual corrections to the WIK Model' that results in an additional increment of 37.5 cpm.

Further, the effect of the correction for OPEX of 9 cpm proposed by Vodafone as an increment to cost estimate represents double counting as Vodafone does not subtract any value for the OPEX that is contained in the estimate of 7.3 cpm by the WIK Model.

In addition, as outlined in other sections, Vodafone has reduced the mobile penetration and coverage assumptions from 96 per cent to 92 per cent of the total population (which impacts the relative cpm by reducing the annual traffic minutes estimated in the model) to arrive at this increment.

The comparison of actual costs incurred by Vodafone and the increments derived from its manipulation of the WIK Model, also bring to light the multiplicative impacts that Vodafone has sought to maximise because of the interdependent relationship between OPEX as a percentage of the value of network assets. This raises further doubt about the robustness of Vodafone's submission about the value of, and incremental impact associated with, OPEX derived from the WIK Model, if increments for factors such as equipment prices and asset lives are not considered reasonable.

The Commission also notes submissions from Optus that the OPEX mark-up should reflect 'the actual experience of MNOs in Australia.'[435] The Commission also notes Vodafone's submission that 'the use of the European average would still under-estimate the OPEX cost any network would incur in Australia.'[436] At least in relation to one MNO, as already outlined above, the actual OPEX incurred by that MNO is much lower than the OPEX estimated in the model. The Commission reiterates a more general proposition that the OPEX incurred by a hypothetical efficient MNO may not reflect the actual OPEX costs incurred by an MNO. As such, the OPEX in the WIK Model will reflect efficient and reasonable OPEX costs and not OPEX that relates to historical network planning and investment decisions of MNOs.

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[435] Optus submission, p. 34.

[436] Vodafone submission, p. 27.

The Commission considers that the OPEX mark-ups assumed in the WIK Model appear to over-estimate the OPEX incurred by Australian MNOs, rather than underestimate it. As a consequence, the estimated amount for OPEX in the WIK Model is reasonable in an Australian context.

In addition, the Commission notes that Optus considers that the entire carrier licence fee of $1.944 million that WIK allocated to network services (one third) and to retail (two thirds) should be all allocated to network services.[437] The Commission considers that the approach adopted in the WIK Model represents a reasonable approach to the allocation of licence fees, as the carrier licence fee is related to the entire mobile business of an MNO and should therefore be treated in the same way as common organisational-level costs. The Commission notes the *WIK Report* states that:

> … the licence fee of A$1.944 million is calculated as the average of the fees of Vodafone and Optus in 2006 which should approximate the relevant fee payable by an MNO with a 25 per cent market share. As a result, one third of the licence fee of the hypothetical operator is allocated to network services consistent with the relative proportion of network costs to total costs of an MNO…The licence fee and USL contributions add an additional A$5.5 million in common organisational-level costs.[438]

A.2.4. Organisational-level costs

A.2.4.1. WIK Model approach

Common organisational-level costs are not incremental to a particular service in the sense that they are not avoided if the firm does not produce the service. The *WIK Report* states that common organisational-level costs include such costs as management, administration, and human resources.[439] The *WIK Report* notes that very few costs are common to several or all services in a mobile telecommunications network, but that where common costs exist they need to be recovered across all areas of the MNO's business activities.

The WIK Model uses an EPMU approach to allocate common costs in proportion to the incremental costs of each business activity or service. The TSLRIC of a particular service is then increased by a certain percentage mark-up to cover business overheads.

The WIK Model calculates common organisational-level costs as a percentage mark-up on the total network cost (annualised CAPEX and OPEX). A pre-defined fixed amount of common organisational-level costs is then added to capture licence and other regulatory fees.

Table A.2-4: Mark-ups for common organisational-level cost proposed by WIK

| Mark-up for common organisational-level cost	Value
Annual common organisational-level cost	$5,500,000
Mark-up for common organisational-level cost	10 per cent

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[437] Optus submission, p. 35.

[438] WIK, *WIK Report*, p. 117.

[439] ibid., p. 88.

The WIK Model calculates common organisational-level costs using an EPMU approach as illustrated in the figure below.

Figure A.2-3: Consideration of common organisational-level costs
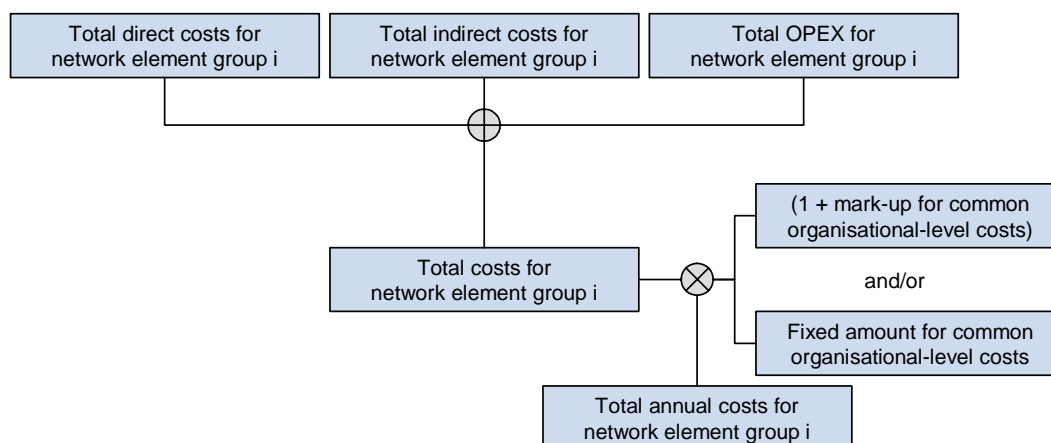
Source: WIK, *WIK Report*, p. 89.

A.2.4.2.   Parties' views

Telstra submits that common costs need to be recovered and allocated in the price for the supply of the MTAS and that this was recognised by the Tribunal in its assessment of the *Optus Undertaking Decision*.[440]

Vodafone submits that the 10 per cent of annualised CAPEX for common organisational costs 'substantially underestimates the cost of operating a mobile network in Australia' and that international studies are unlikely to be of benefit given country-specific characteristics such as population and traffic distribution, distance, labour force, and the wage rate.[441] In addition, Vodafone submits that the most rigorous approach to determining the operating costs of a new entrant is to analyse the common costs of mobile-only operators. An efficient new entrant should incur a similar percentage of common costs. It is important to note that Vodafone's market size (around 17 per cent share) indicates that it is unlikely to be incurring significant diminishing returns to scale and management economies of scale may result in lower OPEX percentages for larger networks, such scale does not apply to common organisational costs.[442]

Vodafone subsequently submits that using its RAF reported organisational-level common costs will increase the MTAS by around 5 cpm.[443]

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[440]   Telstra submission, p. 31.

[441]   Vodafone submission, p. 28.

[442]   ibid.

[443]   ibid.

A.2.4.3.   Commission's view

The Commission has outlined that when determining an appropriate cost for the purposes of the pricing principle, TSLRIC should be augmented by a mark-up (or '+') to enable a contribution toward the recovery of organisational-level common costs using the so-called 'equi-proportionate mark-up' (EPMU) rule as discussed in section 2.5.

The Commission notes Vodafone's submission about the impact of using its organisational-level common costs to increase the MTAS by around 5 cpm.[444]

Firstly, in making its submission about the incremental increase associated with common organisational costs to reflect the value of reported in its RAF data (as with other effects for the individual corrections to the WIK Model estimate),[445] Vodafone has not subtracted the relevant value or equivalent cpm for organisational level costs that is originally estimated to represent organisational level costs. In this way, Vodafone double counts the costs and cpm value of common organisational costs and the increment of 5 cpm necessarily over estimates the value of the organisational-level costs relevant to supplying the MTAS as submitted by Vodafone.

Secondly, the Commission notes that the reliance on RAF data without corroborating evidence is problematic as outlined previously because:

- the WIK Model is concerned about estimating the cost of termination on 2G networks, and not 3G networks, Vodafone's RAPM does not provide sufficient detail about the nature of costs reported under the RAF as being solely related to its 2G network;

- Vodafone's RAPM provides limited or no detail about the nature of costs reported under the specific cost classifications of Organisation Costs and no disaggregation of these costs except broad cost pools for: General administration, IT, accommodation and property, other non-communications asset costs, and other organisational costs. In this way, the Commission is reluctant to rely on Vodafone's submission that it is comparing 'like with like' and that organisational costs as reported by Vodafone in its 2005-06 RAF report are consistent with the definition of organisational level costs relevant to the WIK Model; and

- Organisation costs, by their very nature relate to general cost pools which may or may not be directly allocated and attributable to the supply of the MTAS. The Commission is generally concerned about how MNOs may allocate organisational costs to the termination service and as part of a continual improvement process has been considering how to improve the allocation of these general cost pools using a more direct and referable allocation key. The Commission remains concerned about how these costs are allocated within the RAF reporting framework and the relevance of certain indirect allocation keys to allocate these cost pools and the concomitant incentives to load-up costs of this nature to access services such as the MTAS.

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[444] ibid.

[445] ibid., p. 29.

Without further corroborating information the Commission is not satisfied that the value for common organisational costs as submitted by Vodafone can be relied on.

Thirdly, Vodafone submits that correcting the organisational-level common costs parameter in the WIK Model increases the cost of supplying the MTAS by around 5 cpm. However, the Commission notes that the correction of 5 cpm for organisational-level common costs has been arrived at by making additional adjustments to other model parameters which contain errors. Any errors prevalent in these parameters have flowed through to network costs and OPEX will necessarily exaggerate the common operating cost mark-up. These errors include:

1. incorrect assumptions about the actual level of coverage and market penetration prevalent in Australia (which impacts the relative cpm by reducing the annual traffic minutes estimated in the model) (as discussed in the WIK Model Annexure A.3.1.3.1);

2. incorrect information about the busy-hour information (traffic distribution busy hour percentage and the number of busy days per year) which together result in an unrealistic estimated level of minutes of 13 billion per annum, when WIK estimated in the *WIK Report* that the total voice-equivalent minutes in 2004-05 for Australia were around 28 billion per annum[446] (as discussed in the WIK Model Annexure A.3.1);

3. incorrect information about the relevant asset life of software (as discussed in the WIK Model Annexure A.2.1.3);

4. incorrect information about Vodafone's actual level of OPEX incurred (as discussed in the WIK Model Annexure A.2.3.3);

5. incorrect information about site sharing (as discussed in the WIK Model Annexure A.2.5.3);

6. use of asset prices that may not necessarily be referable to efficient price benchmarks (as discussed in the WIK Model Annexure A.2.1.3); and

7. exaggeration of the network resilience impacts by changing the number of MSC sites not the number of MSC units (as a result of confusing number of MSC locations with units as discussed in the WIK Model Annexure A.1.1.3.4).

This has resulted in a cost increase which is attributable to cumulative, rather than incremental, adjustments to costs. The Commission consequently considers that the 5 cpm cost increase submitted by Vodafone cannot be solely attributed to an adjustment in organisational common-level costs that reflects a reasonable or efficient level of costs.

The Commission further notes that as indicated previously, even if an accurate comparison was possible, there may be some differences in the efficient cost estimate produced by the WIK Model for a hypothetical efficient operator and those incurred by Vodafone or other MNOs.

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[446] WIK, *WIK Report*, p. 107.

A.2.5. Site Sharing

A.2.5.1. WIK Model approach

This section explains the approach to site sharing and how site sharing affects the other elements in the WIK Model. In the non-integrated MNO scenarios of the WIK Model site sharing occurs at macrocell and microcell (BTS) sites and at repeater sites. The *WIK Report* states that BTS sites are often shared between several operators which has an impact on the relevant costs of the MTAS. This is particularly prevalent with respect of the shared 3G networks in Australia, but also common for 2G infrastructure. WIK assumes that sites include land, buildings and the tower. WIK designs the model to account for 'site sharing' by applying a factor to reduce the amount of investment required BTS site.

For BTS sites, the following site sharing assumptions are used: 50 per cent of Macrocell sites, 30 per cent of Microcell sites and no picocell sites are shared. If the reduction in the investment value for Macrocell sites and Microcell sites is assumed to be 40 per cent, this yields a net reduction in the investment value of 20 per cent and 12 per cent, respectively, for the relevant BTS site.[447]

The same approach is used for repeater sites such that 30 per cent of the repeater sites share 40 per cent sites with another MNO. The implied average sharing factor is 12 per cent for each repeater site.

BSC sites and MSC sites are not shared in the non-integrated MNO scenarios in the *WIK Report*.[448]

Any adjustments to site sharing will directly impact network investment which will then impact on the cost of the MTAS.

A.2.5.2. Parties' views

Optus considers that the 50 per cent sharing assumption for macrocells is too great. In the Optus network the proportion of macro base stations including antennas located on a tower owned by another carrier or a specialist tower provider is approximately [c-i-c]. Further, microcell sites are generally not shared with other carriers. They are typically positioned at busy street intersections, (to service that intersection alone), and are placed on street-lighting poles or shop awning. Neither Optus nor Telstra own or otherwise use these structures.[449]

Optus also submits that the extent of cost reductions may also be overstated, as typically, carriers share only the antenna support structures and not shelters containing carrier-specific equipment.[450]

In contrast, Vodafone submits that no savings are made and it uses site sharing to enable the transfer of 'upfront CAPEX' to 'annualised OPEX.' It submits that while Vodafone co-locates some of its BTS sites with Crown Castle, Telstra or Optus these

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[447] WIK, *WIK Report*, pp. 76-77.

[448] ibid., p. 132.

[449] Optus submission, p. 33.

[450] ibid.

arrangements do not result in any annualised reduction in the cost of installing, and leasing BTS sites.[451] Vodafone submits that co-location results in a transfer from annualised CAPEX to annualised OPEX to the same, if not greater amount which does not change the value of the total network costs because of co-location.[452]

Vodafone submits that either the site sharing factor is removed from the model, or if the sharing factor remains, that operating expenditure be increased but this is not its preferred approach.[453]

Vodafone submits that there are three key reasons why it chooses to 'co-locate' despite the higher costs of doing so, which include: the difficulty in developing greenfield BTS sites because of a lack of suitable land or buildings; delays in planning approval processes to build new BTS sites; and financing considerations of initial upfront payments associated with CAPEX even though the annualised cost of BTS deployment does not change with co-location.[454]

Vodafone submits that removing the site sharing factors (macro, micro and repeater) increases the estimated MTR by around 0.8 cpm.[455]

A.2.5.3. Commission's view

Site sharing in Australia is commonplace and is facilitated through Parts 3 and 5 in Schedule 1 of the *Telecommunications Act 1997*. This Schedule sets out the legal obligations for the 'first' carrier (or MNO) for providing access to the 'second' carrier. It empowers the Commission to arbitrate on the reasonableness of the access terms (price and non-price) given by the first carrier. The main criterion is contained the Telecommunications Act.

> For the purposes of this clause, in determining whether the second carrier's request is reasonable, regard must be had to the question whether compliance with the request will promote the long- term interests of end-users of carriage services or of services supplied by means of carriage services. That question is to be determined in the same manner as it is determined for the purposes of Part XIC of the Trade Practices Act 1974.[456]

Subsequent to the enactment of the Telecommunications Act, the Commission was empowered under Clause 37 of Part 5 of Schedule 1 to make a facilities access code. The Facilities Access Code (the FAC) was developed during 1998 and released in 1999. The FAC set out mandatory conditions and procedures for access to telecommunications facilities. Annexure A sets out the general access conditions and procedures for 'transmission towers and sites of towers.'[457] One of the main purposes of the access legislation in the Telecommunications Act and the FAC is, where technically feasible, to avoid the duplication of infrastructure and to encourage the

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[451] Vodafone submission, p. 19.

[452] ibid., p. 20.

[453] ibid.

[454] ibid.

[455] ibid.

[456] The *Telecommunications Act 1997*, Schedule 1, Part 3, Clause 17, subclause 3.

[457] This includes both mobile towers and repeater sites that could be used for backhaul networks for fixed-line networks.

sharing of facilities. This derives from the recognition of statutory objectives which inform the efficient use and investment infrastructure.

Interested parties submit that site sharing does occur in an Australian context but have varying opinions on how site sharing would affect a MNO's costs.[458]

In the 31 per cent market share scenario, 50 per cent of macrocell sites and 30 per cent microcell sites are assumed to be shared. The WIK Model estimates that a hypothetical MNO shares 1,632 BTS sites out of a total 4,144 BTS sites with another MNO. Of the 1,632 BTS sites that are shared, only 1,270 sites relate to BTS macrocells. In the 25 per cent market share scenario the relevant BTS site numbers are 1,436 out of a total of 3,619 BTS sites. Of the 1,436 BTS sites that are shared, only 1,137 sites relate to BTS macrocells.

There are ample empirical examples of site sharing in Australia.[459]

When comparing the total number of macrocell sites shared in the WIK Model (a maximum of 1,270 BTS macrocell sites) with the 2,000 shared sites Telstra operates[460] and the 1,385 sites leased by Crown Castle Australia Limited,[461] the WIK Model's sharing assumptions appear reasonable.

The Commission considers that MNOs can make savings on the amount they invest in mobile network sites. These investment savings flow through to savings in the cost of providing mobile services. Therefore it is reasonable to assume that an efficient MNO in an Australian context would share sites to minimise costs. The MNO scenarios in the *WIK Report* estimate that the saving from sharing, *ceteris paribus*, is approximately 0.1 to 0.2 cpm on the cost of the MTAS.[462] Sharing of BTS microcell sites saves a MNO 0.01 to 0.03 cpm on the cost of the MTAS. The Commission notes the order of magnitude of the impact is much lower than Vodafone's submission of 0.8 cpm. The Commission again notes that in arriving at this increment Vodafone has made some unrealistic assumptions such as reducing the mobile penetration from 96 per cent to 92 per cent of the total population (which impacts the relative cpm by reducing the annual traffic minutes estimated in the model).[463]

The legislative environment is only one reason that site sharing occurs in areas throughout Australia. Vodafone provides examples of some of these reasons associated with the direct and indirect costs of developing 'greenfield' sites, including construction cost;

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[458] Refer to previous section or see Optus submission, p. 33; and Vodafone submission, p. 19.

[459] For example in 1998, the Eutelis Consortium reported that a quarter of Optus's sites were shared with Vodafone. Eutelis Consortium, *Case Study Australia for the Recommended Practices for Collocation and other Facilities Sharing for Telecommunications Infrastructure, Eutelis Consult/Horrocks Technology/Tera Consultants , Study for DG XIII of the European Commission*, December 1998 p. 35. Optus and Vodafone have subsequently sold the majority of their towers however it is likely both MNOs continue to share at Crown Castle's sites.

[460] ibid., p. 26.

[461] For the number of Crown Castle's sites see: Crown Castle International Limited, *2005 Annual Report*, Crown Castle Australia Pty Ltd, March 2006, p. 8.

[462] The extent of the saving will change depending on differences in the market share and coverage parameters.

[463] For Vodafone's calculation of the impact of removing site sharing, see Vodafone submission, p. 20.

timely navigation local planning laws and resident opposition; and the potential financing costs associated with an up-front rather than annualised cost.[464]

In doing so, Vodafone attempts to present these costs of ownership in the form of CAPEX as costless propositions that equate to annualised OPEX. In the case of site ownership and development, Vodafone itself provides for one way in which site ownership is likely to be more costly than a co-location site sharing proposition: financing of the 'upfront' costs of the initial outlay. Even if site acquisition and construction is not financed by debt financing, the alternative use of these funds rather than annual lease payments, this is all the more relevant when delays and local planning constraints come into play. A lease arrangement once entered into provides immediate use of the site according to the terms under the lease agreement.

Vodafone also submits that the annual costs of ownership of the site or annualised CAPEX are transferred as a higher OPEX. In this way, the Commission considers if the OPEX in the WIK Model is referable to Vodafone's actual OPEX then one can test the reasonableness of the site sharing assumptions used in the WIK Model.

To do this, the Commission references Vodafone's RAF data, which Vodafone submits is a reasonable level of OPEX. The Commission has made the assumption that lease costs are included in OPEX. Vodafone's OPEX can be estimated with reference 'maintenance costs' and 'other operating costs' under 'network costs' in Vodafone's 2005-06 RAF report. The Commission considers that this is a reasonable assumption to make because: depreciation costs as classified in the RAF data generally relate to the cost of ownership of a fixed asset and further Vodafone submits that the costs relating to non-ownership of a site are annualised OPEX rather than annualised CAPEX.

As outlined in the WIK Model Annexure A.2.3, the relevant OPEX amount for the supply of the mobile services as produced by the WIK Model ($136.2 million) is much higher than Vodafone's actual OPEX, which suggests that the site sharing assumptions are reasonable, when verified with Vodafone's actual operating costs or the OPEX it incurs.

As discussed, if as Vodafone submits no savings are made from site sharing,[465] this result is only likely to hold if it is assumed that there is only one MNO per site or if the site owner charges a lease price inclusive of a very large mark-up to each MNO sharing the site. By examining Optus's submission, the ACMA Register of Radiocommunication Licences and financial reports of tower providers, it is clear that this would be an unrealistic assumption.[466] By having more than one MNO co-located at a BTS site, it is unlikely that one MNO will pay for all the costs incurred from using the site alone and consequently some benefits from site sharing can be derived.

Vodafone's submission about the lack of benefits derived from site sharing directly contradicts submissions made by Vodafone New Zealand to the New Zealand Commerce Commission that:

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[464] Vodafone the last two points in their submission, refer to previous section or see Vodafone submission, p. 20.

[465] Refer to previous section or see Vodafone submission, p. 19.

[466] For example refer to previous section or see Optus submission, p. 33; and Vodafone submission, pp. 19-20.

> Co-location is a mechanism to help building by lowering costs. Roaming and building are substitutes in areas where costs are relatively low. The availability of co-location therefore expands the area in which building is economically viable, and therefore increases the area in which building and roaming are substitutes.[467]

For example, Optus submitted that the WIK Model's assumption of 50 per cent of macrocell sites as being 'too great.'[468] It is silent on the site sharing assumptions made about microcell sites, by implication the WIK Model may reflect an assumption close to reality for these BTSs, which is likely to be reasonable.

Given that Optus has not provided commercial-in-confidence material to the Commission to either determine the financial significance of its submission about site sharing for macrocells, the Commission finds in the absence of this information that it can place little reliance on this submission at present. As the Commission has indicated, the site sharing assumption for macrocells provides for between a 0.1 cpm to 0.3 cpm reduction in the cost of the supply of the MTAS.

Optus notes that it does not share its shelters on any site. The Commission understands that this is commonplace and notes that only 40 per cent of the investment on the site is shared. It is highly unlikely that the cost of a shelter (usually a single tin shed) on a site will exceed 60 per cent of the site value. Therefore, the assumption considers that the cost of the shelter is included in the 60 per cent of that which is not shared on the site. If any MNO believes that this is not the case, it should provide information to the Commission about the relative value of a shelter in the total value of a macrocell site.

Given Optus's submission about microcells, one further point can be made.[469] The model has been developed based upon the assumption that the hypothetical MNO is building the site rather than leasing the site. Further, the WIK Model estimates the optimal design of a new mobile network. It is not trying to emulate the specific design any one of the four MNOs in the Australian market. The model is based on an optimal network design and may provide for different assumptions about real-world factors than what is observed for a number of reasons.[470] These assumptions can only be tested if verifiable information is provided to the Commission. In the absence of this information, the Commission considers the site sharing assumptions made in the WIK Model are reasonable.

As also outlined, it is even possible that WIK Model has understated the extent of site sharing in its assumptions given the differences between the number of sites shared in the WIK Model and the number of sites shared in reality. This is reflected by the WIK Model's estimate of 1,632 BTS sites sharing compared to the combined number of more than shared sites 3,385 leased by Crown Castle International and Telstra.

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467 Vodafone New Zealand Limited, *Submission to the Commerce Commission – Schedule 3 Investigations into Amendments to the Roaming and Collocation Services – Issues Paper,* March 2007, p. 28.

468 For example, refer to previous section or see Optus submission, p. 33.

469 Optus submitted that it installed microcells on street lights and shop awnings rather than building towers, see Optus submission, p. 33.

470 Refer to section 4 for a discussion on the bottom-up approach used in the model.

A.3. Demand and Traffic Distribution

A.3.1 Busy hour considerations

A.3.1.1. WIK Model approach

Annual traffic volumes are used as one of the inputs in the model to determine how the average (network element) cost per minute is calculated. Busy-hour traffic is used to dimension the network with respect to capacity requirements. Part of the annual traffic in the WIK Model comprises busy-hour traffic. The *WIK Report* defines busy-hour traffic as a typical share of daily traffic when traffic is at peak capacity. The *WIK Report* illustrates a typical shape of busy-hour traffic with the aid of the following diagram:

Figure A.3-1: Shape of busy-hour traffic
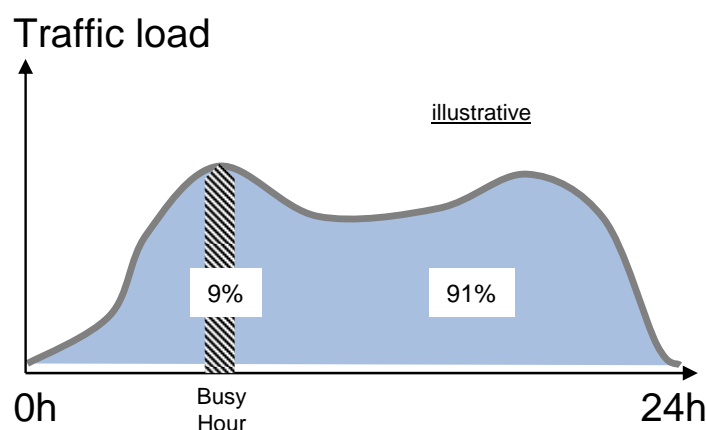
Source: WIK Consult, *Mobile Termination Cost Model for Australia*, January 2007, p. 92.

This diagram is an example of the usual traffic shape over a typical business day. The WIK Model assumes there are two peaks in busy-hour traffic during the day. One peak is during the morning and the other is in the afternoon. The WIK Model assumes that the morning busy hour is driven by the working population while the afternoon busy hour is driven by the residential population. The *WIK Report* notes that not all 365 days in a year are business days and that this traffic shape is not relevant for non-business days. Therefore, the WIK Model includes an input parameter that defines the number of days that are equivalent to typical business days. The following formula is used to estimate the annual traffic when changing several parameters contained within the WIK Model:[471]

$$Annual\ Traffic = \left(\frac{Busy\ \text{-}\ Hour\ Traffic}{Percentage\ Busy\ \text{-}\ Hour\ Day} \right) \times Number\ of\ Days$$

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[471] WIK Consult, *Mobile Termination Cost Model for Australia*, (*WIK Report*), January 2007, p. 92. Note that this equation has been changed in the new version of the WIK Model to account for unbillable minutes.

The *WIK Report* notes that with more up-to-date empirical data, it would be possible to calibrate the above input parameters to calculate more realistic annual traffic volumes.[472] For example, if 20 per cent of the annual traffic was considered to be unbilled minutes, an additional parameter could be included to account for these minutes into the equation. There are three parameters used in the above equation: busy-hour traffic, the percentage of a business day covered by the busy hour; and the number of business days in a year.

Busy-hour traffic is expressed in milli-Erlang per hour. Milli-Erlang demand is an exogenous variable in the WIK Model. The WIK Model converts this figure into the number of voice-equivalent minutes for the busy hour and subsequently into the number of minutes for the average business day. To obtain the initial estimate of milli-Erlang WIK assumes that the busy-hour percentage is 8.5, the number of annual business days is 250 and the annual traffic for the Australian market is 28.8 billion voice-equivalent minutes[473]. The WIK Model calculated the annual traffic in Australia by estimating the approximate amount of minutes by using data from the 2004-2005 Market Indicator Report.[474]

Solving for busy-hour traffic in the annual traffic formula and then dividing the amount to obtain the Erlang amount per minute per mobile subscriber results in a demand of 0.00083 Erlang. To calculate capacity requirements in the busy hour, the number of mobile subscribers is calculated using demographic data, the hypothetical MNO's market share and mobile penetration.[475]

WIK derives the 250 business days and the 8.5 busy-hour percentage based on its experience in analysing industrialised European countries.[476] The distribution of busy-hour traffic across services is directly impacted by market share of the relevant operator[477] to reflect the change in the relative proportion of on-net voice traffic to off-net voice traffic. With increasing market share, the WIK Model, generates higher on-net traffic and lower voice termination traffic. The interaction between market share and the share of termination services is illustrated using the two hypothetical efficient operator scenarios.

In order for the WIK Model to calculate relevant per-unit cost figures, it requires an estimate of the total number of voice and voice-equivalent minutes to calculate total annual traffic. Unlike voice services, non-voice services are measured in units of capacity rather than minutes. Therefore, the WIK Model transforms the units of non-voice services into the number of minutes for an average business day. The following conversion factors are used for non-voice services:

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[472] ibid.

[473] Includes data equivalent and voice minutes

[474] Figures in the 2004-05 Market Indicator Report were adjusted for data services and a forecasted increase in the number of minutes since 30 June 2005. Refer to ACCC, *Telecommunications Market Indicator Report 2004-05*, July 2006, pp. 17 and 19.

[475] For a description of the process used to calculate the modified Australian population using the demographic data, please refer to the WIK Model Annexure A.1. of this report (Network dimensioning)

[476] WIK, *WIK Report*, p. 107.

[477] ibid., p. 120.

Table A.3-1: Percentages of mobile services[478]

Data service	Conversion factor
SMS	432 messages per voice minute
MMS	187.5 messages per voice minute
GPRS	0.080357 MByte per voice minute
Basic Data	1 data minute per 1 voice minute
HSCSDS	0.5 data minute per 1 voice minute

In the WIK Model, the costs of the signalling processor and central processor are assumed to be driven by the busy-hour call attempts. The WIK Model assumes that both successful and unsuccessful call attempts are included in the number of busy-hour call attempts. The WIK Model uses the following formula to estimate the number of successful call attempts during the year.

$$Annual\ number\ of\ successful\ call\ attempts = \left(\frac{Successful\ busy\text{-}hour\ call\ attempts}{Percentage\ busy\text{-}hour\ day} \right) \times Number\ of\ days$$

Note that the only difference in this equation is that busy-hour call attempts are used instead of busy-hour traffic is used to estimate annual traffic.

Table A.3-2: Distribution of traffic generated by the WIK Model's scenarios

Service	Proportion of total traffic for 25 per cent market share scenario[479] (per cent)	Proportion of total traffic for 31 per cent market share[480] (per cent)
Voice On-Net	22.6	24.4
Voice Termination	35.7	34.8
Voice Origination	35.7	34.8
Basic Data	2.0	2.0
High Speed Data	0.8	0.8
GPRS	3.0	3.0
SMS	0.1	0.1
MMS	0.1	0.1
Total	**100.0**	**100.0**

As outlined, the WIK Model uses information from the 2004-2005 Market Indicator Report[481] and traffic flows observed in the Australian market to approximate the distribution of voice-minutes between voice on-net, voice origination and voice termination services.[482] The WIK Model assumes that voice termination and voice origination minutes are symmetrical for the hypothetical MNO. The WIK Model uses

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[478] ibid., p. 106.

[479] ibid., p. 120.

[480] ibid., p. 124.

[481] ACCC, *Telecommunications Market Indicator Report 2004-05*, July 2006.

[482] WIK, *WIK Report*, pp. 107-108.

the information on voice termination minutes, to determine the percentages of voice origination and voice on-net services. Voice-equivalent minutes for data services are then distributed according to observed market data for SMSs and WIK's own experience for the remaining data services.[483]

Busy-hour traffic is also adjusted for different time-zones between the Western and Eastern seaboard. The time-zone differences mean that there is less demand for busy-hour capacity in the core network than if the busy-hour occurred simultaneously everywhere. The WIK Model accounts for this by reducing total traffic at locations in the core network which are not in the busy-hour. For example, if:

- traffic from Perth to Sydney is 150 Erlang in the Perth busy-hour;

- traffic from Sydney to Perth with a value of 200 Erlang is generated in the Sydney busy-hour; then

- it is assumed that there is a traffic reduction factor of 0.75.

The following adjustments would be made: at the Perth busy hour, traffic generated on the Perth to Sydney link is 150E + 200E*0.75 = 300E; and at the Sydney busy-hour, the traffic generated on the Perth to Sydney link is 150E*0.75+200E = 312.5E.

A.3.1.2. Parties' views

Annual traffic and cost calculation

Optus submits that WIK's busy-hour percentage assumptions appear to be highly conservative when compared to the Swedish cost model.[484]

Optus submits that the relationship between billable minutes and the busy hour is localised and planning is done at a more disaggregated level than in the WIK Model. This means that the WIK Model is likely to be biased towards under provisioning network elements, particularly in the radio layer.'[485]

In this regard Optus submits that changing the busy-hour ratio in the WIK Model may be misleading because it will change the total volume of traffic model as well as its distribution throughout the day. Optus finds this is a unique and perplexing feature of the WIK Model. A simultaneous adjustment may be possible to the busy-hour Erlang in order to hold the total traffic volume constant. For example, increasing the busy-hour ratio to 12 per cent appears to require the busy-hour Erlang to be increased to hold total traffic constant. If this adjustment is undertaken the MTAS rate is modelled at 6.9 cents for the base-case (25 per cent market share) scenario.[486]

The WIK Model indicates that the relevant SMS conversion factor is at 432 messages per voice minute. Optus submits that the approach chosen by WIK is 'unreasonably

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[483] ibid.

[484] Optus, *Optus Submission to the Australian Competition and Consumer Commission on the WIK Mobile Network and Cost Model for Australia*, (Optus submission), March 2007, p. 27.

[485] ibid., pp. 26-27.

[486] ibid., p. 27.

aggressive.'[487] Based on 125 bytes per message this would imply a channel rate in excess of what is best in use by MNOs and significantly greater than is used in international cost models.

Optus submits that international cost models use a figure of around 145 messages per voice minute based on 40 bytes per message and a 768bps channel rate. For example, the mobile model produced for OPTA used an SMS conversion factor of approximately 143 messages per voice minute. Similar issues apply to the WIK Model's other data conversion factors.[488]

Vodafone submits that changing the busy-hour percentage assumption from the original 8.5 to reflect Vodafone's actual busy-hour percentage, amongst other parameter changes, results in an increase in the MTAS of 2.7 cpm.[489]

Vodafone further notes that there is no clear justification for the 250 day busy-hour assumption. Vodafone submits that there are three approaches to network dimensioning advocated by the International Telecommunication Union Telecommunication Standardization Sector: a five-day average, three-day average and one-day per week average. Vodafone submits that the ITU-T E.492 Recommendation is to identify the four highest daily figures for any one month, and provision the network based on the second highest of these figures.[490]

In this regard Vodafone submits that adopting the three-day average for network dimensioning - replacing 250 days results in an increase of the MTR by 6.2 cpm.[491]

Vodafone submits that the WIK Model is unable to change the dimensioning assumptions without automatically changing the annual volume of traffic and, as such, the model is unable to accurately deal with changes to dimensioning figures without changing the annual traffic usage.[492]

Busy-hour traffic, call attempts and network dimensioning

Optus submits that the busy-hour parameter is critical for network dimensioning and the cost of the network 'is highly sensitive' to the busy-hour. The busy-hour for the entire network can be highly misleading, particularly in planning the radio layer of the network as it smooths traffic and ignores the reality that carriers need to dimension individual sites to cater to local traffic peaks. These factors are likely to drive additional investment in the network above what is modelled by WIK.[493]

Optus further submits that the busy hour varies from country to country.[494] Further, it submits that busy-hours are carrier specific and 'somewhat dependent on the marketing strategy of the MNO.'[495]

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[487] ibid., p. 30.

[488] ibid.

[489] Vodafone Australia Limited, *Submission to the Australian Competition and Consumer Commission: WIK Mobile Network and Cost Model and MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*, (Vodafone submission), March 2007, p. 15.

[490] ibid.

[491] ibid.

[492] ibid., p. 16.

[493] Optus submission, p. 26.

[494] ibid., p. 27.

Optus further submits that it is unclear whether the traffic matrix used by the WIK Model assumes any call duration.[496]

Telstra submits that 'the traffic per customer inputs used in the WIK Model are understated' and it expects traffic to be higher than the amount used in the WIK Model.[497]

Traffic distribution

Optus submits that the WIK Model does not appear to cater for SMS traffic in the busy hour. Similarly, a parameter is required to account for GPRS and other data traffic. Such allowances are typically applied in international cost models.[498]

According to Optus, traffic volumes and the mix of traffic will vary amongst existing MNOs and a new entrant's average subscriber's traffic volume and mix will vary depending on the marketing strategy of that entrant. For example, Optus had a high proportion of on-net traffic due to its 'yes time' promotion whereas Hutchison and Vodafone focussed on capped plans to increase total traffic. The potential implication is that the cost attributed to MTAS (per unit) is higher or lower depending on the individual MNO's traffic mix.[499]

Optus submits that there is no justification for the levels of traffic contained in the traffic matrix, the matrix appears to allocate traffic between MSCs (and thus routing factors) according to arbitrary rules of thumb and is unlikely to accurately model real traffic patterns in Australia.[500]

Vodafone submits that the failure to accurately model the traffic profile of the network is likely to result in inaccurate transmission usage.[501]

Unbilled minutes

Optus submits that the WIK Model does not take into account unbilled minutes. Optus submits that this is an important omission as the ringing time (and holding time) of successful and unsuccessful calls is a key consideration in dimensioning a mobile network. The busy-hour Erlang could be adjusted to reflect unbillable minutes. Overseas cost models include uplift factors of between 10 percent and 30 percent to account for these minutes and their effect on network dimension (see Norway and Netherlands). The absence of this factor makes WIK's model appear upwardly biased.[502]

A.3.1.3. Commission's view

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[495] ibid.

[496] ibid., p. 29.

[497] Telstra, *Submission in Response to the ACCC's Discussion Paper on the WIK Mobile Network and Cost Model to Inform the MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*, (Telstra submission), March 2007, p. 23.

[498] Optus submission, p. 27.

[499] ibid., p. 28.

[500] ibid., p. 29.

[501] Vodafone submission, p. 16.

[502] Optus submission, p. 28.

As outlined above, annual minutes and call attempts, and routing factors inform the cost (cent per minute) of the MTAS in the WIK Model.[503] The busy-hour traffic and call attempts inputs in the WIK Model inform the capacity requirements for the SNPT. The busy-hour percentage and the number of business days are used to convert busy-hour traffic and call attempts into annualised figures. These annualised figures are then allocated according to the routing factors to estimate the cent per minute cost of the MTAS.[504] The issues raised by interested parties are dealt with under the relevant headings below.

A.3.1.3.1. Annual traffic and cost calculation

Optus and Vodafone submit that the use of 8.5 per cent as the percentage of busy-hour traffic in an average business day is too low and that the busy hour in Australia is more 'peaky' than fixed-line services.[505]

The Commission understands that this is an empirical matter. As a result and based on representations made by parties in their submissions, the ACCC wrote to all MNOs on 3 April 2007 and asked them to provide it with busy-hour information. The information provided by MNOs[506] confirmed that the assumptions about busy-hour percentages made in the WIK Model fell within the range of values provided to the Commission. In particular, Telstra, as the largest MNO operating in Australia stated that the averaged measured proportion of daily traffic in the busy-hour of 8.5 per cent is reasonable.[507]

Vodafone makes a number of comments in its submission and letter to the Commission in relation to the WIK Model's use of annual traffic amounts and the calculation of the parameters in the annual traffic equation.[508] First, the Commission considers that Vodafone may have incorrectly interpreted the process that the WIK Model uses to dimension network elements. For example, in its letter to the Commission Vodafone submits that the WIK Model sets busy-hour traffic and percentage of traffic in the busy-hour exogenously and annual traffic is an endogenous variable in the WIK Model so that annual traffic does not reflect the causation that determines network dimensioning.[509] However, the network dimensioning in the WIK Model does not rely on annual traffic volumes but relies on the busy-hour traffic. Vodafone also confuses the ITU standard for estimating the busy-hour percentage for the number of business days in a year. The WIK Model does not use 250 days to calculate the average busy-hour percentage but to set the number

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[503] WIK Consult, *Specification of the Cost Module of the WIK Mobile Network and Cost Model*, p. 61.

[504] For a discussion on routing factors please refer to the WIK Model Annexure A.3.2 of this report.

[505] ibid., pp. 14-15; and Optus submission, pp. 26-27.

[506] The public versions of the letters from the MNOs are located at the ACCC's website. Refer to ACCC, May 2007, *Mobile Terminating Access Service (MTAS) 2007 Pricing Principles – Letters to the MNOs about 'busy-hour' information* , accessible from: http://www.accc.gov.au/content/index.phtml/itemId/783052/fromItemId/356715, viewed on: 11 May 2007.

[507] Telstra, *Letter from Dr Tony Warren to Mr Wright about Mobile Terminating Access Service – WIK Model: Busy-Hour Statistics*, 18 April 2007.

[508] Vodafone submission, pp. 14-16 and Vodafone, *Letter from Mr van Hoof t to Mr Wright about Mobile Termination Cost Model: Busy-hour Statistics,* 20 April 2007.

[509] Vodafone, *Letter from Mr van Hoof t to Mr Wright about Mobile Termination Cost Model: Busy-hour Statistics,* 20 April 2007.

of business days in a year which is used to convert business-day traffic into annual traffic. Again, the Commission considers that the business day traffic is an empirical question, even though Analysys has used the 250 business days in its models for application in the Netherlands, Sweden, the United Kingdom and Norway [510] The Commission also asked MNOs about the reasonableness of the business day assumptions. The information provided by MNOs confirms that the assumptions used in the WIK Model and, supported by overseas model approaches verifies that 250 business days in a year is a realistic assumption. However, Telstra considers that the average number of days per year in which a typical day is relevant understates the actual averages based on Telstra's experience.[511] Therefore the Commission considers that increasing the number of business days may be appropriate for Australian conditions.

Optus notes in its submission that the impact of busy-hour percentage on annual traffic in the WIK Model is 'perplexing'.[512] The Commission is concerned that Optus has confused the purpose of the busy-hour percentage parameter in the WIK Model with busy-hour traffic calculations. The purpose of the busy-hour percentage and number of business days in the WIK Model is to convert busy-hour traffic into annual traffic in order for the WIK Model to estimate the cost per minute of different mobile services.[513] The busy-hour percentage indirectly impacts network dimensioning as, together with other factors, the busy-hour percentage, number of business days and the annual traffic are used to estimate the milli-Erlang demand per mobile user. The milli-Erlang demand per mobile user is a demand factor used to dimension the network.

The Commission considers that the approach adopted in the WIK Model underestimates the voice equivalent traffic for non-voice services. Consequently, the number of non-voice minutes in the WIK Model is underestimated and as a result the efficient cost is reasonable. Further, Optus's estimation of 145 messages per voice minute which is based upon a bandwidth of 768bps,[514] but this relates to the bandwidth allocated to SMSs within the signalling layer. As discussed in the WIK Model Annexure A.1.1 the WIK Model does not explicitly include a signalling layer but has allowed for this by making two slots unavailable to traffic in the mobile network and as a result the voice network is over-dimensioned.[515] The main purpose of converting SMS traffic into voice equivalent minutes is for the purposes of cost calculation and not network dimensioning.

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[510] 250 business days is used as an input parameter in the Analysys model spreadsheets for these countries. For example, see Analysys Consulting Limited, *Mobile BULRIC Model – OPTA's BULRIC Model Documentation,* June 2006 or Analysys Consulting Limited, *NPT's Mobile LRIC Model Version 4,* December 2006, accessible from: http://www.opta.nl/download/bijlage/annex_d_final_bulric_model.xls, viewed on: 3 May 2007.

[511] Telstra, *Letter from Dr Tony Warren from Mr Wright about Mobile Terminating Access Service – WIK Model: Busy-Hour Statistics*, 18 April 2007

[512] Optus submission, p. 27. Vodafone expresses similar views in its submission, refer to Vodafone submission, p. 16.

[513] Refer to the WIK Model Annexure A.3.1.1 for explanation of how the busy-hour percentage interacts with annual traffic.

[514] ibid.

[515] Refer to the WIK Model Annexure A.1.1.3.5 for the discussion WIK's approach to signalling transfer points. Refer to footnote 319 for an definition of a slot.

The Commission notes Telstra's submission that it considers that the WIK Model understates both the average number of days per year on which the busy-hour is relevant and a lower average traffic per customer which therefore results in a lower number of minutes than observed in reality.[516] This illustrates the reasonable approach used in the WIK Model. That is lower annual traffic than observed in reality will result in a higher cent per minute cost of the MTAS. Increasing traffic per customer will increase the dimensioning requirements in capacity driven districts and subsequently increase costs however this effect is generally off-set by the increased number of minutes. There are two effects, one is the increased costs in dimensioning for capacity-driven areas and the other is decreased costs due to the increased number of minutes.

The Commission considers that Vodafone has incorrectly identified an error, when in fact there is none in the *WIK Report* with respect to the 17 per cent scenario in the *WIK Report*, as it has confused market penetration with market coverage. The scenario correctly adjusts geographic coverage from 96 to 92 per cent while Vodafone not only adjusts coverage but also mobile market penetration. By doing so Vodafone reduces the capacity requirements and annual traffic in the 17 per cent scenario. As a result of this error and the other parameters used by Vodafone in its scenario, the total amount of traffic in the market it estimates (based upon its busy-hour parameters) is 11.7 billion minutes. This is less than half of the annual traffic used in the 17 per cent scenario used in the *WIK Report* (26.4 billion minutes) and almost a quarter of the estimated minutes used in this report and the WIK Model to reflect the Commission's reasonable estimate of the current voice-equivalent minutes (45.2 billion voice-equivalent minutes).[517]

A.3.1.3.2. Busy-hour traffic, call attempts and dimensioning

Telstra submits that the traffic per customer inputs are underestimated in the WIK Model.[518] The Commission is aware that the efficient cost of the MTAS will decrease if, *ceteris paribus*, the traffic per user is increased. Optus comments on the need to use Australian data to determine the traffic per customer input in the model and traffic profiles.[519] The Commission agrees that this is the case and has subsequently received information from the MNOs to assist it with finer calibration of the model with respect to traffic per customer in an Australian context. Based on the information received to date the Commission notes that the largest Australian MNO considers that the average traffic per customer during the busy-hour understate the actual averages based on its experience.[520]

Optus and Vodafone comment on how the WIK Model uses uniform busy-hour traffic to dimension the hypothetical network.[521] Optus notes how it disaggregates its own busy-hour traffic over different parts of its network when conducting network

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[516] Telstra, *Letter from Dr Warren to Mr Wright about Mobile Terminating Access Service – WIK Model: Busy-Hour Statistics*, 18 April 2007.

[517] This figure includes 1.7 billion unbillable minutes.

[518] Telstra submission, p. 23.

[519] Optus submission, p. 26.

[520] Telstra, *Letter from Dr Tony Warren to Mr Wright about Mobile Terminating Access Service – WIK Model: Busy-Hour Statistics*, 18 April 2007.

[521] Optus submission, p. 26; and Vodafone, p. 16 (described as traffic profiling).

planning and that the WIK Model's approach might 'smooth' the traffic and underestimate the required capacities.[522] The Commission is of the view that the application of an average milli-Erlang demand per consumer in the WIK Model to estimate busy-hour traffic is reasonable. This is due to:

- the actual milli-Erlang demand per consumer in rural areas is likely to be below the average milli-Erlang demand per consumer;

- in suburban and urban areas the milli-Erlang demand per consumer is expected to be above the average milli-Erlang demand per consumer;

- as BTS units located in rural areas are further away from BSC locations than suburban or urban areas, using an average milli-Erlang demand per consumer results in an over-estimation of the capacity required for transmission; and

- the impact from overestimating milli-Erlang demand in rural areas has a greater impact on cost than the underestimation in suburban and urban areas due to the longer transmission links required in rural areas.

Further, the WIK Model uses the Erlang-B formula which has an inverse and non-linear relationship between capacity and traffic. In other words when traffic volumes are low, the WIK Model will over compensate the capacity requirements for links between BTS units and BSC locations. When considering the combined effects of increased capacity requirements with the above average busy-hour traffic for rural areas it is clear that the approach adopted in the WIK Model is reasonable.

Optus and Vodafone make comments about the need to take into account that busy-hours vary in different locations.[523] It is the Commission's view that the WIK Model addresses this issue through use of the assumption of a morning and afternoon busy-hour in the Cell Deployment Module of the WIK Model. The WIK Model selects the busy-hour with the highest traffic to determine cell deployment. The busy-hour traffic in the morning is adjusted using the working population data and the busy-hour traffic in the afternoon uses the residential data. Therefore in the morning peak, higher traffic routed through the BTS units located in business districts are compensated by the reduced traffic from BTS units located in residential and/or rural areas. In the afternoon, the opposite occurs with higher traffic from BTS units in residential and/or rural areas being offset by the reduced traffic from BTS units located in business districts. The WIK Model then uses either the morning or afternoon busy hours with the highest traffic to determine the capacity requirements for each link between a BTS unit and BSC location and subsequently the design of the other network elements. Further, the WIK Model is not attempting to estimate the dimensioning of the Optus or Vodafone network but rather an optimised network. On an optimised network, peaks in each busy-hour in certain districts may vary from that of traffic patterns of an actual MNO.

The Commission considers that the fact that there are no adjustments for daylight savings and the time zone in central Australia is a reasonable approach to take, addressing concerns raised by Optus on this issue.[524] By ignoring the time zone differences between States the WIK Model would overestimate the capacity required

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[522] Optus submission, p. 26.

[523] Vodafone submission, pp. 13 and 16; and Optus submission, p 26.

[524] Vodafone submission, p. 16; and Optus submission, pp. 21 and 24.

for the core network. As the number of minutes in the network remains unaffected by changes to traffic in the core network, the over-dimensioning in the core network results in a higher cent per minute cost of the MTAS.

Optus and Vodafone submit that the traffic reduction factor of ten per cent to account for different time zones in Eastern and Western Australia is excessive. Vodafone has assumed that the traffic reduction reduces traffic throughout the entire network by ten per cent.[525] This is not the case as the traffic reduction factor only reduces the traffic at the MSC location or locations outside of the busy hour.

Notwithstanding the legitimacy of a traffic reduction factor to account for staggered busy hours on the Eastern and Western seaboards, the Commission has set the traffic reduction factor between the Eastern and Western seaboard to zero. The Commission considers this provides an additional level of conservatism to the WIK Model outcomes as elimination of the traffic reduction factor will increase (albeit slightly) the cost estimates for the supply of the MTAS.

Despite interested parties submissions to the contrary, the WIK Model does include assumptions about busy-hour call attempts and durations as can be seen by the service distribution ratios which appear in the Cost Module. Traffic in circuit-switched networks can be calculated by multiplying the number of busy-hour call attempts by the average call duration. These variables are used to determine the number of MSC units located at MSC locations in the WIK Model. The WIK Model does not require busy-hour call attempts or average call duration to dimension the core link; rather it uses busy-hour traffic.

A.3.1.3.3. Traffic distribution

Optus comments in its submission that the WIK Model has not catered for SMS and data services.[526] The WIK Model considers SMS and data services in the dimensioning process, as all of these services are included in the demand figure of 8.3 milli-Erlangs per mobile customer.[527] The WIK Model accounts for the upstream SMS traffic to the SMSC by using the busy-hour traffic values allocated to SMS services. The WIK Model does not consider downstream SMS traffic in the network dimensioning process as SMSs will only be delivered where excess capacity exists and the network is not congested.

On a related matter, Optus notes in its submission that the MNOs in Australia employ different pricing strategies and as a result traffic volumes and the share of on-net and off-net services are directly influenced by such strategies.[528] The Commission agrees with this point of view. However, it is also the Commission's view that the objective of the WIK Model is to estimate the costs of a hypothetical network and not replicate a specific MNO's network and business strategy. Marketing strategies such as Optus's 'yes time' are a case in point, and its marketing strategies to build market share by its own submission provide for a greater level of on-net rather than off-net traffic. Further, in the long-run it is expected that MNOs operating in the same market will have traffic distributions which will converge. As a result, it is important that the

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[525] Vodafone submission, p. 16.

[526] Optus submission, p. 27.

[527] Table 3-1 in WIK Model Annexure A.3.1.1 or refer to *WIK Report*, p. 107.

[528] Optus submission, p. 28.

traffic distribution reflects the market as a whole rather than that of a specific MNO's traffic profile.

A.3.1.3.4. Adjustments to mode to account for busy-hour factors

Given the submissions made by interested parties to the Commission and subsequent letters, the WIK Model has been recalibrated for minor features. Changes have been made to include unbillable minutes and uplift factors as suggested by Optus in its submission.[529] The new version of the WIK Model will be using the following formula to calculate annual traffic:

$$Annual\ traffic = \left(\frac{Busy\text{-}hour\ traffic \cdot (1\text{-}Percentage\ of\ unbillable\ minutes)}{Percentage\ busy\ hour\ of\ the\ day} \right) \cdot Number\ of\ business\ days$$

Further, the busy-hour percentage, number of business days and traffic per mobile users will be calibrated to reflect information from public sources and the submissions received from the MNOs. This does not mean that parameters will be used to reflect a specific MNO but rather what is appropriate to reflect the traffic patterns of an efficient MNO.

A.3.2 Routing factors

A.3.2.1. WIK Model approach

Routing factors are a relative measure of which services use which network elements, and how intensive that use is on a per-minute basis. In this way the routing factors provide the basic usage measure in the WIK Model.[530]

It is important to understand what and how many network elements are used by each service to identify the cost of each service.

The services identified that use the network elements in the WIK Model are:[531]

- Voice Origination Off-Net;

- Voice Termination Off-Net;

- Voice On-Net;

- SMS;

- Basic Data (up to 9.6 Kbps);

- MMS;

- GPRS; and

- High Speed Circuit Switched Data.

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[529] ibid.

[530] WIK, *WIK Report*, pp. 90-91.

[531] ibid., p. 90.

The purpose of identifying how traffic is routed through the network elements for network services is important for the calculation of costs per mobile service and the usage of network elements. The usage of network elements is also used by the WIK Model to calculate the EPMU that allocates common organisational costs to a hypothetical MNO's mobile services. If a network element is specific to a particular service eg the SMSC, then that network element cost is only allocated to the relevant service in this case the SMS. A BTS unit is one network element that would be common to all the services listed.[532]

A.3.2.2. Parties' views

Optus submits that the routing factors in the WIK Model are based on the number of network elements that are either derived by the model algorithms (e.g. base stations) or that are input into the model (e.g. BSCs and MSCs). In this regard, Optus submits that it appears that the routing factors implied by this traffic matrix indicate that around 63 percent of on-net calls and around 63 percent of incoming calls 'touch' two MSCs, implying that 63 percent of those calls are interstate. The degree to which this occurs in practise is an empirical question for MNOs to clarify.[533]

Optus submits that there is no justification of the levels of traffic contained in the traffic matrix, the matrix appears to allocate traffic between MSCs (and thus routing factors) according to arbitrary rules of thumb and is unlikely to accurately model real traffic patterns in Australia.[534]

Vodafone submits that the routing figures contain errors which users are unable to correct or determine the impact on the MTAS cost.[535]

Further, Vodafone submits that the HLR is engaged only for terminating calls, be it on-net or off-net incoming. The information required to make a call is downloaded to the VLR — the HLR plays no active role. This results in routing factors of one for incoming and off-net incoming only. Vodafone submits that this is unable to be amended in the WIK Model.[536]

Vodafone submits that the WIK Model does not appropriately deal with traffic profiling and handovers. Vodafone submits that this has implications for MSC routing and transmission costs.[537]

Vodafone also submits that the WIK Model does not address provision of interconnection services. Vodafone submits that this factor increases the cost of transmission for mobile networks due to two factors:

- the PSTN interconnect protocols require that mobile networks perform far-end handovers from the mobile to the PSTN networks; and

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[532]   WIK, *WIK Report*, pp. 88-90.

[533]   Optus submission, p. 29.

[534]   ibid.

[535]   Vodafone submission, p. 24.

[536]   ibid.

[537]   ibid.

- mobile networks also bear the cost of transmission for PSTN originated calls terminating on their network. As a result, the PSTN network performs a near-end handover.[538]

Vodafone submits that it is unable to determine how this error affects the WIK Model cost estimates, but 'given that the transmission costs account for around 22 per cent of total costs, Vodafone would expect a material change in the estimated cost of providing MTAS.[539]

A.3.2.3. Commission's view

Routing factors are one of the key inputs in linking the network dimensioning with the cost calculation in the WIK Model. The traffic matrix in the WIK Model shows the usage factors of the network elements for different mobile services. The usage factors imply how the WIK Model routes traffic through the different network elements. A number of submissions are made by interested parties about the appropriateness of the routing factors in the WIK Model which are discussed below.[540]

The WIK Model assumes that point of interconnection for mobile terminating calls occurs at the MSC nearest to where the calls originate (such as public switched telephone network (PSTN) calls). However, for the point of interconnection for a mobile originating call (including PSTN calls), the WIK Model assumes, this occurs at the MSC nearest to the mobile user. It is the Commission's view that a reasonable approach is adopted in the WIK Model as the assumption with respect to originating traffic for PSTN results in an overestimation of the cent per minute cost of the MTAS. This is due to the usage of the network elements being underestimated for off-net origination and as a result a higher proportion of common costs are allocated to the other mobile services in the WIK Model.

The Commission considers that the WIK Model has taken a reasonable approach with respect to routing factors. In particular, the routing factors of most network elements should be used at least once for incoming and outgoing traffic and twice for on-net traffic. Further, the WIK Model has taken a reasonable approach as the routing factors for the core network elements are calculated solely on the traffic weights of the MSC locations. Therefore, the traffic is evenly distributed across the network. The routing factors do not take into account the distance between MSC locations in the WIK Model's estimations.

It is the Commission's view that the WIK Model's approach is reasonable, and is likely to overestimate the capacity requirements for the links on the core network in Australia. This overestimation results in higher investment costs and subsequently a higher cent per minute cost of the MTAS. The Commission considers this to be the case because it is unlikely that 80 per cent of the traffic[541] from one MSC location is transported to other MSC locations given Australia's population distribution. The traffic distribution assumption used in the WIK Model is generally used for small countries with highly mobile populations unlike Australia which is large country with

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[538] ibid., p. 25.

[539] ibid.

[540] Optus submission, pp. 24-25, and 29; and Vodafone submission, pp. 24-25.

[541] This is assuming that there are five MSC locations specified in the scenario.

populations staying within one region. As a result, the WIK Model is likely to overestimate the capacity required on core links. Further, the WIK Model does not take into account the distance between MSC locations for routing traffic. When combining the effects of the overestimated required capacity as a result of evenly distributed traffic between MSCs with the distance between MSC locations; it is likely a reasonable approach has been taken in the dimensioning and cost calculation of the core links in the WIK Model.

The Commission finds that due to the interested parties' confusion between MSC units and MSC locations that they have mistakenly assumed that the 163 per cent figure in the 'Usage Factors' window means that 63 per cent of on-net calls travel interstate (from one MSC location to another). This is not necessarily true as this usage factor also includes the signalling and central processors. As discussed in the WIK Model Annexure A.1 the MSC comprises switching machines, central processors and signalling processors. As there is more than one signalling and central processor per MSC location it is possible that more than one processor is used at a MSC location, while only one switching machine is used. For example in the 31 per cent scenario in the *WIK Report*, the WIK Model estimates that the hypothetical mobile network requires five switching machines, 14 central processors and 21 signalling processors. As discussed in the WIK Model Annexure A.1.1.3.4 now nine switching machines are deployed.

A.3.2.3.1. Adjustments to model to account for traffic routing factors

The Commission considers that the WIK Model adopts a reasonable approach to the routing of traffic.

However, the Commission acknowledges that some minor adjustments are required to calibrate routing factors in the model. The adjustment will involve specifying that the HLR is only used for (on-net and off-net) call termination. Traffic for all other services will no longer use the HLR in the WIK Model. As a result of these changes it is expected that a higher proportion of common costs will be allocated to the off-net mobile termination and on-net services.

A.4. WIK Model Consultation Process

A.4.1. WIK Model access regime and consultation process as part of the ongoing consultation process with industry

A.4.1.1. Consultation period

On 1 February 2007, the *WIK Report* was released for public consultation along with the *Discussion Paper on the WIK Mobile Network and Cost Model to Inform the MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*[542] on the WIK Model and the *Reference Paper: To Accompany the Release of the WIK Mobile Network and Cost Model*.[543]

At 9am on 16 February 2007, the WIK Model and the *WIK Mobile Network and Cost Model Version 1.01 User Guide* (*User Guide*) was available for collection by interested parties that signed a *WIK Mobile Network and Cost Model Access Deed* (*Access Deed*). A sample *Access Deed* was released along with the *WIK Model Discussion Paper* to parties on 1 February 2007, to afford parties sufficient time to agree to the conditions of access for the WIK Model, sign an *Access Deed*, and collect the WIK Model.

The *WIK Report* was provided to parties for a period of six weeks and the WIK Model and the *User Guide* was provided for a period of four weeks.

The Consultation period for the WIK Model and *WIK Report* ended at 5pm on 16 March 2007.

The WIK Model CD-ROM was not operative after 16 March 2007.

A.4.1.2. Objective of the WIK Model consultation process

The *WIK Model Discussion Paper* outlined that the WIK Model would assist the Commission in informing it of an estimate of the efficient cost of supply of the MTAS for inclusion in a pricing determination for the period 1 July 2007 to 30 June 2009.

Further, it was stated that the WIK Model was being developed to inform the Commission about the estimated efficient cost of providing services on mobile networks in an Australian context. However, the development of the WIK Model should not be considered as an isolated and independent process from the ongoing consultation with industry that has preceded the *WIK Report* and WIK Model consultation period.

As mentioned, the development of a bottom-up cost model is considered an important and supplementary information to support the robustness and reliability of the international cost benchmarking and RAF data analyses that have informed the

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[542] ACCC, *Discussion Paper on the WIK Mobile Network and Cost Model to Inform the MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*, (*WIK Model Discussion Paper*), February 2007.

[543] ACCC, *Reference Paper: To Accompany the Release of the WIK Mobile Network and Cost Model*, (*WIK Reference Paper*), February 2007.

current 5 cpm to 12 cpm range of efficient cost estimates supporting the price-related terms and conditions contained in the *MTAS Pricing Principles Determination* for the period 1 July 2004 to 30 June 2007.

A.4.1.3. Submission content and format

A.4.1.3.1. Submission content

As outlined in the *WIK Model Discussion Paper*, the ACCC sought submissions from interested parties on:

1. the WIK Model released on 16 February 2006; and

2. the *WIK Report* and, in particular, the range of cost outcomes arising from the various scenarios presented that will inform the Commission of price-related terms and conditions for inclusion in a *MTAS Pricing Principles Determination* relevant for the period 1 July 2007 to 30 June 2009.

The ACCC did not limit the scope of parties' submissions and provided the following list of issues as a guide:

- WIK Model engineering and costing framework. The WIK Model is comprised of two modules: a Strategic Network Planning Tool (SNPT) and a Cost Module. The SNPT is used to design and dimension a mobile network for an Australian context. The Cost Module calculates the costs (capital, operating and common-organisational level) of the various network elements used to provide the various mobile services;

- WIK Model functionality and in particular the component parts;

- suitability of the input parameters used in the WIK Model in an Australian context. The WIK Model has the flexibility to change input parameters which can be broadly categorised as population coverage, market share, traffic shares of various services and the prices of equipment and facilities;

- other issues concerning the WIK Model that may impact the cost estimates of the MTAS; and

- cost estimates informed by a range of scenarios including different market shares and population penetration. Several scenarios are contained in Section 6 of the *WIK Report,* illustrating various scenarios that might represent a hypothetical operator and how these compare to operators with different market shares and population coverage of services. Scenarios are also presented on an integrated mobile and fixed-line operator and the cost implications of providing services on a 3G compared with a 2G network.

The ACCC provided core documents for parties on which it sought submissions. These included the *WIK Report* and *WIK Model Discussion Paper*.

The ACCC did not request nor accept submissions on either the *User Guide* released with the WIK Model or the *WIK Reference Paper* released with the *WIK Model Discussion Paper*. The Commission stated in the *WIK Model Discussion Paper* that it considered that these documents were in the nature of reference material to assist parties to make submissions and support the use of the WIK Model.[544]

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[544] ACCC, *WIK Model Discussion Paper*, p. 8.

A.4.1.3.2. Submission format

The *WIK Model Discussion Paper* outlined that written submissions would be accepted. In addition, the ACCC indicated that all submissions would be considered as public submissions and posted on the ACCC's website.

It also outlined those parties wishing to submit commercial-in-confidence material as part of their submission to the ACCC would be required to submit both a public and commercial-in-confidence version of their submission. The public version of the submission should clearly identify the commercial-in-confidence material by replacing the confidential material with an appropriate symbol or 'c-i-c'.

Only one party, Vodafone, provided a public and commercial-in-confidence version of its submission to the ACCC. On 20 March 2007, the ACCC indicated on its website that parties requiring a copy of this commercial-in-confidence submission should directly contact Vodafone and provided the details of Vodafone's contact officer for this matter.

Optus provided a public version of its submission to the ACCC, which contained commercial-in-confidence material marked 'c-i-c'. It did not provide the ACCC with a commercial-in-confidence version of this document as requested in the *WIK Model Discussion Paper*. Accordingly, the Commission has not had access to the material marked c-i-c by Optus.

A.4.1.4. WIK Model Access Conditions

Interested parties that signed the *Access Deed* were provided with a copy of the WIK Model and *User Guide* on CD-ROM to assist with their submissions on and from 16 February 2007.

The *WIK Model Discussion Paper* outlined that the WIK Model would be made available on a CD-ROM to parties which agree to the conditions set out in the *Access Deed*.

The *User Guide* and WIK Model were only released to interested parties that signed the *Access Deed*.

Parties were provided with details for arranging to sign the *Access Deed* on 1 February 2007, more than two weeks before the WIK Model was available for collection.

A.4.1.5. Access Deeds executed

The ACCC received inquiries regarding access to the WIK Model from 14 organisations. Of these, 12 organisations entered into an *Access Deed* with the ACCC. Table 3-2 below lists the interested parties who entered into an *Access Deed*.

Table A.4-1: Interested Parties who entered into the *Access Deed*

Access Deed Party	Access Deed Date	Date on which WIK Model Access was requested	WIK Model Collection Date	Date Returned WIK Model CD-ROMs received by ACCC
AAPT Limited	15 February	13 February	16 February	16 March
Telstra Corporation Limited	15 February	14 February	16 February	16 March
Hutchison 3G Australia Pty Limited	16 February	15 February	22 February	16 March
Vodafone Australia Limited	16 February	9 February	16 February	19 March
Allens Arthur Robinson (AAR)	19 February	15 February	22 February	Not applicable. AAR provided Marsden Jacob and Associates (MJA) with AAR's copy of the WIK Model CD-ROM on or about 13 March. MJA returned the CD-ROM to the ACCC. (16 March)
SingTel Optus Pty Limited	20 February	5 February	20 February	19 March
PowerTel Limited	28 February	16 February	1 March	16 March
Synergies Economic Consulting Pty Limited	1 March	1 March	Telstra provided Synergies with one of Telstra's copies of the WIK Model CD-ROM on or about 1 March	19 March
Access Economics Pty Limited	2 March	27 February	2 March	20 March
The Competitive Carriers' Coalition Inc.	5 March	28 February	7 March	20 March
Marsden Jacob and Associates	8 March	15 February	AAR provided MJA with AAR's copy of the WIK Model CD-ROM on or about 13 March	16 March
Primus Telecommunications Pty Limited	16 March	14 February	Not applicable. Primus could obtain access to the WIK Model from the CCC.	Not applicable. Primus could obtain access to the WIK Model from the CCC.

Note: All dates in the table are 2007.

Three of the parties provided with a copy of the WIK Model CD-ROM (i.e. Optus, Vodafone and AAPT) informed the ACCC that they were experiencing difficulties in installing and running the WIK Model contained on the CD-ROM. An ACCC staff

member was made available to assist these parties with the installation process. It eventuated that these difficulties resulted either from difficulties with their own internal information technology processes or from not following the instructions set out in the *User Guide*. ACCC staff successfully assisted Optus, Vodafone and AAPT to install and run their copies of the WIK Model. In addition, ACCC staff assisted Access Economics with its installation of the WIK Model. On 21 February 2007 and 26 February 2007 Optus requested an extension of time in which to lodge its submission due to the time it took Optus to install and run the WIK Model. The ACCC did not consider that it was appropriate to grant Optus an extension since the difficulties Optus experienced were not due to any technical problem with the CD-ROM or *User Guide* and that it would be inappropriate to allow one party an extension while maintaining the required timeframes for other interested parties.

As Telstra notes in its submission, Telstra wrote to the ACCC seeking access to the source code to the WIK Model and the ACCC denied this request. [545]

The ACCC declined to provide access to the source code because it was not required for the purpose of making submissions during the consultation period. The ACCC provided interested parties with material relevant to the submission period including the WIK Model, the *WIK Report* and the *User Guide*. The Commission considers that this material provided interested parties with sufficient information to enable them to make meaningful submissions about the WIK Model.

Telstra was informed that:

- Section 4 of the *WIK Report* describes the network design (the SNPT) and Cost Module of the WIK Model. In particular, the Cost Module section provides details about how investment and cost calculations are made, which directly relate to the underlying code in the WIK Model. Accordingly, the comprehensive detail contained in the *WIK Report* regarding the SNPT and Cost Module obviates any potential need for access to the underlying code. In addition, Annexes A, B and C of the *WIK Report* outline the input parameters used in the model for the reference of users of the WIK Model. Many of these input parameters could be altered, particularly those that can significantly influence the cost estimate generated by the WIK Model; and

- access to the WIK Model was provided to interested parties for the sole purpose of making submissions on the *WIK Report* and, in particular, the range of cost outcomes arising from the various scenarios presented that will inform the Commission of price-related terms and conditions for inclusion in a *MTAS Pricing Principles Determination* relevant for the period 1 July 2007 to 30 June 2009. Access to the underlying code of the WIK Model was not required for the purpose of making submissions in that process; and

- in relation to the specific issues raised by Telstra[546] about the level of detail provided in the *WIK Report* about the SNPT, the input and output files are provided to interested parties and documented in the Appendices to the *WIK*

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[545] Telstra Corporation Limited, *Submission in Response to the ACCC's Discussion Paper on the WIK Mobile Network and Cost Model to Inform the MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*, (Telstra submission), March 2007, p. 9. Telstra had claimed confidentiality over this correspondence but in its submission cited this correspondence and referred to certain details set out therein.

[546] Telstra submission, March 2007, p. 10.

Report. This includes the weight of base transmission stations (BTSs) in the costing of the MTAS. The various scenarios presented in section 6 of the *WIK Report* also provide an insight into the relationships between population coverage and the extent of BTS deployment and these relationships can be tested and reviewed by interested parties in developing their own scenarios.

Accordingly, Telstra and other interested parties were not deprived of the information required to make submissions on the BTS deployment in the model and indeed many interested parties made constructive submissions on this and other network related issues.

In the Commission's view, the *WIK Report* contained sufficient detailed material for parties to make meaningful submissions and it was not necessary to provide access to the source code for this purpose.

All the WIK Model CD-ROMs supplied to interested parties who entered into an *Access Deed* were returned to the Commission. Under the *Access Deed*, interested parties were required to return their copy of the WIK Model to the Commission by 5pm on 16 March 2007. Table 3-2 sets out when the returned WIK Model CD-ROMs were received by the ACCC.

On 28 March 2007, 2 May 2007, 3 May 2007, and 17 May 2007 ACCC staff attended meetings and presentations given by Vodafone in relation to Vodafone's submission. On 29 March 2007, ACCC staff attended a presentation given by Access Economics (on behalf of the CCC) in relation to the CCC's submission. Representatives of PowerTel and Macquarie Telecom also attended Access Economics' presentation.

In light of submissions made by interested parties about the use of busy-hour data in the WIK Model, the ACCC wrote to all MNOs on 3 April 2007 asking them to provide certain busy-hour information. All the MNOs provided the requested information, and any public versions of these submissions have been posted on the ACCC's website.

A.4.1.6. Parties' views on *WIK Report* and WIK Model consultation process

The ACCC received a number of submissions on the *WIK Report* and WIK Model consultation process.

AAPT submits that the WIK Model is user-friendly.[547]

Optus submits that the consultation process is not sufficiently transparent and that the Commission should 'provide Optus and interested parties with all of its correspondence, meeting notes, file notes and working papers that have been produced during the preparation of the WIK Model.'[548] Also, it submits that the Commission should implement processes within the Commission for more open and constructive dialogue including public hearings with the Commission and WIK.[549]

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[547] AAPT Limited, *AAPT Limited's Response to Request for Submissions Regarding the WIK Mobile Network and Cost Model to inform the MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*, (AAPT submission), p. 1.

[548] Optus, *Optus Submission to the Australian Competition and Consumer Commission on the WIK Mobile Network and Cost Model for Australia*, (Optus submission), March 2007, p. 5.

[549] ibid.

Optus submits that it 'would be happy to engage with the Commission, including the supply of confidential information flagged in this submission as [c-i-c] and additional confidential information, if features of this request are incorporated into the Commission's future processes.'[550]

Telstra submits that the authors of the WIK Report 'rely on international benchmarks in respect of various inputs into the model without discussing the applicability of those benchmarks to Australia' and '[i]n some instances it is not clear why local data could not have been used.'[551] Telstra further submits that the inability of parties to make submissions on the *User Guide* is 'difficult to reconcile with its previous criticisms of Telstra's failure to provide third parties with a user manual to accompany the PIE II model.'[552] Also, that the Commission's approach to its assessment of PIE II and the present consultation process are plainly inconsistent especially in stressing the importance of access to the source code of PIE II as being fundamental before a model can be accepted as reasonable and used to set indicative prices; yet in another context to simply deny access to the source code of the WIK Model.[553]

Telstra also notes that the Commission stated in its assessment of Telstra's ULLS monthly charge undertaking that the absence of a user manual 'makes review and manipulation of the model for the purposes of critiquing it difficult.'[554]

Consultation time period

Optus submits that it is puzzling that the Commission would criticise Telstra's consultation process of six weeks for the PIE II model, but then applies a more restricted approach to consultation on its own model[555]. Additionally, 'arguments that the timeframe for the consultation process has been affected by the need to protect the intellectual property rights of WIK are unhelpful and contrary to the objectives of the Commission in respect of establishing pricing principles for regulated services.'[556]

Optus submits that it had less than one month to access the model. Upon receiving the CD-Rom from the Commission, Optus's use of the CD-Rom was affected by technical errors it encountered and that its request for an extension from the Commission was in Optus's view unreasonably denied. The Commission's approach, requiring all correspondence to be in writing, contributed to this delay.[557]

Optus further submits that the Commission's approach to this consultation must be contrasted to its criticisms of Telstra and the transparency of the PIE II model and access to that model. Optus's review of the WIK Model is necessarily limited and as such the fact that Optus has not at all or fully critiqued any aspect of the model should

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[550] ibid.

[551] Telstra submission, p. 15.

[552] ibid., p. 9.

[553] ibid., p. 11

[554] ibid., p. 9.

[555] Optus submission, p. 3.

[556] ibid.

[557] ibid.

not be taken as acceptance of the quality or appropriateness of any part of the model.[558]

Telstra submits that the time period to assess the WIK Model was too short and contrasts this with the ordinary undertaking process.[559]

Telstra submits that it is difficult to see how the Commission can justify giving interested parties only four weeks to consider the WIK Model yet take over a year to consider other people's MTAS models (which, Telstra notes, were less complex than the WIK Model).[560]

Telstra submits that there has been insufficient opportunity for party consultation. Telstra submits that 'the consultation period has been disproportionately short and access to the WIK Model has not been open and transparent.'[561]

Vodafone submits that it 'is concerned by the 'one shot' opportunity to comment on the WIK cost model' and that other regulatory authorities have recognised that cost model development is an iterative process requiring industry consultation. Vodafone submits that processes associated with other cost models developed in the Netherlands and the UK took in some cases a couple of years to complete.[562]

Model source code

AAPT submits that the WIK Model does not allow the equations to be viewed by the user.[563] This results in uncertainty which may amount to time consuming and costly pricing disputes.[564]

Telstra submits that the inability of parties to access the source code is 'disappointing' as the *WIK Report* stressed the importance of 'an open and transparent consultation process about the model and model outcomes that would inform future regulatory processes.'[565]

Telstra submit that the scenario analysis undertaken by WIK should have included an assessment of the impact of sensitivity analysis applied to key input parameters.[566]

Telstra submits that access to the source code is critical to understanding several aspects of the WIK Model.[567]

Vodafone submits that it has concerns with the inability of parties to analyse the algorithms underpinning the calculation of the cost model's output. Vodafone submits

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[558] ibid., pp. 3-4.

[559] Telstra submission, p. 8.

[560] ibid., p. 9.

[561] ibid., p. 8.

[562] Vodafone Australia Limited, *Submission to the Australian Competition and Consumer Commission: WIK Mobile Network and Cost Model and MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*, (Vodafone submission), March 2007, p. 12.

[563] AAPT submission, p. 3.

[564] ibid., pp. 3-4.

[565] Telstra submission, p. 10.

[566] ibid., pp. 47-48.

[567] ibid., p. 9.

that 'while it respects protection of WIK's intellectual property, this could have been done in a manner which allowed relevant parties to fully understand the cost model's workings.'[568]

Vodafone submits that 'in all other major regulatory consultations with which Vodafone has been involved (e.g. UK, Netherlands, Sweden, Greece, Romania) full access to the cost model algorithms has been made available.'[569]

Process going forward

Optus submits that the WIK Model should be made available to all parties on a permanent basis as this will 'facilitate improvements in the modelling, assist negotiations between parties and allow adequate consultation.'[570]

Telstra submits that further concern arises in relation to where the consultation process will head from here and that it can be expected that the submissions received by the Commission will be of their very nature confidential.[571]

Telstra further submits that the requirement of parties to destroy the WIK Model and associated materials on the day that their submissions are due means that parties will not be in a position to consider the submissions of other parties or any outcomes from the consultation process.[572]

Telstra submits that there can be little confidence that the Commission can properly be held to account on the reasonableness of the ultimate form of the model and its outputs and no assurances have been given as to the visibility of the consultation process after its submissions have been lodged.[573]

Telstra further notes that no draft version of the *WIK Report* has been provided for public comment and hence parties have not had an 'opportunity to comment on any changes made to that version as a result of the industry consultation process.'[574]

A.4.1.7. Commission's view

The *WIK Report* consultation period and WIK Model access regime as outlined in the WIK *Model Discussion Paper* released on 1 February 2007 was intended to be open and transparent to all parties. In addition, the Commission was cognisant that in order to treat parties fairly and afford each interested party with the same opportunity for interface with the Commission about the *WIK Report* and WIK Model that this required strict adherence to the timeline and process established in the *WIK Model Discussion Paper*.

As a result, and in the face of strong criticism from interested parties in their submissions about the process as well as approaches to the Commission by individual interested parties before, during and subsequent to the consultation period of

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[568] Vodafone submission, p. 12.

[569] ibid.

[570] Optus submission, p. 5.

[571] Telstra submission, p. 12.

[572] ibid.

[573] ibid.

[574] ibid.

1 February 2007 to 16 March 2007, the Commission maintains that the conditions imposed, did afford all parties equal opportunity to make submissions on the WIK Model and *WIK Report*.

Further, the Commission is mindful of the fact that unlike other processes, such as arbitrations where the direct and relevant interested parties are clearly defined and known for a particular process, the *WIK Report* and WIK Model consultation process is a public process, with many different interested parties. These may or may not be known at the time of the consultation process. The Commission considers it is even more difficult in these processes to extend deadlines for submissions, provide material to one interested party and not all interested parties, and in general divert from the publicly announced timeframes. For these reasons, the timeframe established in the *WIK Model Discussion Paper* was adhered to.

In order to maintain openness and transparency of the consultation process in the development and public release of the *WIK Report* and WIK Model, the Commission notes that it has:

- engaged in a public tender process, with the release of a RFT on 31 March 2006, to identify and award WIK the consultancy to develop an engineering and economic cost model;

- requested WIK to develop a model that primarily uses input parameters that are not commercial-in-confidence, as was expressly outlined in the RFT: the Commission believes that there will be minimal commercial-in-confidence issues involved in providing the required consulting services.'[575] To this end, prior to the public release of the WIK Model the Commission sought assistance from all four MNOs about non-commercially sensitive information that they could provide to assist this parameterisation process;

- released the *WIK Report* publicly on 1 February 2007, and indicated in the Commission's *WIK Model Discussion Paper* released on the same day, that the WIK Model (and its *User Guide*) was available to all interested parties that signed the *Access Deed* on and from 16 February 2007;

- provided the WIK Model to interested parties on substantively the same terms and conditions, and flexibly responded to practical problems raised about the WIK Model access conditions to allow access to the WIK Model throughout the consultation period. These issues have, by their very nature, been varied amongst the interested parties but have been consistently dealt with as the circumstances warranted;

- the WIK Model and *User Guide* were made available to all interested parties during the period 16 February 2007 to 16 March 2007 (subject to signing the *Access Deed*) even though some interested parties attempted to obtain extensions to provide submissions after the due date; and

- provided technical support for interested parties when they have experienced difficulties in either installing or running the WIK Model. However, it is inevitable that the type of support provided has needed to vary across interested parties according to the nature of issues encountered.

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[575] ACCC, *Request for Tender for the Provision of Expert Telecommunications Sector Consultancy Services to the Australian Competition and Consumer Commission*, 31 March 2006, p. 3.

The Commission maintains that the consistency of treatment of all interested parties in relation to the *WIK Report* and WIK Model consultation process consistent with the timeframes as outlined in the *WIK Model Discussion Paper* afforded all interested parties with the same opportunities to make meaningful submissions without providing advantage to any party over other parties.

(a)   Expertise and experience of WIK

The Commission has noted both Telstra's and Optus's submissions in respect of the expertise and experience of WIK.

The Commission does not agree with these submissions and notes WIK's extensive experience in consulting in the global telecommunications industry, details of its experience can be accessed on its website at www.wik-consult.com.

(b)   Duration of consultation period

Telstra[576], Optus[577] and Vodafone[578] have each submitted that they were not provided with sufficient time to consider the WIK Model.

The Commission is of the view that four weeks for the WIK Model and the *User Guide*, and six weeks for the other documentation, was sufficient to allow interested parties to make submissions. The initial six week consultation period is within the range of consultation periods which have taken place in the respect of MTAS cost model processes as outlined in section 3.2. The material made available by the Commission for this consultation is sufficient to enable interested parties to make meaningful submissions. In addition, working with the WIK Model and the *WIK Report* afforded interested parties with the ability to understand the significant relationships amongst parameters and how the WIK Model was producing the outcomes.

Optus submitted that the 'timeframe for the consultation process has been affected by the need to protect the intellectual property rights of WIK'.[579] In determining the duration of the consultation period, it was not necessary to take into account the intellectual property rights of WIK. The consultation period selected by the Commission was selected for the reasons set out in the above paragraph. Any concerns which the Commission had in relation to the protection of intellectual property rights were addressed through requiring interested parties to enter into an *Access Deed*.

Telstra submitted that the Commission's approach to this consultation could be contrasted with the process for the consideration of an ordinary access undertaking under Division 5 of Part XIC and the time taken by the Commission to consider MTAS models for Vodafone's and Optus's MTAS undertakings.[580] Similarly, Optus

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[576]   Telstra submission, pp. 8-9.

[577]   Optus submission, pp. 3-4.

[578]   Vodafone submission, p. 12.

[579]   Optus submission, p. 3.

[580]   Telstra submission, pp. 8-9.

submitted that the Commission's approach could be contrasted with the approach taken in relation to recent consultations on Telstra's undertakings.[581] These regulatory processes in relation to the assessment of undertakings are different from the regulatory process currently being undertaken by the Commission and should not be used a guide. The current consultation is part of continuous consultation on the subject with the industry. It is not a 'one-off' or isolated consultation. As outlined in section 3.2, there has been consultation with interested parties in other MTAS cost model processes of 20 weeks prior to the WIK Model consultation process. The underlying principles and some key cost inputs have already been discussed in the context of these other undertaking processes that have been the subject to review by the Tribunal. In addition, the six-week period of consultation on the draft *MTAS Pricing Principles Determination* will be part of future on-going regulatory processes that will involve the WIK Model.

The Commission notes that Telstra[582], Optus[583] and Vodafone[584] would have preferred more time in which to consider the WIK Model. The WIK Model will be made available to parties at appropriate junctures to support regulatory processes. The WIK Model is considered an important to support the Commission's indicative prices relevant for the period 1 July 2007 to 31 December 2008, supporting and confirming the outcomes of international benchmarking and regulatory accounting data that informs the range of 5 cpm to 12 cpm relevant for the current *MTAS Pricing Principles Determination*.

As part of this ongoing consultation the Commission will release the WIK Model for a another period associated with the release of a draft *MTAS Pricing Principles Determination* relevant for the period 1 July 2007 to 31 December 2008. The WIK Model will be released once an *Access Deed* is signed by each relevant party. Additional materials will also be provided to interested parties, in order to assist interested parties to make submissions on the draft *MTAS Pricing Principles Determination*. The terms on which the WIK Model will be made available to interested parties for this additional consultation period are set out in more detail in paragraph (g) below.

The Commission notes Vodafone's submission that other regulatory authorities have recognised that cost model development is an iterative process requiring industry consultation.[585] The Commission agrees with Vodafone's submission. The Commission would like to note, however, as set out above in this report, that the consultation process has been an iterative one. The consultation process has been ongoing and commenced in 2003 with the *Mobile Service Review* which informed the 2004 *MTAS Final Report* which resulted in the declaration of the MTAS in 2004 and led to a series of MTAS undertakings (which were rejected by the Commission, including two that were subsequently rejected by the Tribunal) and the development of cost models on behalf of Optus and Vodafone submitted in support of their MTAS undertakings. Each of these events involved industry consultation.

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[581]   Optus submission, pp. 3-4.

[582]   Telstra submission, pp. 8-9.

[583]   Optus submission, pp. 3-4.

[584]   Vodafone submission, p. 12.

[585]   ibid.

The Commission also notes that MNOs were invited to attend consultation meetings with WIK which were held in September 2006. The Commission notes that certain interested parties ignored its invitation to discuss certain issues such as parameterisation of the model with publicly-available Australian inputs. However, on the other hand questioned why only international benchmarks are used. That said, as outlined in section 3.2, the Commission also considers that parties have not acknowledged the extensive consultation that has already been undertaken in respect of two other models developed by Australian MNOs with Australian inputs. The Commission considers that the outcomes of these processes have been ongoing and have continued specifically in relation to cost models since the end of 2004, when both Optus and Vodafone[586] submitted cost models to support their undertaking.

(c)   *Transparent and open access to the WIK Model*

While Telstra submits that 'the consultation period has been disproportionately short and access to the WIK Model has not been open and transparent,'[587] this ignores the fact that the Commission has had extensive and ongoing consultation about cost models frameworks, input parameters and pricing principles since 2003. Again, as set out above, interest parties were invited to attend consultation meetings in September 2006 as the WIK Model was being developed.

As the Commission understands it, Telstra submits that since the WIK Model is based on publicly available information then the consultation process should be open and transparent and this would include providing access to the WIK Model source code.[588] In the Commission's view, the consultation process has been open and transparent and the fact the Commission declined to provide Telstra with a copy of the WIK Model source code (for the reasons set out in paragraph (e)) does not compromise the integrity, openness or transparency of the consultation process. The Commission notes that Telstra quotes the *WIK Report* about an open and transparent consultation process about the model and model outcomes that would inform future regulatory processes.[589] The *WIK Report* in fact states that:

> To avoid reliance on commercial-in-confidence information the ACCC did not require an assessment of the cost of termination of any particular mobile carrier operating in Australia. The model structure and model parameter inputs needed to be based on publicly available information in Australia, on modelling exercises in other jurisdictions and the expert knowledge of the consultant. This approach brings two benefits:
>
> 1. Development of a model consistent with a hypothetical efficient operator in an Australian context, and
>
> 2. Enable an open and transparent consultation process about the model and model outcomes that would inform future regulatory processes.[590]

This comment is made in relation to the use of publicly available information, which as the Commission has indicated, has been used to parameterise the WIK Model

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[586]   Vodafone resubmitted its undertaking in February 2005, after initially withdrawing an earlier undertaking it submitted in November 2004.

[587]   Telstra submission, pp. 8 and 10.

[588]   ibid., p. 10.

[589]   ibid.

[590]   WIK, *WIK Report*, p. 1.

where possible. When the Commission did seek assistance from Telstra and other MNOs to obtain any publicly available information, one MNO declined to input into this process. The Commission therefore considers that any criticisms now levelled at the Commission about transparency by a party that declined to participate and assist in the development of the model at that time are somewhat inconsistent.

In light of the issues raised by Telstra and other interested parties about access to the WIK Model and future processes, the Commission is making available additional material to parties regarding the model workings (although it does not consider that the additional material will necessarily provide any further information or detail that will add to the understanding of the workings of the key inputs, outputs and relationships in the model since the input files were already documented in the Annexes A and B of the *WIK Report*).

With respect to Optus's submission regarding access to the WIK Model,[591] the Commission is concerned about the Optus's characterisation of this issue. As set out above, Optus's use of the CD-ROM did not involve technical errors in relation to the CD-ROM. Rather, the issues related to Optus's own internal information technology processes.

(d)   Submissions on the User Guide

Telstra submitted that the inability of parties to make submissions on the *User Guide* is difficult to reconcile with the Commission's previous criticisms of Telstra's failure to provide third parties with a user manual to accompany the PIE II model.[592]

The Commission does not accept that there is any difficulty in reconciling the two propositions. The *User Guide* was made available to interested parties who entered into an *Access Deed*. The purpose of the *User Guide* was to make access to, and use of, the WIK Model easier. The *User Guide* outlined the installation procedure for the WIK Model and provided a guide for carrying out cost calculations.

The *User Guide* was provided to interested parties to assist them in the installation process for the WIK Model, to identify the source of any error messages in running the WIK Model and illustrating the sequential order of the worksheets and what data and information they contained in the WIK Model. The *User Guide* did not contain anything about the workings of the WIK Model which was not available from the *WIK Report* or the WIK Model itself. It did not show, for example, the relationships and interactions of the key parameters and inputs of the WIK Model. The Commission does not consider that the *User Guide* is essential for the evaluation of the WIK Model. Therefore, while it was helpful for interested parties to have a *User Guide* so they could efficiently install and use the WIK Model, if its instructions were followed correctly, it was not necessary for submissions to be made on the *User Guide*. However, as section 2.1 of the *WIK Model Discussion Paper* indicated, the Commission was not seeking to limit parties' submissions, and the fact that parties provided submissions about the *User Guide* and the Commission is addressing these submissions indeed proves that point.

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[591]   Optus submission, p. 3.

[592]   Telstra submission, p. 9.

Telstra and other parties seek to draw parallels between the WIK Model consultation process and materials and other cost model processes such as for the PIE II model.

These submissions do not relate to the current process and it is difficult to ascertain without the material being available for direct comparison whether there is any relevance or not of these submissions to the WIK Model and supporting materials. The Commission also notes that the differences in processes between the WIK Model and PIE II need to factor in:

- previous consultation processes for other MTAS models about similar or the same issues presented in the WIK Model;

- as parties have themselves submitted, the nature of, and complexities inherent in, each model; and

- the end purpose for which that model will be used.

The Commission's sole purpose in highlighting the nature of the *User Guide* as supporting material to the WIK Model was to signal to parties that it was not intending parties to make submissions about this material and that they should concentrate their efforts on making submissions on the material on which the Commission was seeking submissions.

(e)   *Access to the WIK Model algorithms and its source code*

The Commission has provided interested parties with extensive and comprehensive documentation to assist interested parties with their use of the WIK Model in order that they can make meaningful submissions (i.e. the *WIK Report*, the *WIK Model Discussion Paper* and the *WIK Reference Paper*). Section 4 of the *WIK Report* describes the network design (the SNPT) and Cost Module of the WIK Model. In particular, the Cost Module section provides details about how investment and cost calculations are made, which directly relate to the underlying code in the WIK Model. Accordingly, the comprehensive detail contained in the *WIK Report* regarding the SNPT and Cost Module obviates any potential need for access to the underlying code. In addition, Annexes A, B and C of the *WIK Report* outline the input parameters used in the model for the reference of users of the WIK Model. Of which many could be altered and significantly influence the cost estimate generated by the WIK Model. Access to the WIK Model was provided to interested parties for the purpose of making submissions on the *WIK Report* and, in particular, the range of cost outcomes arising from the various scenarios presented that will inform the Commission of price-related terms and conditions for inclusion in a *MTAS Pricing Principles Determination* relevant for the period 1 July 2007 to 30 June 2009. Access to the underlying code of the WIK Model was not required for the purpose of making submissions in that process.

AAPT,[593] Telstra,[594] and Vodafone[595] have all submitted that access to the algorithms would have enhanced their understanding of the WIK Model's workings and allowed parties to make more meaningful submissions.

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[593]   AAPT submission, pp. 3-4.

[594]   Telstra submission, pp. 9-10.

[595]   Vodafone submission, p. 12.

In particular, Telstra submitted that it was unable to test the robustness of the WIK Model due to the lack of transparency in its construction.[596] The Commission is of the view that the WIK Model itself, the comprehensive description of the WIK Model set out in the *WIK Report* and the *User Guide* provide the transparency necessary to test robustness and, therefore, it is not necessary to analyse the WIK Model source code. In any event, the relationships and robustness of the WIK Model can be tested by systematically changing the parameter sets which any interested party who had access to the WIK Model could do. WIK has provided sensitivity analyses for key factors that materially drive costs in the WIK Model (e.g. population coverage and population penetration). The Commission also notes that a scenario in section 6 of the *WIK Report* provides outcomes for efficient cost estimates when different WACCs are applied.[597] In this scenario, the WACC changed from 11.68 to 15.35 per cent (see Table 6-4 of the *WIK Report*). In addition, the impact of unit prices and volumes discernable by annual cost information that was provided for each scenario (e.g. see Tables 6-3, 6-7, 6-10, 6-13 and 6-15 of the *WIK Report*). The Commission also notes that the WIK Model has been populated with reasonable parameters and if interested parties have more reliable or robust information they could present this information properly referenced to the Commission.

The workings and relationships of the WIK Model can be ascertained by changing parameters with reference to documentation and scenarios presented.

To assist interested parties in their consideration of the WIK Model, the Commission has decided to release the technical specification manuals (which comprehensively set out key relationships in the WIK Model).

The Commission is of the view that sufficient information was provided in the *WIK Report* to allow Telstra to understand the SNPT and how it determines the deployment of base transmission stations. In addition, the *WIK Report* contained sufficient information in relation to the provisioning of the backhaul network and the calculation which is made to determine the lengths of the backhaul network. Telstra submitted that it required access to the source code to understand these aspects of the WIK Model.[598] The Commission considers any remnant concerns about these issues will be addressed with reference to even more detailed output files and access to technical specification manuals being made available with the WIK Model.

Telstra, in its submission, also refers to the Commission's comments on the lack of transparency provided by Telstra in relation to Telstra's PIE II model for the purposes of the Commission's *Assessment of Telstra's ULLS and LSS monthly charge undertakings (Final Decision)(December 2005), Assessment of Telstra's ULLS monthly charge undertaking (Final Decision)(August 2006)* and *Final Determination: Model Price Terms and Conditions of the PSTN, ULLS and LCS services (October 2003)*.[599] The Commission has been open and transparent in this consultation process as outlined in section 1 (which has been extensive since 2003) and the next phase of this ongoing process will include further access to the WIK Model and access to the technical specification manuals for the WIK Model.

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[596]   Telstra submission, pp. 10 and 47-48.

[597]   WIK, *WIK Report*, pp. 122-123.

[598]   Telstra submission, p. 10.

[599]   ibid., p. 11.

(f)   *Access to submissions made by interested parties*

The *WIK Model Discussion Paper* states that '[a]ll submissions will be considered as public submissions and will be posted on the Commission's website.'[600] The Commission has placed all these submissions including submissions provided on subsequent matters such as information on busy-hour statistics on its website at: http://www.accc.gov.au/content/index.phtml/itemId/783052/fromItemId/356715.

Vodafone submitted both a commercial-in-confidence and public version submission. The Commission's website has details of how the parties can obtain a copy of Vodafone's confidential submission.

Optus has not made available to the Commission a commercial-in-confidence submission to support its public submission (containing commercial-in-confidence information).

(g)   *Future access to the WIK Model*

The consultation process for cost models and costing principles has been ongoing and continuous for the past four years. The WIK Model has been developed as part of this process and there will be opportunity for parties to constructively contribute to processes going forward and as required. The Commission will make the WIK Model available with the draft *MTAS Pricing Principles Determination* for those interested parties that sign the *WIK Model Access Deed*.

In addition, the Commission intends to make the WIK Model available to interested parties to assist interested parties in certain future regulatory processes and consultation periods. For example, the Commission envisages that such regulatory processes include responses to a draft decision relating to an MTAS undertaking where the Commission proposes to rely on the WIK Model or a determination in relation to an access dispute about the MTAS. There may be other regulatory processes in which the WIK Model will be a relevant tool for interested parties.

Telstra submitted that the obligation to destroy the WIK Model, and associated materials generated using the model, on the day submissions were due means that interested parties will not be in a position to consider the submissions of the other parties or any outcomes from the consultation process.[601] In the Commission's view, this does not prevent interested parties from considering the other submissions or the outcomes of this phase of the consultation process since the Commission has published the submissions in the public domain. The Commission notes that when the WIK Model will be next released to interested parties (see above) they will be able to use the WIK Model to attempt to replicate or assess the validity of the results achieved by other interested parties through their initial access to the WIK Model. The Commission also notes that under the *Access Deed*, parties were able to retain WIK Model outputs generated as a direct consequence of inputting data into the WIK Model in accordance with the *User Guide*.

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[600]   ACCC, *WIK Model Discussion Paper*, p. 9.

[601]   Telstra submission, p. 12.

Telstra in its submission noted that according to the Commission's RFT a draft report was to be provided by the successful tenderer. Telstra also noted that no such report was provided for public comment.[602] The Commission notes that it was not intended for the draft report to be made available for public comment because the draft was only intended to be reviewed by Commission staff for accuracy prior to submitting the report to the Commission. This draft report is not used as the basis for any Commission decision and as a result is not a relevant document for interested parties. Telstra in its submission also expressed concern that it may not be given the opportunity to comment on any changes made to the WIK Model as a result of the industry consultation process.[603] The Commission notes that all interested parties will be given such an opportunity during the current phase of the consultation process and other relevant regulatory processes over time.

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[602] ibid.

[603] ibid.

Appendices

Appendix A – MTAS Disputes Notified to Commission

Name of Dispute (access seeker/access provider)	Date dispute notified	Status of dispute
PowerTel / Vodafone	16 December 2004	Final Determination and Interim Determination made
Telstra / Vodafone	17 December 2004	Dispute withdrawn
Telstra / Optus	22 December 2004	Dispute withdrawn
H3GA / Vodafone	23 December 2004	Final Determination and Interim Determination made
PowerTel / Optus	23 December 2004	Dispute withdrawn
AAPT / Vodafone (2005)	27 January 2005	Final Determination and Interim Determination made
HTAL / Optus	24 February 2005	Final Determination and Interim Determination made
H3GA / Optus	24 February 2005	Final Determination and Interim Determination made
HTAL / Vodafone	24 February 2005	Final Determination and Interim Determination made
Primus / Vodafone	7 March 2005	Final Determination and Interim Determination made
AAPT / Optus	21 June 2005	Final Determination and Interim Determination made
Telstra / Optus	7 December 2005	Final Determination and Interim Determination made
Telstra / H3GA	19 December 2005	Final Determination and Interim Determination made
Telstra / HTAL	19 December 2005	Final Determination and Interim Determination made
Vodafone / H3GA	20 December 2005	Dispute withdrawn
Vodafone / HTAL	20 December 2005	Dispute withdrawn
AAPT / Vodafone (2006)	11 January 2006	Final Determination made
Optus / Telstra	12 January 2006	Final Determination and Interim Determination made
Telstra / Vodafone	7 February 2006	Final Determination and Interim Determination made
HTAL / Telstra	8 February 2006	Final Determination and Interim Determination made
H3GA / Telstra	8 February 2006	Final Determination and Interim Determination made
Optus / HTAL	2 May 2006	Final Determination made
Optus / H3GA	2 May 2006	Final Determination made
AAPT / HTAL	14 June 2006	Dispute withdrawn
AAPT / H3GA	14 June 2006	Dispute withdrawn
PowerTel / H3GA	12 July 2006	Dispute withdrawn
Telstra / Optus Mobiles	13 November 2006	Interim Determination made
Telstra / Optus Networks	13 November 2006	Interim Determination made
Optus Mobiles / Vodafone	20 December 2006	Dispute withdrawn
Optus Networks / Vodafone	20 December 2006	Dispute withdrawn
Optus Mobiles / Telstra	22 December 2006	Interim Determination made
Optus Networks / Telstra	22 December 2006	Interim Determination made

Telstra/Vodafone	17 May 2007	Constitution of Commission
Telstra/H3GA	17 May 2007	Constitution of Commission

Appendix B – Adjustment of POAs

In order to account for anomalies in the Census data as discussed in the Annexure on the WIK Model Outcomes (WIK Model Annexure) at A.1.1.3.1, the following table outlines the POAs that were selected and adjusted:

Table B-1: Postal Areas changed for airports

Airport	Post Code	Selected Suburb	Post Code	Original Population	Original Classification	Increase in Population	Adjusted Population	New Classification
Mascot	2020	St Peters	2044	7,076	suburban	13,611	20,687	urban
Melbourne	3045	Flemington	3031	15,905	suburban	11,004	26,909	urban
Brisbane	4009	Albion	4010	2,277	suburban	6,698	8,975	urban
Perth	6105	Rivervale	6103	7,263	suburban	10,938	18,201	urban
Adelaide	5032	Novar Gardens	5040	2,422	suburban	7,566	9,988	urban
Darwin	820	Darwin GPO	800	2,741	urban	4,099	6,840	denser urban
Canberra	2609	Thredbo Village	2625	914	suburban	3,919	4,833	urban

This table shows that the distribution of 57,835 people has been adjusted account for airports. This number includes passengers along with the people who go to the airport to pick up passengers such as friends, relatives, taxi drivers, etc. The adjustment of 57,835 people represents 0.28 per cent of Australia's total population.

Table B-2: Postal Areas changed for industrial areas

Industrial Districts	Post Code	Selected Suburb	Post Code	Original Population	Original Classification	Increase in Population	Adjusted Population	New Classification
Altona	3018	Williams RAAF	3027	109	rural	3,488	3,597	suburban
Cronulla	2230	Bulli	2516	5,707	rural	977	6,684	suburban
Belconnen	2617	Jerrabomberra	2619	2,795	rural	1,984	4,779	suburban
Ipswich	4305	Marburg	4346	616	rural	4,981	5,597	suburban

This table shows the distribution of 11,430 people has been adjusted to account for industrial areas. This number includes workers, staff, shoppers and other visitors to the area. The adjustment of 11,430 people represents 0.06 per cent of Australia's total population.

When the impact of these changes is combined 69,265 people have been adjusted to account for anomalies in the Census data. This accounts for 0.34 per cent of Australia's population.

Appendix C – Dual-band allowance

In order to account for the availability of spectrum in an Australian context which restricts the access of all MNOs except Telstra to the spectrum in the 1,800 MHz band outside of Australia's capital cities, an allowance has been made in the latest version of the WIK Model.

The nature of this allowance is derived by running two scenarios for both references cases for an operator with 25 per cent and 31 per cent market share.

For each reference case, a cost estimate is derived with an assumption of dual-band frequency and a single-band frequency. The following assumptions were made in determining these estimates

Table C-1: List of assumptions for single band and dual-band scenarios

WIK Model parameter assumptions	Derivation of Dual band cost estimate		Derivation of Single band cost estimate	
Scenario	25 per cent scenario	31 per cent scenario	25 per cent scenario	31 per cent scenario
milli-Erlang demand (to obtain approximately 43.5 billion minutes comprised of 41 billion voice minutes plus 6 per cent non-voice minutes)	13.1	13.1	13.1	13.1
Number of BSC locations	20	20	22	26
Traffic reduction factor	0	0	0	0
Number of ports per MSC (to maintain the number of switching machines at nine)	1,008	1,100	875	1,008
Busy-hour percentage	8.5	8.5	8.5	8.5
Business days	250	250	250	250
Unbilled minutes	0.04	0.04	0.04	0.04
WACC per cent	13	13	13	13
Cost estimate (cpm)	5.2697	4.8592	5.8626	5.5528

As a result the average cent per minute cost of the MTAS for each of the scenarios in this report is for the:
- 25 per cent scenario, an average cent per minute cost of 5.566 = (5.2697+5.8626)/2; and
- 31 per cent scenario, an average cent per minute cost of 5.206 = (4.8592+5.5528)/2.

Appendix D – Weighted Average Cost of Capital

Parties provided submissions on the following WACC parameters:

1. Risk free rate
2. Market risk Premium
3. Equity beta
4. Gearing levels

The relevant parameters as submitted by parties are considered in the following two scenarios

Taking into account the key parameters – a market risk premium informed by Australian referable risk-free and market interest rates and the range of equity betas submitted as reasonable, the following WACC outcomes are derived.

Table D-1: Scenario - Risk Free Rate (5.5 per cent)

WACC parameter		Equity Beta 1.10	Equity Beta 1.32	WIK Scenario
Nominal Risk Free Rate (%)	rf	5.5	5.5	4.4
Cost of Debt Margin over rf (%) *	dm	1.1	1.1	1.1
Nominal pre-tax cost of debt (%)	rd	6.6	6.6	5.5
Market Risk Premium (%)	MRP	6.0	6.0	4.5
Corporate Tax Rate (%)	T	30	30	30
Effective Tax Rate (%)	Te	20	20	20
Proportion of Franking Credits attributed value by shareholders (%)	g	50	50	0
LT Proportion of Equity Funding (%)	E/V	60	60	82.8
LT Proportion of Debt Funding (%)	D/V	40	40	17.2
Asset Beta	Ba	0.67	0.81	1.10
Equity Beta	Be	1.1	1.32	1.32
Post-Tax Nominal WACC		8.33	9.0	9.25
Pre-Tax Nominal WACC		**10.7**	**11.6**	**11.68**

Table D-2: Scenario – Risk Free Rate (5.7 per cent)

WACC parameter		Equity Beta 1.10	Equity Beta 1.32	WIK Scenario
WIK Nominal Risk Free Rate (%)	rf	5.7	5.7	4.4
Cost of Debt Margin over rf (%) *	dm	1.1	1.1	1.1
Nominal pre-tax cost of debt (%)	rd	6.8	6.8	5.5
Market Risk Premium (%)	MRP	6.0	6.0	4.5
Corporate Tax Rate (%)	T	30	30	30
Effective Tax Rate (%)	Te	20	20	20
Proportion of Franking Credits attributed value by	g	0.5	0.5	0

shareholders (%)				
Equity Funding (%)	E/V	60	60	82.8
Debt Funding (%)	D/V	40	40	17.2
Asset Beta	Ba	0.67	0.81	1.10
Equity Beta	Be	1.1	1.32	1.32
Post-Tax Nominal WACC		8.5	9.2	9.25
Pre-Tax Nominal WACC		**10.9**	**11.8**	**11.68**

*Cost of debt margin is comprised of debt issuance cost of 0.08 per cent and a debt premium of 1.02 per cent.

The conclusion is that a WACC of between 10.7 per cent and 11.8 per cent is reasonable, given the submissions about WACC parameters provided by interested parties. This is referable to the WIK Model WACC of 11.68 per cent derived using international parameters as outlined in the *WIK Report*.[604]

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[604] WIK Consult, *Mobile Termination Cost Model for Australia*, (*WIK Report*), January 2007, pp. 30-35.

Appendix E– 17 per cent market share scenario

A GSM operator covering 96 per cent of population and 96 per cent coverage with a market share of 17 per cent

This appendix outlines the scenario derived from the WIK Model for a smaller mobile network operator with a market share of 17 per cent. This scenario is developed for illustrative purposes only.

Other network element assumptions and outcomes

The following assumptions have been changed from the 17 per cent scenario in the WIK Report, using Version 1.1 of the WIK Model:

- 96 per cent geographic coverage;
- 13.1 milli-Erlang used;
- Dual-band and single-band scenarios were estimated and averaged;
- Traffic reduction in the core network was set zero;
- WACC was increased to 13 per cent; and
- The number of ports per MSC was reduced to ensure that nine switching machines are deployed in both the dual-band and single-band networks.

Compared to the 25 per cent scenario used in this report, the 17 per cent scenario:

- Uses 20 BSC locations instead of 21 BSC locations;
- Uses the same amount of switching machines; and
- Uses 3,971 BTSs and 2,992 sites compared to 4,878 BTSs and 3,619 sites in the 25 per cent scenario.

Relevant input parameter values

The market share assumption means that the smaller operator only serves 3.3 million customers. The smaller customer base results in a smaller share of On-Net traffic which is assumed to be 18.8 per cent of the operator's total traffic. The relative traffic for relevant all services is shown in the table below:

Table E-1: Proportion of mobile services for the 17 per cent scenario

Service	Proportion of total traffic (%)
Voice On-Net	18.8
Voice Termination	37.6
Voice Origination	37.6
Basic Data	2.0
High Speed Circuit Switched Data	0.8
GPRS	3.0
SMS	0.1
MMS	0.1
Total	100.00

WIK Model results

Due to the economies of scale, a smaller operator with 17 per cent market share faces higher costs for all services compared to the 25 per cent operator. The TSLRIC+ of providing voice termination increases from 5.6 cpm (25 per cent market share) to 6.7 cpm (17 per cent market share)or by 20 per cent.

Table E-2: Cent per minute outcomes of the 25 and 17 per cent scenarios

Service	Reference Scenario 25 % market share, 96 % coverage, WACC 13 % cpm	Scenario 17 % market share, 96 % coverage, WACC 13 % cpm
Voice On-Net	10.1	12.2
Voice Termination	**5.6**	**6.7**
Voice Origination	4.8	5.8
Basic Data	4.8	5.8
High Speed Circuit Switched Data	4.8	5.8
GPRS	4.6	5.5
SMS	15.3	20.9
MMS	5.2	6.1

Due to the reduced traffic volumes (2.9 billion of minutes per annum), the small operator can operate a smaller network.

The entire network (productive network assets and network support assets) represents an investment value of $1,314.7 million. Total annual costs of operating the network amount to $540.5 million per annum, $350.2 million of which represent the TSLRIC of the various network elements.

The table below represents the cost structure of the network. This cost structure is similar to that of the efficient smaller operator:

Table E-3: Annual costs of the 17 per cent scenario

Network element	Annual costs $ million	Proportion of TSLRIC (%)
Base Stations	203.3	58.0
BSC	27.5	7.9

MSC (incl. SP, CP and TRAU)	13.3	3.8
Signalling	1.5	0.4
HLR	3.4	1.0
SMSC	0.9	0.2
Radio links BTS-BTS hub	19.5	5.6
Radio links BTS hub-BSC	18.0	5.2
Leased lines BTS hub-BSC	-	0.0
Leased lines BSC-MSC	29.9	8.5
Leased lines MSC-MSC	32.9	9.4
Total annual network costs	350.2	100.0
Operating Expenditure	136.2	
Common organisational-level costs	54.1	
Total annual costs	540.5	

The total operating expenditure associated to the MTAS is $51.2 million ($136.2 million multiplied by 37.6 per cent).

Appendix F – Commission's estimation of the number of voice-equivalent minutes and the input cost savings arising from the reduction in the MTAS prices

1. Estimation of the number of voice-equivalent minutes

Purpose

To provide a range of parameters for the WIK Model, using estimates of the number of minutes of origination and termination (end minutes) on Australian mobile networks for 2006-07.

The publicly available data used to estimate annual traffic are limited to originating (retail outgoing) amounts.

So approximations are required to account for FTM, MTF and international outgoing and incoming minutes Further, growth factors are required to estimate 2006-07 quantities from earlier-period counts.

WIK Model approach

The WIK Model released on 16 February 2007 used a total of 27.5 billion end minutes in its model and 28.8 billion end minutes for the report. These minutes were estimated by using the 2004-2005 Market Indicator Report data. WIK found that the total amount of traffic is representative (within a reasonable margin of error) of the total volume of voice services observed in the Australian market.[605]

Parties' Views

Telstra argues that WIK's assumptions produce a 'minutes of use figure that is approximately [c-in-c] lower than expected.'[606] Telstra could be interpreting WIK's figure as only applying to business days, because (see below) making Telstra's adjustment still leaves the number short of those based on direct estimates of MOUs.

While Vodafone submits that the WIK Model has too many minutes; this appears to be based on a misinterpretation of the number of busy days and the absence of a reality check by comparison with market data.[607]

Estimates for 2006-07 Based on More Recent Data

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[605] WIK Consult, *Mobile Termination Cost Model for Australia*, (*WIK Report*), January 2007, pp. 107-108.

[606] Telstra Corporation Limited, *Letter from Dr Tony Warren to Robert Wright*, dated 18 April 2007, p. 1.

[607] Vodafone Australia Limited, *Submission to the Australian Competition and Consumer Commission: WIK Mobile Network and Cost Model and MTAS Pricing Principles Determination 1 July 2007 to 30 June 2009*, (Vodafone submission), March 2007, pp. 14-16.

Telstra reports first-half 2006-07 voice minutes of 4,147 million.[608]

Assumptions made:

- Given that outgoing minutes are based on Telstra's half-year results, the number of minutes is assumed to be the same in the second-half of 2006-07 which the Commission considers is reasonable given rapid growth in minutes. In this way the number of minutes is double to derive a full year minute value;

- Telstra's market share is estimated as 43 per cent (based on subscriber share); and

- If further assumptions are made in the absence of publicly available data that the number of MTF minutes is the same as the number of FTM minutes and the number of international outgoing minutes is the same as the number of international incoming minutes.

Voice Minutes

Telstra Annual Report *(lower-bound estimate of voice minutes)*

Total minutes using Telstra's data can be calculated as follows to derive total voice minutes in the market: 38,577 million mobile end minutes for 2006-07 [being (4147 million[609] x 2[610] x 2[611]) ÷ 0.43[612] = 38,577 million)].

Minutes based on Market Indicator Report *(higher estimate of voice minutes)*

Using ACCC Market Indicator Report data which show that minutes reported in Telstra's Annual Report are underestimated. Extrapolating the minutes in the ACCC Market indicator report to account for approximately 16 per cent[613] understatement of

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[608] Telstra Corporation Limited, *Financial Results for the Half Year Ended 31 December 2006*, p. 10.

[609] ibid.

[610] Estimate that the half year minutes of 4,147 million minutes when doubled result in 8,294 million minutes for 2006-07.

[611] End minutes are doubled to obtain total minutes.

[612] Telstra Market share using subscriber numbers.

[613] Comparison of Market Indicator Report and the Telstra Annual report results in the following understatement:

Financial Period	Telstra Annual Report (Million minutes) [@]	ACCC Market Indicator Report (million minutes) [#]	Understatement of Telstra minutes compared to ACCC Market Indicator Report (%)
2001-2002	4,853	5,780	16
2002-2003	5,255	6,335	17
2003-2004	6,145	7,183	16
2004-2005	6,746	8,026	16

[@] 2001-2002, 2002-2003 and 2003-2004: Telstra Corporation Limited, *2004 Annual Report*, p. 6; 2004-2005: Telstra Corporation Limited, *2006 Annual Report*, p. 16.

[#] 2001-2002: ACCC, *Telecommunications Market Indicator Report 2001-2002*, September 2003, p. 22; 2002-2003: ACCC, *Telecommunications Market Indicator Report 2002-2003*, June 2004, p.

minutes over the period from 2001-02 to 2004-05, the estimated minutes for Telstra for 2006-07 are as 9,621 (being 4,417 x $2^{[614]}$x $1.16^{[615]}$).

As a result total voice minutes for the market are 44.7 billion [being (9,621 x $2^{[616]}$) ÷ $0.43^{[617]}$= 44,749 million].

Total Minutes

An assumption is made that data services represent 6 per cent of voice services.

To derive a lower-bound of the total number of voice equivalent minutes using Telstra Annual Report data this results in voice equivalent minutes of 40.9 billion minutes (1.06 multiplied by 38.577 billion voice minutes).

To derive a higher estimate of the total number of voice equivalent minutes using Telstra Annual Report and the Market Indicator Report data this results in voice equivalent minutes of 47.433 billion minutes (1.06 multiplied by 44.749 billion voice minutes)

Conclusion

An annual traffic figure of 43.5 billion voice equivalent minutes is considered reasonable for 2006-07. These minutes were used to adjust the milli-Erlang demand to be used in the scenarios from 8.3 milli-Erlang to 13.1 milli-Erlang. This was calculated holding the busy-hour percentage and the number of business days as those stated in the WIK Report.

2. Estimating input cost savings arising from the reduction in the MTAS prices

The following table outlines a process that can be used to estimate the input cost savings relating to lower MTAS prices for FTM minutes, making reasonable assumptions based on publicly available data.

1. Derive market share – based on FTM minutes

	Minutes (millions) [618]	Market share FTM minutes per cent (%)
Telstra	4,392	73
Optus	958	16
Other * this does not include all fixed line	660	11

23; 2003-2004: ACCC, *Telecommunications Market Indicator Report 2003-2004*, June 2005, p. 24; 2004-2005: ACCC, *Telecommunications Market Indicator* Report *2004-05*, July 2006, p. 23.

[614] Estimate that the half year minutes of 4,147 million minutes when doubled result in 8,294 million minutes for 2006-07.

[615] Estimated understatement by comparing the Market Indicator Report and the Telstra Annual Report results as demonstrated above.

[616] End minutes are doubled to obtain total minutes.

[617] Telstra Market share using subscriber numbers.

[618] ACCC, *Telecommunications Market Indicator* Report *2004-05*, July 2006, Table B, p.22.

providers			
Total	6,010	100	

3.   **Derive total FTM minutes**

<u>Assumption:</u> **Market shares of FTM minutes are unchanged since 2004-05**

FTM Minutes per relevant period

	2003-04	2004-05	2005-06	HY to December 2006
If: Telstra has 73% of FTM minutes	4,226.00[619]	4,375.00[620]	4,491.00[621]	2,339[622]
Then: Optus with 16% of FTM minutes	926.25	958.90	984.33	512.66
And: Other with 11% of FTM minutes	636.79	659.25	676.73	352.45
Equals: Total market (FTM minutes)	5,789.04	5,993.15	6,152.05	3,204.11

3. Derive MTAS only FTM Minutes (using inverse of mobile market shares)

	Calendar Year			
	2005		**2006**	
	H1	**H2**	**H1**	**H2**
Telstra - MTAS Minutes (56% total FTM minutes)	1,225.00	1,257.48	1,257.48	1,309.84
Optus FTM - MTAS minutes (67% total FTM minutes)	321.23	329.75	329.75	343.48
Other (fixed line carriers) FTM MTAS minutes (100% FTM minutes)	329.62	338.36	338.36	352.45
Total FTM MTAS minutes	1,875.86	1,925.59	1,925.59	2,005.77

4. Use FTM MTAS minutes to derive estimate of input costs

	2005	**2006**	
Total FTM MTAS minutes for the relevant calendar year	3,801.45	3,931.37	
Value of difference between indicative MTAS rate and 21 cpm ($ million)	114.04	235.88	349.92

[619]   Telstra Corporation Limited and Controlled Entities, *Annual Report 2004*, pp. 6. and 19.

[620]   Telstra Corporation Limited and Controlled Entities, *Annual Report 2006*, p. 8.

[621]   ibid.

[622]   Telstra Corporation Limited and Controlled Entities, *Half Year Report for the Half-Year Ended 31 December 200*6, pp. 10-11.

In relation to FTM calls, the input cost savings achieved by lower MTAS are in the order of $350 million.