Australian
Competition &
Consumer
Commission

Transmission network cost model

Discussion paper

May 2007

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Glossary

CCA	Call Charge Area
CSP	Carriage Service Provider
DSLAM	Digital Subscriber Line Access Multiplexer
Gbps	Gigabits per second
LTH	Local Transmission Hub
LTIE	Long term interests of end users
Mbps	Megabits per second
MTH	Main Transmission Hub
O&M costs	Operations and Maintenance costs
POI	Point of interconnection
SDH	Synchronous Digital Hierarchy
TEBA	Telstra Exchange Building
TSLRIC	Total Service Long Run Incremental Cost
WACC	Weighted Average Cost of Capital
WDM	Wave Division Multiplexer

1. Introduction

Under Part XIC of the *Trade Practices Act 1974* (the Act), the Australian Competition and Consumer Commission (the Commission) is responsible for arbitrating disputes about access to particular declared services and also for assessing access undertakings relating to access to such declared services. The determination of an appropriate access price is a key issue in these processes.

In July 1997, the Commission published *Access Pricing Principles: Telecommunications — a Guide* (the Guide). The purpose of the Guide was to advise the telecommunications industry and other interested parties about the principles that are likely to be relevant in assessing undertakings or in arbitrating access disputes.

In its Guide, the Commission noted that when determining a cost-based price, it would generally seek to determine the Total Service Long-Run Incremental Cost (TSLRIC) of providing the service. The Commission considered that an access price based on TSLRIC would be consistent with the price that would prevail if the access provider faced effective competition, and would usually best promote the long-term interests of end-users. In practice, TSLRIC has been interpreted to include a contribution to indirect organisational-level costs (TSLRIC+). As indirect costs are not directly attributable to the production of any one service, the allocation of these costs across services can be undertaken via different allocation methods.[1]

Despite this, the Commission also indicated in its Guide that the pricing principle applied would be assessed on a case-by-case basis for each service.

The Transmission Capacity Service

The Commission deemed various types of transmission capacity as declared services (the 'Domestic Transmission Capacity Service') when it became the telecommunications competition regulator on 30 June 1997.[2] The Commission has since conducted public inquiries in 1998, 2001 and 2004 to review this declaration (see Chapter 2 for further details).

The current scope of this declaration (determined in April 2004) *excludes* transmission capacity:

- between the main capital cities (i.e. inter-capital transmission between Adelaide, Brisbane, Canberra, Melbourne, Perth and Sydney); and
- on 14 nominated capital-regional routes.

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1 One commonly used approach is the 'equi-proportionate mark-up' (EPMU) over directly attributable costs approach. 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. Another option is the use of a Ramsey-Boiteux (R-B) approach. Under a R-B approach, these costs would be allocated in inverse proportion to the elasticity of demand for the services over which the common costs relate.[1] In practice however, and as noted previously by the Commission, there can be substantial informational difficulties with applying an R-B approach.

2 ACCC, *Deeming of Telecommunications Services*, June 1997.

In September 2004, the Commission released transmission capacity pricing principles. The purpose of the pricing principles was to inform industry, government and other interested parties of the approach the Commission would apply, in the usual case, when considering an access dispute or assessing an undertaking in relation to pricing for the declared transmission capacity service. The Commission recommended that a TSLRIC approach should be adopted when determining an appropriate access price for the transmission capacity service.

The transmission cost model

To assist its regulatory functions, and to also assist parties in commercial negotiations, in relation to the supply of the Domestic Transmission Capacity Service, the Commission engaged Gibson-Quai AAS to develop a model to estimate the TSLRIC of providing transmission capacity services (the 'transmission cost model').

The transmission cost model (and the accompanying user manual) are available on the Commission's website (www.accc.gov.au) and should be considered in conjunction with this discussion paper.

The eventual purpose of the transmission cost model will be to inform the Commission's estimation of the cost of providing transmission capacity services between various capital-to-regional locations in Australia.

The transmission cost model has been configured on Telstra's optical fibre transmission network, as the Commission understands that:

- this network is based on current best-in-use technology;
- the architecture of this network broadly reflects that which other optical fibre transmission providers would develop (or already have developed) in order to supply transmission services; and
- this network has the scale required for the purpose of access seekers requiring transmission capacity to a broad range of sites within Australia (including various capital to regional locations); and
- the primary driver of the need for transmission services is to serve access seekers that have DSLAMs located in Telstra exchanges.

It should be noted in this context, however, that the transmission cost model is intended to be capable of estimating the cost of providing transmission services between capital and regional locations on typical optical fibre transmission networks within Australia.

Purpose of this discussion paper

The purpose of this discussion paper is to seek industry comment on various elements of the transmission cost model. This includes whether the model has been appropriately specified in accordance with industry best practice. It also includes, for certain parameters contained in the model, some indication of the empirical inputs that could be used in applying it to derive an appropriate cost of supplying

transmission capacity services between various capital to regional locations in Australia.

Importantly, it should be noted at the outset that the transmission capacity model has been specified in generic form. As such, it is not specifically related to a particular transmission route. Moreover, the empirical inputs that appear in the model at this stage are 'indicative only' and do not necessarily reflect the parameters considered reasonable by Gibson-Quai AAS, or the empirical parameters that will be relied on by the Commission in informing an appropriate price for transmission capacity services.

Making submissions

The Commission seeks written submissions on this discussion paper by **Wednesday 23 May 2007**. These submissions should be addressed to:

Nicole Hardy and John Bahtsevanolgou
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Australian Competition and Consumer Commission
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In addition to a hard copy, parties making submissions are encouraged to provide an electronic copy of the submission to nicole.hardy@accc.gov.au and john.bahtsevanoglou@accc.gov.au.

Outline of discussion paper

The remainder of this discussion paper is structured as follows:

Chapter 2 provides background on previous declaration inquiries regarding the transmission capacity services, the current scope of declaration and the pricing principles that apply;

Chapter 3 presents the draft model and seeks submitters' views on a range of issues relevant to the model; and

Chapter 4 contains a complete list of questions that the Commission is seeking comments on from interested parties.

2. The Declared service

Background

As noted in Chapter 1, the Commission deemed various types of transmission capacity as declared services when it became the telecommunications competition regulator on 30 June 1997.[3] Originally, the declared service did not include transmission capacity on major 'inter-capital' routes (specifically defined as routes between the cities of Brisbane, Sydney, Canberra, Melbourne, Adelaide and Perth).

On 4 November 1998, the Commission varied the declared transmission capacity service following a public inquiry process.[4] The variations involved, *inter alia*, the inclusion of the major inter-capital routes with the exception of those between Melbourne, Canberra and Sydney. The Commission also established a monitoring program to assess aspects of market structure and market conduct on all the inter-capital routes. The monitoring program began in March 1999 and involved periodically collecting data (on a voluntary basis) from Telstra and Optus.

In May 2001, following a public inquiry, the Commission decided to vary the declaration to remove the remaining inter-capital routes, on the basis that increasing/impending entry was stimulating competition on these routes. To assess the development of competition, the monitoring program was extended by including the new carriers providing transmission services on these inter-capital routes.

On 1 April 2004, following a further public inquiry, the Commission decided that the transmission capacity service declaration should be allowed to expire and replaced with a new declaration that took affect from 1 April 2004. The scope of declaration was varied to exclude certain 'capital-regional' routes (see next section for further detail). The Commission also decided to discontinue its monitoring program.

Current service description

Transmission capacity is a generic service that can be used for the carriage of voice, data or other communications using wideband or broadband carriage (the minimum bandwidth in the current declaration is 2 Mbps). Carriers/CSPs can use transmission capacity to set up their own networks for aggregated voice or data channels, or for integrated data traffic (such as voice, video, and data).

There are a number of types of transmission capacity services, including:

- inter-capital transmission;
- 'other' transmission;
- inter-exchange local transmission; and
- tail-end transmission.

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[3] ACCC, *Deeming of Telecommunications Services*, June 1997.
[4] ACCC, *Competition in data markets – Inquiry Report*, Chapter 4, November 1998.

Inter-capital transmission refers to transmission between transmission points located in different capital cities. Under the service description of existing transmission capacity service declaration, this includes transmission between the cities of Melbourne, Sydney, Canberra, Brisbane, Adelaide and Perth. As noted above, inter-capital transmission is outside the scope of the declared service.

'Other' transmission refers to transmission between transmission points located in different 'call charge areas' (CCAs), except for those between the capital cities listed in the previous paragraph and also except for those set out in Table 1. For example, it includes transmission between Adelaide-Darwin, Perth-Darwin and Melbourne-Hobart, as well as transmission along capital-regional (e.g. Melbourne-Wodonga) and regional-regional (e.g. Geelong-Ballarat) routes.

Table 1: Capital-regional routes removed from declaration

NSW	Victoria	QLD	SA
Sydney-Albury	Melbourne-Ballarat	Brisbane-Toowoomba	Adelaide-Murray Bridge
Sydney-Lismore	Melbourne-Bendigo	Brisbane-Gold Coast	
Sydney-Newcastle	Melbourne-Geelong		
Sydney-Grafton	Melbourne-Shepparton		
Sydney-Wollongong			
Sydney-Taree			
Sydney-Dubbo			

Inter-exchange local transmission refers to transmission between transmission points located at or virtually co-located with an access provider's local exchanges, that are within a single CCA. In functional terms, these transmission links, together with switching and network management functions constitute the inter-exchange network, which carries traffic within a call charge area, but where the transmission points are not linked to the same local exchange.

Tail-end transmission refers to transmission between a point at a customer location and some point on the access seeker's network (such as a point of interconnection or "POI"). For example, in the case of a customer whose premises are located near an access provider's local exchange where there is a transmission POI, the transmission of traffic from that customer premise to the access provider's local exchange, and hence to the transmission POI, would constitute tail-end transmission.

The Current Configuration of the Transmission Network

Major carriers usually use optical technology for their core transmission network, with microwave radio where optical is impractical.

In order to maintain a high level of reliability of the network very extensive protection mechanisms are included. This is very important considering that the transmission network underlies virtually all services and applications. Hence, the network is constructed using a ring topology. Within a ring there are then two paths between each pair of ports: one of those is the "worker" and the other the "protection" path. These transmission rings vary in size from quite small CBD rings connecting major

city buildings to extremely large rings covering major proportions of a State (where the ring length many be many thousands of kilometres).

Hence, in considering the cost of transmission between any two points it is necessary to include both the worker and protection paths, not just the worker.

The capacity of a particular ring is then designed to accommodate the aggregate traffic from all points connected to the ring, including the protection paths.

Two end points may not be located on the one transmission ring. The total path will then be across a number of inter-connected transmission rings, each of which will have worker and protection paths. The major rings passing through the Main Transmission Hubs in the major cities are "Tier 1" rings, and the subtended rings from those are "Tier 2" rings.

From those rings there are then transmission tails to particular end points. These may also be constructed using (small) rings, or may be simple point-to-point links.

Transmission Pricing Principles

In September 2004, and as required under section 152AQA of the Act, the Commission released pricing principles for the declared transmission capacity service.

Specifically, the Commission determined that wherever it is reasonable or practical to do so, the price of the domestic transmission capacity service should be set equal to the TSLRIC+ of supplying the service. It was noted that there it was not practicable to set price on the basis of TSLRIC+, the price of the domestic transmission capacity service should be set having regard to an appropriate benchmark.[5]

Further to this, the Commission outlined that access prices for domestic transmission capacity services should be based on the TSLRIC principles because such prices would:

- be charged with the access provider faced effective competition;
- encourage competition in telecommunications markets by promoting efficient entry and exit in dependent markets as well as encouraging economically efficient investment in infrastructure;
- encourage the efficient use of existing infrastructure and provide incentives for access provider to minimise costs of pricing access over time through efficient investment; and
- promote the legitimate business interests of the access provider by allowing them to fully recover the efficient costs of producing the service.

[5] The Commission noted that a service would be an appropriate benchmark where (i) it is supplied in a competitive market or is subject to cost based regulation and (ii) its physical attributes are comparable to the Domestic Transmission Capacity Service in question.

The Commission also sought to provide further clarification on a number of 'implementation issues' which would have a direct impact on the determination of an access price in an arbitral context. This included:

- the relevant service and the degree of route aggregation or commonality between different transmission routes;
- network configuration and dimensioning;
- cost allocation methodology; and
- cost of capital and annualisation.

3. The Transmission Cost Model

As noted in Chapter 1, the Commission engaged Gibson-Quai AAS to develop a model to estimate the costs of providing transmission capacity services (the 'transmission cost model') to inform its role in arbitrating access disputes, and also to assist commercial negotiations, regarding the transmission capacity service.

The eventual purpose of this model will be to assist the Commission, and also parties in commercial negotiations, to estimate the cost of providing transmission capacity services between various capital-regional locations in Australia, based on the TSLRIC principle.

At this stage, however, the Commission is seeking industry comment on various elements of the transmission cost model. This includes comments on the appropriateness of the specification of the model. It also includes, for certain parameters contained in the model, some indication of the empirical inputs that could be used in applying it to derive an appropriate cost of supplying transmission capacity services on various elements of Telstra's transmission network.

In this regard, it is important to again reiterate that the transmission cost model is currently in generic form. As such, it is not specifically related to a particular capital-regional transmission route. Further, the empirical inputs that currently appear in the model are intended to be 'indicative only', and will not necessarily reflect the empirical parameters relied on by the Commission to determine an appropriate price in an arbitral context.

The purpose of this chapter is to outline various aspects of the transmission cost model and to request comment from interested parties. Chapter 4 of this discussion paper contains a summary of the specific issues relating to the transmission cost model which the Commission is seeking comment.

Overview of the model

The transmission cost model aims to provide the capability to cost transmission capacity services between capital cities and regional centres in Australia.

As noted in Chapter 2, there are different types of transmission that are captured under the broader heading of 'transmission capacity services'. Those relevant for providing transmission capacity services from capital cities to regional centres include 'other' transmission, inter-exchange local transmission and 'tail-end transmission'.

Based on the different components that can be included in transmission capacity services between capital cities and regional centres, the transmission cost model is designed to calculate annual charges for the following services:

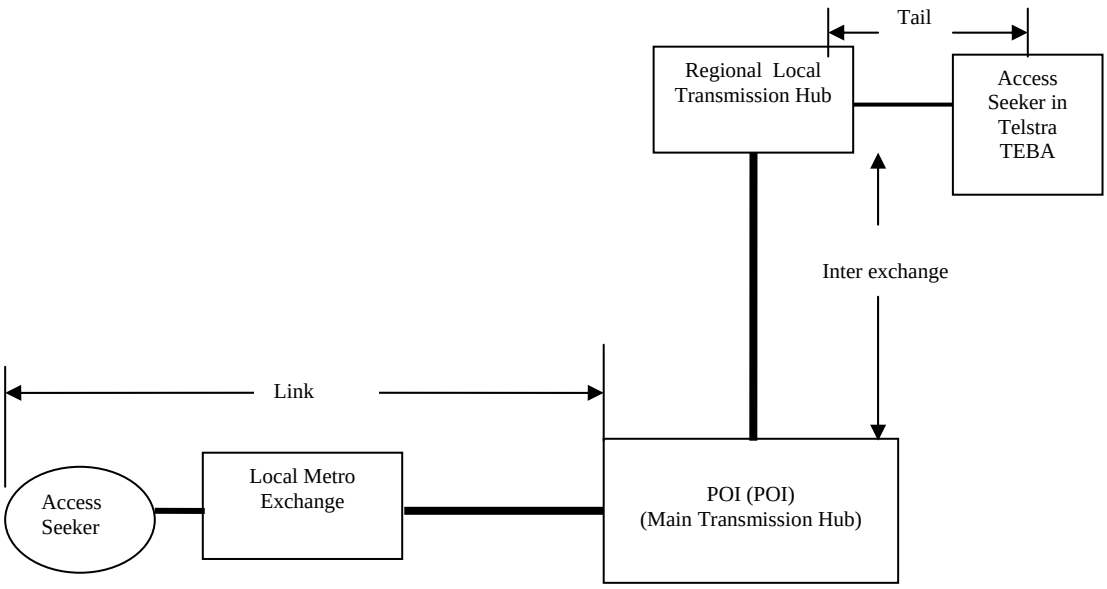
- ***link transmission*** (for 34, 45, 140 and 155Mbps services) – connecting an Access Seeker via a local exchange normally in an inner metropolitan area in close vicinity of a Main Transmission Hub (MTH). This can include an optical fibre service from the Access Seekers host premises to Telstra's metropolitan local exchange

- ***inter-exchange transmission*** (specified regional routes for 2, 8, 10, 34, 45, 140, 155, 622Mbps and 2.5Gbps services and regional radial distances for 2, 8, 10, 34, 45, 140, 155, 622Mbps and 2.5Gbps services) – connecting a Main Transmission Hub (MTH) to a Regional Local Transmission Hub (LTH)

- ***tail-end transmission*** (regional radial distances for 2, 8, 10, 34, 45, 140, 155, 622Mbps and 2.5Gbps services) – connecting a Regional LTH to a local exchange within the CCA serviced by the LTH. It is assumed the Access Seeker requires the transmission service to terminate on its equipment located in the Telstra Exchange Building Access (TEBA) space within the local exchange.

Figure 1 identifies the 'link', 'inter-exchange' and 'tail' transmission services that are captured by the transmission cost model.

Figure 1: Transmission elements to be modelled



The transmission cost model has also been specified to calculate annual charges for transmission capacity services provided across submarine or undersea cable routes (for example between Melbourne and Hobart).

As noted in the introduction, the transmission cost model is based on Telstra's current optical fibre network architecture for the provision of transmission capacity services. This includes the arrangement of optical fibre routes in rings and deployment of transmission technologies located at exchange sites to complete the transmission capability. The Commission understands that this reflects current 'best-in-use' technology, and that other suppliers of optical fibre transmission services would configure their networks in a broadly similar manner.

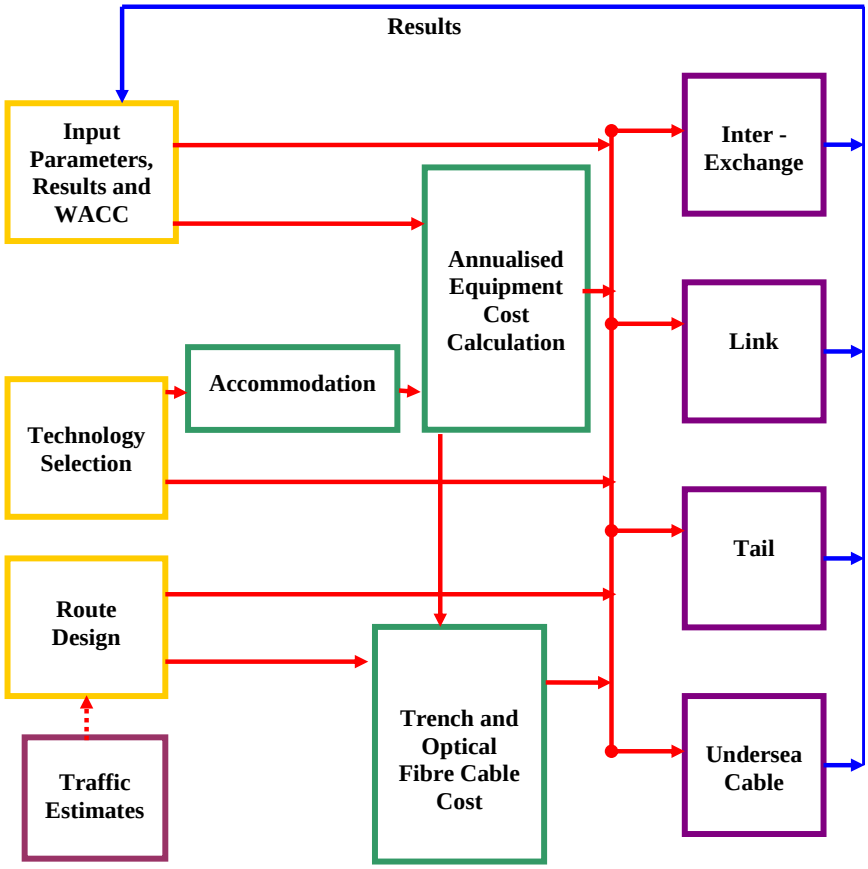
Questions for interested parties:

- Do you agree with the architecture of the routes that are proposed to be modelled? If not, why not?
- Do you agree that the model allows for the appropriate transmission elements and services to be modelled? If not, why not?
- Do you consider the transmission between capital cities and regional centres should be modelled based on Telstra's current optical fibre network architecture? If not, why not?
- In your opinion, to what extent will the cost of transmission differ on a particular route depending on the available bandwidth that is offered to an access seeker?

Model structure

The spreadsheet model consists of 11 spreadsheets. The figure below presents the relationships between the various spreadsheet components.

Figure 2: Model Framework



As shown in Figure 2, the results from the four output models on the right have been consolidated and presented for ease of use in the 'Input Parameters, Results and WACC' page. Importantly, the 'Traffic Estimates' page has no direct computational linkage to any other sheet, and is only provided for the purpose of providing an indicator as to the likely transmission volumes that would potentially be encountered

to inform decisions made within the 'Route Design' and 'Technology Selection' sheets.

Throughout the transmission cost model, only certain cells are designed to accept inputs – these cells are coloured 'yellow'. Cells which are coloured 'green' contain calculations and results and as such these cells should not be altered by the model's user.

In the following sections, various elements of the model are considered in turn.

Input Parameters and Result Sheet

This worksheet contains three panels; the 'results', the 'input parameters' and the WACC analysis. The latter two panels contain parameters that influence the values in the 'results' panel.

Input parameters panel

This panel contains a selection of parameters that are applied within the model to calculate the annualised cost of each cost item. Certain mark-ups are applied on capital costs. Separate mark-ups for calculating operating and maintenance (O&M) costs (direct) based on a percentage of capital costs are also applied. A single factor is employed for the indirect O&M mark-up, which is applied to all O&M costs. The input parameters set as defaults in the model are shown below.

Figure 3: Input parameters panel

Markup on Capital Costs		
Spares	5%	*Sparesmu*
Installation	15%	*Installmu*
Undersea Cable Installation	100%	*Ucinstallmu*
Indirect	5%	*Indirectmu*
Markup on O&M Costs		
(Applied as a Markup on Capital Costs)		
Trench	11%	*trencho&mmu*
Conduit	11%	*conduito&mmu*
Optical Fibre	10%	*Ofo&mmu*
Indirect O&M Cost Markup		
(Applied as a Markup on O&M Costs)		
All O&M Items	25%	*Indo&mmu*
Others		
Inflation	3%	*Inf*

WACC parameters panel

This panel facilitates the entry of relevant factors and performs the necessary calculation to determine the relevant WACC subsequently employed in later annualised capital calculations.

Figure 4: WACC parameters panel

Capital Pricing Formula					
Rate =	Risk free rate +(Beta x Market Premium)				
Risk free rate =	5.50%				
Beta =	1.02				
Market Risk Premium =	7.00%				
CAPM rate=	12.64%				
Tax rate=	30%				

WACC Determination	Weighting	Estimated Cost	Tax Credit	Weight	**Weighted Av. Cost of Capital**
Non interest bearing debt	15.0			15.0%	0.00%
Interest bearing debt	5.0	9.5%	2.85%	5.0%	0.33%
Share capital & reserves	80.0	12.6%		80.0%	10.11%
WACC	**100.0**				**10.44%**

Questions for interested parties:

- Do you think that the specified mark-ups listed in Figure 3 are appropriate in a model used to estimate the costs of supplying transmission capacity services? Why or why not?
- In your opinion, what is the appropriate magnitude of any mark-ups for the purpose of estimating transmission costs? What evidence is there to support these magnitudes?
- In your opinion, what is the appropriate WACC value to apply when estimating the costs of providing transmission capacity services? To what extent can the WACC value be benchmarked against those applied for the provision of PSTN services? To what extent (if at all) should a different WACC estimate be used to estimate the costs of providing transmission capacity services on different capital-regional routes?

Route Design Sheet

This sheet develops the route design for 'inter-exchange transmission', 'link transmission', 'tail-end transmission' and 'submarine routes'. It contains diagrams that illustrate the architecture of a route to assist the model's user to understand the context of decisions made about the specifications of the route to be modelled.

Each panel in this sheet allows for data to be entered to specifically reflect the architecture of a particular transmission route, such as the distance between transmission hubs, the number of transmission hubs and the number of intermediate exchanges. Most of these parameters can be manipulated in the model to suit the particular transmission route that is being considered. A further panel caters for a number of additional considerations which include:

- the additional lengths of optical fibre employed within an exchange that is in addition to trench and conduit lengths;

- the number of optical fibres employed per transmission link; and
- factors used to calculate the number of optical fibre cable joints that would be employed.

Further detail on the parameters developed in this sheet can be found in section 3.3 of the transmission cost model manual.

Questions for interested parties:

- Are the parameters specified to model the cost of transmission on a 'inter-exchange' route appropriate? If not, why?
- Are the parameters specified to model the cost of transmission on a 'link' route appropriate? If not, why?
- Are the parameters specified to model the cost of transmission on a 'tail-end' transmission route appropriate? If not, why?
- Are the parameters specified to model the cost of transmission on a 'submarine route' appropriate? If not, why?
- Are the additional parameters specified to incorporate the 'additional length of optical fibre into each exchange', the 'optical fibres in exchange cable lead in' and the 'optical fibre cable joints' appropriate? If not, why?

Technology Selection

The transmission cost model is based on current best-in-use technology for transmission, taking into account transmission volumes and deployment locations.

The Commission has been advised that the best-in-use technologies at this point in time will include Synchronous Digital Hierarchy (SDH) and or Wave Division Multiplexer (WDM) equipment on optical fibre routes. In addition, Ethernet aggregation equipment is also included within the capability of the transmission cost model; however this technology may not currently be regarded as best-in-use technology for regional routes as it is not in use in these locations and the cost and capacity considerations. Furthermore, the Commission has also been advised that although Telstra still uses microwave technology to connect some exchanges (usually in more remote areas and for legacy reasons), it has not been considered an appropriate technology for the purposes of this model.

The 'technology selection' worksheet[6] allows, to some extent, for the possible technology selections of equipment to be varied for the different types of transmission. For instance, it allows users to nominate system capacity for each of the technologies that may be employed for different types of transmission.

[6] See Section 3.3 of GQ-AAS ACCC Transmission Network Cost Model Description of Operation pp 13-14

Further detail on the parameters developed in this sheet can be found in section 3.4 of the transmission cost model manual.

Questions for interested parties:

- Do you agree with the technology choices available in the model? If not, what is the 'best-in-use' technology?
- Are the assumptions in Technology selection sheet of the model reasonable?
- Are the parameters specified in the Technology selection sheet appropriate? If not, why?

The Transmission Demand Estimates

The Transmission Demand Estimates sheet is designed to inform the model's user about the capacity that would typically be required to service the needs of customers of the operator in a CCA.

Knowing the total capacity required within a region to service all of an operator's needs allows rational decisions to be made about an 'efficient' design to cater for these needs. For instance, decisions that flow from knowing the broad capacity requirements include whether WDM may be required, the likely capacity of an SDH system, the number of LTH that an SDH ring is likely to efficiently include, and the number of overlayed rings that would typically require optical fibre pairs in the interconnection optical fibre cables.

As noted previously, the Transmission Demand Estimates sheet results are not directly linked to other calculations within the transmission cost model. Rather the intent of this sheet is to provide information to assist with the selection of design parameters consistent with an efficient network design of the situation being modelled.

Questions for interested parties:

- Does the methodology employed in the Demand estimates sheet provide reliable and reasonable estimates of capacity demand?
- Are the assumptions in Demand estimates sheet of the model reasonable?
- Does the Demand estimates sheet assist with the selection of parameters which are consistent with an efficient network design?

Accommodation Cost Estimates

The model estimates the accommodation costs that should be apportioned to each element of the transmission capacity system. Accommodation costs are calculated separately from the other transmission costs. Once calculated, the accommodation costs are used to inform the overall cost of transmission.

Questions for interested parties:

- Are the assumptions in the Accommodation cost estimates sheet of the model reasonable?
- Does the methodology employed in the Accommodation cost estimates sheet provide reliable and reasonable estimates of accommodation costs?

Annualised Cost Calculation

To facilitate a TSLRIC calculation of the network costs, this worksheet is included that converts the cost of each element from its capital and operational components into an annualised cost.

For most network items, the key inputs required are the initial capital investment, the relevant asset life and the forward-looking price trend associated with that particular item. Based on the parameters identified in the 'input parameters' worksheet, a mark-up on capital costs is applied to each network item.

The key step in this worksheet is the conversion of the 'total cost' of each network item into an annualised capital cost. Based on the WACC estimate, asset life, price trend (and the general inflation rate) a conversion factor is calculated for each network item using a formula that converts capital costs into a 'year 0' tilted annuity value. The resulting factor is multiplied by the sum of each network cost item (i.e. total cost) to calculate an annualised tilted annuity cost.

From there, the *direct* and *indirect* O&M mark-ups are applied to each network cost item based on the parameters outlined on the 'Input Parameters' worksheet. The total annualised cost for each network item is used in subsequent worksheets. The relevant worksheet ('Annualised Cost Calculation') is discussed in section 3.7 of the accompanying user manual.

Questions for interested parties:

- To what extent are the initial investment costs for each network item a reasonable approximation of actual price trends?
- To what extent are the price trends assumed for each network item a reasonable approximation of actual price trends?
- To what extent are the price trends assumed for each network item a reasonable approximation of actual price trends?
- Is the conversion factor used to convert the 'total cost' of network items into an annualised cost into a 'year 0' tilted annuity value appropriate?
- Is it reasonable that the model should estimate costs for year 0 in a tilted annuity?

Trench and Optical Fibre Cable Calculation

The 'Trench and Optical Fibre Cable Calculations' sheet provides the necessary calculations particular to trench and cable costs between exchanges that are required to construct an output cost that can be included and treated in the same manner as that of exchange based equipment for the final stages of the specific route cost calculation sheets.

Separate panels are provided for the calculation of optical fibre and trench costs for:

- MTH to MTH – Inter-exchange and Link;
- MTH to LTH – Inter-exchange;
- LTH to LTH Tier 1 – Inter-exchange and Tail;
- LTH to LTH Tier 2 – Inter-exchange and Tail;
- MTH to Local Metropolitan Exchange – Link;
- Local Metropolitan Exchange to Metropolitan Exchange – Link;
- Metropolitan Exchange to Customer Premises – Link;
- Regional LTH to Local Exchange – Tail; and
- Tail Regional Local Exchange to Local Exchange – Tail.

Each panel breaks down the different elements that may make up a route. For instance the MTH to MTH panel caters for:

- MTH to MTH CBD Trench;
- Two types of Metropolitan Trench which may have different cost, cable density and sharing factor values; and
- MTH to MTH Tunnel.

Other panels cater for up to seven forms of trenching, for example:

- MTH to MTH Tunnel;
- Conduit Trench;
    - Metropolitan; and
    - Two Regional.
- Three Direct Buried trench and cable costs.

The costing included in each panel is based on the distance selected in the 'Route Design' sheet. The percentage of the distance along the route that is in each type of trench is selectable along with a sharing factor and the number of optical fibre cables present. A 'Trench cost per optical fibre cable' is calculated based on this data.

A separate calculation is applied to the optical fibre cable that would exist in the trench. Inputs including the number of optical fibres in the cable and the occupancy of the fibres are combined with annualised costs of the trench and cable, along with the cable distance and the number of optical fibres per system to calculate a cost attributable to a system utilising optical fibre in the cable located in the trench.

Questions for interested parties:

- Are the assumptions in the Trench and Optical Fibre Cable sheet of the model reasonable?
- Do you consider distance to be the major driver of trench and optical fibre cable costs?
- Are the calculations performed to estimate Trench and Optical Fibre costs appropriate?

The Inter-exchange, link, tail and submarine model sheets

These sheets are the 'final' stage sheets which draw together all of the previously calculated elements to achieve the final results. These final results are then presented in summary form in the 'input parameters and results' sheet for convenience.

The required inputs into these sheets have been kept at a minimum and are limited to the number of systems supported and the utilisation of supporting systems which relate to accommodation and air-conditioning, power consumption, power systems and batteries.

Questions for interested parties:

- Does the methodology employed in the inter-exchange, link, tail and submarine model sheets provide reliable and reasonable estimates of transmission costs?

Connection charges

The transmission cost model does not calculate connection charges for transmission capacity services. The Commission has been advised that connection charges for transmission capacity are no bandwidth dependent and are relatively minimal with a figure of less than $100 in each instance considered to be reasonable.

4. Summary of questions for interested parties

- Do you agree with the architecture of the routes that are proposed to be modelled? If not, why not?

- Do you agree that the model allows for the appropriate transmission elements and services to be modelled? If not, why not?

- Do you consider the transmission between capital cities and regional centres should be modelled based on Telstra's current network architecture? If not, why not?

- In your opinion, to what extent will the cost of transmission differ on a particular route depending on the available bandwidth that is offered to an access seeker?

- Do you think that the specified mark-ups listed in Figure 3 are appropriate in a model used to estimate the costs of supplying transmission capacity services? Why or why not?

- In your opinion, what is the appropriate magnitude of any mark-ups for the purpose of estimating transmission costs? What evidence is there to support these magnitudes?

- In your opinion, what is the appropriate WACC value to apply when estimating the costs of providing transmission capacity services? To what extent can the WACC value be benchmarked against those applied for the provision of PSTN services? To what extent (if at all) should a different WACC estimate be used to estimate the costs of providing transmission capacity services on different capital regional routes?

- Are the parameters specified to model the cost of transmission on a 'inter-exchange' route appropriate? If not, why?

- Are the parameters specified to model the cost of transmission on a 'link' route appropriate? If not, why?

- Are the parameters specified to model the cost of transmission on a 'tail-end' transmission route appropriate? If not, why?

- Are the parameters specified to model the cost of transmission on a 'submarine route' appropriate? If not, why?

- Are the additional parameters specified to incorporate the 'additional length of optical fibre into each exchange', the 'optical fibres in exchange cable lead in' and the 'optical fibre cable joints' appropriate? If not, why?

- Do you agree with the technology choices available in the model? If not, what is the 'best-in-use' technology?

- Are the assumptions in Technology selection sheet of the model reasonable?

- Are the parameters specified in the Technology selection sheet appropriate? If not, why?
- Does the methodology employed in the Demand estimates sheet provide reliable and reasonable estimates of capacity demand?
- Are the assumptions in Demand estimates sheet of the model reasonable?
- Does the Demand estimates sheet assist with the selection of parameters which are consistent with an efficient network design?
- Are the assumptions in the Accommodation cost estimates sheet of the model reasonable?
- Does the methodology employed in the Accommodation cost estimates sheet provide reliable and reasonable estimates of accommodation costs?
- Does the methodology employed in the inter-exchange, link, tail and submarine model sheets provide reliable and reasonable estimates of transmission costs?

The Commission seeks comments on the above questions by **Wednesday 23 May 2007**. These comments should be addressed to:

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In addition to a hard copy, parties making submissions are encouraged to provide an electronic copy of the submission to nicole.hardy@accc.gov.au and john.bahtsevanoglou@accc.gov.au.