1 INTRODUCTION & BACKGROUND

1.1 Scope of assignment

1.1.1 Counsel to Telstra retained me to "advise us about the appropriateness of the [Telstra Efficient Access ("TEA") Cost] Model, including whether the model accords with [total service long-run incremental costs] ("TSLRIC") principles; and whether the model is consistent with the following criteria" [as specified in Section 152AH(1) of the *Trade Practices Act 1974 (Cth)* ("TPA")] in the pricing of Unconditioned Local Loop Services ("ULLS").[1] To facilitate my review of the TEA model, I requested, and counsel agreed, to retain the services of Dr. William Fitzsimmons. Dr. Fitzsimmons and I have worked together on telecommunications costing and pricing issues since 1994. My resume and the resume of Dr. Fitzsimmons are attached to this report. My qualifications are described below.[2]

1.1.2 During this period I also reviewed relevant sections of the TPA and relevant submissions to and reports, determinations, and declarations by the Australian Competition and Consumer Commission ("ACCC").[3] On that basis, I have

[1] Letter from Mallesons Stephen Jaques to Robert G. Harris, 5 November 2007.

[2] Dr. Fitzsimmons assisted me with the analysis of the structure and performance of the TEA model and provided input and suggestions for this report.

[3] Sections 152AA through 152EQ, Part XIC, Trade Practices Act 1974; Unconditioned Local Loop Service (ULLS), Final Pricing Principles, ACCC (November 2007); Fixed Services Review, Further Consultation on Draft ULLS Pricing Principles, ACCC (October 2007); Access Pricing Principles - Telecommunications: A Guide (Commonwealth of Australia, 1997); Pricing of Unconditioned Local Loops Services (ULLS), Final Report, ACCC (March 2002) ("ACCC ULLS Pricing Principles); Declaration Inquiry for the ULLS, PSTN OTA and CLLS, Final Determination, ACCC (July 2006); Declaration of Services under Section 152AL(3) of the Trade Practices Act 1974, No. GN 32 (11 August 1999); Assessment of Telstra's ULLS Monthly Charge Undertaking, Final Decision, ACCC (August 2006); Assessment of Telstra's ULLS Monthly Charge Undertaking, Draft Decision, ACCC (June 2006) (with supporting consultant reports); Telstra's Undertakings for ULLS, Discussion Paper, ACCC (January 2006); Local Services Review and Strategic Review of the Regulation of Fixed Network Services, Summary of Draft Indicative Prices Published by the ACCC on 28 July 2006, ACCC (July 2006);Re: Final Decision by ACCC dated August 2006 in Respect of Ordinary Access Undertakings Submitted by Telstra Corp. Ltd. for the ULLS, ACompT 3 (17 May 2007); Re: Final

undertaken a review of the TEA model, its economic-engineering assumptions, data sources, methods of calculation, parameters, user input variables, and user interface.

1.1.3 Counsel to Telstra also retained me to prepare "an expert report expressing [my] opinions as to the following questions:

(a) does the model accord with Total Service Long Run Incremental Cost principles; and

(b) is the model consistent with the criteria set out in Section 152H of the TPA."[4]

Counsel also requested that my assessment consider the provisions of Section 152AB of the TPA and their implications for the use of the TEA model in the pricing of ULLS.

1.1.4 Counsel provided the following characterization of ULLS, upon which I have relied in my assessment of the Telstra cost model:

> ULLS is a service declared by the ACCC pursuant to Part XIC of the TPA. The ULLS service is described in the service declaration date 4 August 1999 and the service redeclaration, made on 28 July 2006, both of which are attached for your information.
>
> Essentially ULLS provides the access seekers with the use of the copper based wire between the network boundary point at the end user's premises and a point of interconnection located at or associated with a customer access module (which can be located at Telstra's exchange building or somewhere between the exchange building and the end user customer). Currently, however, ULLS services are acquired by access seekers from the exchange building.[5]

1.1.5 In order to reduce duplication, my report will not describe or discuss the details of the TEA model. Rather, I refer the reader of this report to the TEA Model Overview

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Decision by ACCC dated December 2005 Pursuant to Section 152BU in Respect of Ordinary Access Undertaking Submitted by Telstra Corp. Ltd. for the LLS, ACompT 4 (2 June 2006).

[4] Letter from Mallesons Stephen Jaques to Robert G. Harris, 15 November 2007.

[5] Letter from Mallesons Stephen Jaques to Robert G. Harris, 15 November 2007.

for a description of the model. In my view, that document is an accurate characterization of the TEA model, the data bases on which it is grounded, its economic-engineering and network design assumptions, methods of "constructing" a forward-looking customer access network ("CAN") model, methods of calculation of physical units of capital investment, methods of calculation of the cost of those investments, the conversion of total capital costs into annual capital costs, the methods for incorporating maintenance, operating and other TSLRIC-relevant overhead costs, the means of selecting user-defined input values (and other user variables such as the use of fibre optic cables), and the user interface to the model.

1.1.6 It is critical to note, at the outset, that unlike many other TSLRIC+ models, the TEA model is designed to estimate the cost of the CAN and only the cost of the CAN. The ULLS version of the TEA model is tightly focused on simulating a network designed to estimate the TSLRIC+ of unconditioned copper loops from customers to exchange buildings. As discussed below, this singular purpose and the use of detailed data (actual locations of customers, structure points, and cable routes) makes the TEA model uniquely positioned to model a realistic TSLRIC network focused on the most efficient manner of providing CAN services.

1.2 Further report

1.2.1 This report is a preliminary report only. A more complete report, which elaborates and expands on the conclusions drawn in this preliminary report, will be provided.

1.3 Qualifications of Dr. Robert G. Harris

1.3.1 I am a Professor Emeritus in the Haas School of Business, University of California, Berkeley. I earned my Bachelor of Arts and Master of Arts degrees in Social Science from Michigan State University and my Master of Arts and Doctor of Philosophy degrees in Economics from the University of California, Berkeley. At

Berkeley, I served as Chair of the Business and Public Policy Group, as Founding Director of the National Transportation Policy Research Center, and as Co-Director of the Consortium for Research in Telecommunications Policy, a collaborative program of the University of California at Berkeley, the University of Chicago, the University of Michigan and Northwestern University.

1.3.2 At Berkeley, I taught courses at the undergraduate, MBA and Ph.D. levels, including Microeconomics (emphasizing cost and pricing principles); Business & Public Policy; Industry Analysis and Competitive Strategy; and Telecommunications Economics (emphasizing costing and pricing principles). For several years, I organized and taught a course on telecommunications economics for the staff of the California Public Utilities Commission, and a one-week course on telecommunications economics, policies and strategies for company managers and policy-makers from the United States and abroad. I also taught telecommunications pricing principles and public policy at the Center for Telecommunications Management, University of Southern California. My academic research developed cost models, analyzed the effects of economic regulation and antitrust policy on industry performance, and addressed the implications of changing economics and technology for public policies and competitive strategies in transportation and telecommunications industries.

1.3.3 While on leave from the University in 1980-81, I served as a Deputy Director at the Interstate Commerce Commission, responsible for cost, economic and financial analysis. In that capacity, I was centrally involved in several major rule makings implementing the motor carrier and railroad regulatory reform acts of 1980 and directed the development of the Uniform Rail Costing System. I have also served as a consultant to the U.S. Department of Transportation, the U. S. General Accounting Office, the U. S. Office of Technology Assessment, the U. S. Department of Justice,

the California Attorney General, the California Department of Consumer Affairs, the Minister of Planning of Japan and the Government of Mexico. I have testified on costing methods, competition policy and standards of maximum rate reasonableness, on behalf of several major shippers before the Interstate Commerce Commission.

1.3.4 I have been involved in the construction, review, testing and application of TSLRIC+ and TELRIC+ cost models since 1995. I have testified on telephone rate design, costing methods, costing and pricing principles, competition policy and alternative regulation before the Federal Communications Commission and 25 state regulatory commissions in the United States. I have testified before telecommunications regulatory authorities in Canada and Mexico and before the United States Senate, the United States House of Representatives and the Joint Economic Committee of Congress on transportation, antitrust and telecommunications policy issues.[6]

2 TSLRIC & FORWARD-LOOKING NETWORK DESIGN

2.1 Economic rationale for using TSLRIC in pricing network elements or services such as ULLS

2.1.1 A fundamental economic concept underlying the transformation to competitive telecommunications markets is that competition provides the proper incentives for more efficient investment and innovation. To achieve this transformation, the ACCC mandates that Telstra make CAN assets available to competitors at TSLRIC-based prices. Its recent statement of ULLS pricing principles noted that:

> The ACCC has historically been of the view that TSLRIC+ approach is consistent with the price that would prevail if an access provider faced effective competition, and that it usually best promotes the long-term interests of end-users.

[6] Dr. Harris' professional qualifications are detailed in my curriculum vitae, attached as Appendix 1.

> Further, the ACCC has historically been of the view that a TSLRIC+ pricing approach is consistent with the legislative matters discussed above at 2.2 [relevant sections of the TPA].
>
> The Australian Competition Tribunal also expressed its general agreement with the TSLRIC+ pricing methodology…[7]

2.1.2 As a standard for pricing, TSLRIC+ is only as good as the model and methods used to estimate TSLRIC+. Accurately and objectively estimating TSLRIC+ is a critical step toward simulating competitive prices, and it is these prices that will lead to efficient investment decisions by all competitors. If sound TSLRIC+ principles are adopted, cost-based prices will provide: (1) proper signals for build-versus-lease decisions for all competitors and potential competitors; and (2) fair and reasonable compensation for Telstra. If prices are based upon misguided or inaccurate implementations of the TSLRIC+ methodology, these prices will undermine and distort the incentives necessary for future investment and result in an inferior telecommunication's infrastructure in Australia.

2.1.3 In the case at hand, Telstra is putting forth a model designed to apply the TSLRIC+ methodology to estimate the long run, forward-looking, efficient costs of building and operating a local network capable of providing unconditioned copper loops. A model used for this purpose must estimate the direct cost of building and operating the CAN to provide unconditioned copper loops, as specified by the ACCC, at the level of output provided over Telstra's current network using current build-out conditions (such as existing terrain, buildings, and other obstacles) and the best technology, practices, and procedures currently in use. In short, it must estimate the costs that a reasonably efficient firm would incur to build and operate a new CAN to

[7] "Unconditioned Local Loop Service (ULLS): Final Pricing Principles," Australian Competition and Consumer Commission, November 2007.

reach all customer premises that are reached by Telstra's current network, and it must include a reasonable allocation of joint and common costs.

2.1.4 Given its intended use in pricing ULLS, it is necessary to ask what it would cost a new facilities-based entrant to replace the CAN when working through the theoretical TSLRIC+ construct. A new entrant would have to build its network in the environment as it exists today, with buildings, highways, streets, yards, rivers, mountains, and other man-made and natural obstacles in place. The entrant would have to use the construction techniques or placement methods that are needed to build around or under these obstacles and would not have the luxury of installing its network in unobstructed "green field conditions." In addition, if the new entrant were building a loop network today designed to serve all of the existing premises (an assumption that is consistent with TSLRIC+), it would operate in a world with rights-of-way in their current positions and paths and face limited opportunity to share the costs of placing facilities with other network service providers.

2.1.5 Although TSLRIC is a theoretical construct, it can provide meaningful information for setting cost-based prices if – and only if – TSLRIC+ cost estimates are based on:

- Actual and realistic, not hypothetical or idealistic, assumptions related to building and operating a reliable network;
- Forward-looking, best available technology and practices consistent with a real-world network architecture and actual conditions;
- Input values that are consistent with the rules and purpose of the modeling exercise and with each other; [8]
- The inclusion of all cost that are incremental to providing copper CAN services (including ULLS) to as many customers as are capable of being supplied with these services; and
- The addition of reasonable allocations of joint and common costs.

[8] The purpose of the exercise at hand is to model the incremental, forward-looking, efficient costs of building and operating a reliable network that reaches all customer premises reached by Telstra's current network to provide ULLS as defined above.

As described below, the TEA model structure is based upon these criteria.

2.2 Importance of appropriate network design assumptions in estimating TSLRIC costs

2.2.1 Objective and realistic TSLRIC+ estimates begin with the simulation of a realistic network. Simulating a realistic network is a complex task made more difficult by the lack of detailed data about customer locations and network routes needed to recreate the paths of the real-world network. As a result of insufficient data, the sophisticated models in common use today simulate hypothetical networks, and these networks have suffered a wide range of serious problems, such as missing network components, assuming that customers move to distribution routes rather than building routes to customers, and placing cables on top of lakes and through buildings. Due, at least in part, to these problems, some modelers have put greater distance between their models and reality by proffering estimates of distribution distances based upon hypothetical route minimization methodologies.

2.2.2 If the data are available, a far better solution is to base the network in a TSLRIC+ model on the existing network after eliminating inefficiencies inherent in any network built and reinforced over an extended period of time. This, in fact, is a distinguishing characteristic of the TEA model. The TEA model starts with an actual, rather than a hypothetical, lay-out of its network based upon Telstra's detailed records of the locations of its facilities and customers. To my knowledge, Telstra is the only major telecommunications company with the detailed network data necessary to build a cost model on the foundation of an actual network that reaches actual customer locations. This is a substantial advantage over models that, by necessity, begin with a hypothetical network to reach hypothetical customer locations, and usually do so by "placing routes" over and through all sorts of natural obstacles and right-of-way limitations.

2.2.3 A second distinguishing characteristic of the TEA model, which also makes use of Telstra's detailed network data, is that the network in this model is based on the locations of the pillars in Telstra's network. As such, this model does not adhere to the "scorched node" approach, which is common to other cost models. In keeping with the hypothetical nature of the networks and customer locations in other models, the scorched node approach ignores the locations of nodes in the "outside plant" portion of the network. Basing costs on the actual network layout, including the locations of pillars, has the advantage of accounting for existing rights-of-way and the associated costs, and an added advantage is that it makes the model adaptable for the examination of sub-loop unbundling, if this emerges as a concern at some point in time. Against these advantages, there is the possibility that a hypothetical network that followed engineering guidelines, accounted for rights-of-way issues, and obeyed natural laws, could relocate a portion of the pillars and realize a lower cost. Based on my experience with the analysis of cost models, the fact that this network will need to cover essentially the same ground to reach the same customers, and the fact that relocating pillars may lead to cost increases related to acquiring rights-of-way, my rational expectation is that placing pillars in alternative positions will have little, if any, negative impact on the cost of building a network.

2.2.4 A final observation regarding the use of actual network information is that, although the paths of the network in the model follow existing routes in Telstra's network, the routes used in the model avoid using duplicative cable runs that are present in networks that were built over extended periods of time. The lay-out of the network in the TEA model is, therefore, based upon a realistic and efficient forward-looking design and satisfies the TSLRIC+ standard in this respect.

3 TEA MODEL AS A TOOL FOR COSTING ULLS

3.1 Overview of analysis of TEA cost model

3.1.1 Experience with cost models reveals that it is much easier to reach general agreement about the definition of total long run incremental cost than it is to reach agreement about the selection of a model and the input values that are used to estimate these costs. Experience has also taught that there are a number of guidelines for negotiating a path toward the selection of a model and the most reasonable values for key inputs. For my preliminary analysis of the TEA model, I examined the model in the context of these guidelines, as described below.[9]

3.1.2 Working with Dr. Fitzsimmons, I began with an examination of the overall structure of the model to determine if it is consistent with sound cost modeling practices and the specific goal of estimating the forward-looking, efficient incremental costs related to the CAN. Taking this one step further, I delved into the model structure to determine if it is sufficiently comprehensive and detailed to reflect all categories of costs, sufficiently flexible to examine costs across reasonable ranges of values for key inputs, and organized in a manner that is open to independent examination and verification. Also included in this step was the examination of the internal consistency of the model. That is, are the assumptions in the structure of the model consistent with each other such that a careful user of the model can include all costs yet avoid accounting for costs that are inconsistent with each other? My final step was to examine whether or not the reaction of the model to changes in values of key inputs is in line with economic intuition and experience in terms of direction and magnitude.

[9] It is my understanding that there are four geographic bands of areas for ULLS based upon the densities of customers. The version of the model that I examined is for Band 2 = Urban.

3.2 Consistency with sound modeling practices

3.2.1 To maintain clarity, my examination and this discussion of the model structure follow the three distinct, though interrelated components of a cost model:

1. **Investment**: This includes the capital outlay for the main and distribution (including lead-ins) portions of the network and for indirect assets, such as software and motor vehicles.

2. **Capital Costs**: In this portion of the model, the investment from above is translated into monthly costs per line using depreciation lives, cost of capital, and tax rates.

3. **Expenses**: This potion of the model uses factors based upon filed information to add-on all other costs, such as maintenance, administrative, and common costs.

3.2.2 This is the underlying structure of all of the credible cost models that I have worked with and analyzed, and it is the structure of the TEA model.

3.2.3 Investment takes two forms − direct investment in the main and distribution portions of the network that connects customers and investment in supporting assets that are necessary for providing high-quality service. Direct investment in the network represents the majority of the cost of the CAN. These costs are driven by the layout of the physical network, quantities and prices of components, such as cable and conduit, and the cost of placing the facilities.

3.2.4 Investments in assets other than those directly estimated in the main and distribution portion of the model, such as investments in software and motor vehicles, are included in the model using factors that are based upon cost categories submitted by Telstra to the ACCC in the Regulatory Accounting Framework ("RAF"). This factor methodology is consistent with methodologies used in other cost models. Although the values of the factors are often subject to debate, my preliminary analysis addresses the model itself, not specific values of inputs. It is noteworthy, however, that much of the past debate over input values stemmed from mistaken

interpretations of the long-run incremental costing methodology. For example, there is often the misperception that "long run" means "a long time," when, in fact, the long run criteria in the TSLRIC+ methodology simply means that a model includes the costs of replacing the entire network that is used to provide a service. That is, even long run assets, which are assets that do not change in the short run, are totally replaced in a credible TSLRIC+ model, as they are in the TEA model.

3.2.5 In the capital cost section of the model, investments are translated into monthly costs using a weighted average cost of capital, a tax rate, and depreciation lives. There is again nothing new or different in how this is accomplished, nor should there be. Investments are captured in the cost estimate by annualizing investments in each class of asset over their economic lives using a weighted cost of capital and dividing the annual costs into monthly amounts. The model allows for the analysis of costs across a range of user adjustable input values, including the components of the weighted average cost of capital (rates of equity and debt, and the relative amounts of equity and debt), a tax rate, and depreciation lives for the relevant classes of assets.

3.2.6 Expenses are included in the model using factors, again based upon costs submitted by Telstra to the ACCC in the RAF reports and aggregating costs using the cost categories in these reports. Once again, the TEA model is consistent with the accepted methodologies used in other long-run incremental cost models that I have reviewed.

3.3 Consistency with the purpose of model

3.3.1 It is my understanding that this model was designed for the immediate and specific purpose of estimating the cost of the CAN such that the network would satisfy the requirements that: (1) the network reflects the economies of scale from providing

service to Telstra's existing customers; and (2) unconditioned local loop service (ULLS) can be used to provide broadband service.

3.3.2 My examination indicates that the TEA model is structured to fulfill these requirements. The model captures the economies of scale by including all of Telstra's customers and customer locations in the basic access version of the model, and, in the ULLS version, the model includes all customers that can be served by all-copper-fed-loops. The ULLS version of the model uses larger gauges of cables to extend copper into the network, but there remain a number of fibre-fed, far distant distribution areas. The model continues to capture the economies of scale from these areas in the main portion of the network, but the costs and lines are excluded from the distribution portion of the network when estimating ULLS costs. Capturing the economies of scale associated with providing service to all or most of Telstra's customers has important implications for the values of other model inputs (that will no doubt be debated at a future date), especially the amount of sharing that could otherwise occur from potential facilities-based competitors.

3.3.3 As indicated by this discussion, the structure of the model is consistent with the immediate and specific purpose of estimating the cost of the CAN subject to the constraints described. In the ULLS version of the model, all copper loops are capable of providing service without requiring a competitor to place facilities anywhere other than exchange buildings.

3.4 Consistency with an appropriate level of detail

3.4.1 As discussed above, the paths of Telstra's actual network and the actual locations of Telstra's customers are the foundation of the TEA model. This level of detail allows for a simulation of a real-world network in the TEA model that other models do not, and cannot, approach. It is also important to examine whether the structure provides: (1) a sufficient level of detail to produce realistic costs estimates; (2) the ability to

allow for the identification of key inputs; and (3) the flexibility to examine costs across a reasonable range of values for these inputs.

3.4.2 Once the paths of the network are established, the facilities are sized as prescribed by the "Access Network Dimensioning Rules" provided by Telstra's network experts.[10] As described, these rules "represent efficient engineering best practices that a network provider would be expected to use in designing and deploying a copper wire customer access network in Band 2 today."[11] Materials costs are then estimated by applying prices to quantities estimated in the model as shown in the "Access Network Modeling Costing Information."[12] An examination of the main and distribution sections of the model reveals that the level of detail in these rules are in line with other models I have reviewed and sufficient for the purpose of estimating the forward-looking incremental costs of the CAN.

3.4.3 The cost of placing facilities is a function of the costs of a variety of activities, such as trenching and boring, as well as cutting and restoring concrete and asphalt, the costs of these activities in rocky and "normal" conditions, and how often each activity is used. Once again, the structure is similar to other cost models I have reviewed and includes sufficient detail to identify key inputs and examine the cost impacts of changing the values of these inputs.

3.4.4 As described above, the model estimates the costs of indirect assets and expenses with information provided by Telstra to the ACCC; it appears to include these assets and expenses at a sufficient level of detail. There are many other user adjustable

[10] "Access Network Dimensioning Rules, Long run incremental cost modeling input," Network & Technology Fundamental Planning, Telstra Confidential Document.

[11] "Access Network Dimensioning Rules, Long run incremental cost modeling input," Network & Technology Fundamental Planning, Telstra Confidential Document, p. 3.

[12] "Access Network Modelling Costing Information," Telstra Fundamental Planning, Telstra Confidential Document.

inputs, including inputs to account for sharing between the main routes and the interexchange network and to account for cost saving when a developer supplies trenches for telecommunications facilities.

3.5 Consistency of changes in cost estimates with changes in input values

3.5.1 The final step in my preliminary investigation of the model structure was a test of the sensitivity of the model to changes in inputs values. I tested the model's reaction to changes in a wide range of inputs, with special focus on inputs similar to those that received considerable attention in dozens of proceedings in which I participated. For these inputs, I tested the sensitivity of the model to changes in values of inputs taken one at a time and to changes to the values of various combinations of inputs.[13]

3.5.2 A subset of the inputs that were changed in the investment section included the design fill factors (used to size cables with sufficient stand-by capacity), the tapering toggle for main cables (which allows for the tapering of cable sizes), the amount of route sharing between the CAN and the interexchange network, the portion of trenches provided by developers, the overhead percent, and several of the inputs associated with placement costs. In the capital cost section, I tested the model's reaction to changes in the components of the weighted cost of capital and the economic lives of assets, and, in the expense section, I tested the sensitivity of the model to changes in the major indirect expense categories.

3.5.3 The directions and magnitudes of the model's reactions to changes in input values are consistent with my expectations for a properly constructed model. For example, changing the design fill for distribution facilities from 60 percent to 90 percent has a minimal impact on distribution investment and an even smaller impact on monthly

[13] To conserve time, my sensitivity tests were run on one ESA at a time, for the Blackburn and Brooklyn Park ESAs, respectively.

cost estimates. Given that realized fill is often much lower than design fill and that fill effects the size of cables but not the larger costs associated with placing cables, a large impact from changing the design fill would have warranted further investigation. Also as expected, changing the inputs associated with the cost of placing cables had more significant impacts, as did changing the capital cost inputs. Finally, changes in expense factors drove directly to corresponding changes in expenses, as expected.

4 SUMMARY AND CONCLUSIONS

4.1 The TEA is consistent with TSLRIC principles

4.1.1 The TEA model is primarily designed to estimate the cost of providing services over unconditioned copper loops from customers' locations to the locations of Telstra's exchange buildings, and my analysis indicates that the TEA model has a sound economic foundation for estimating TSLRIC+ and achieving this purpose.

4.1.2 The network in the TEA model is more realistic than the network in any other cost model with which I am familiar. Because it is based upon Telstra's actual cable routes and customer locations, the model is capable of producing more accurate cost estimates than models that have built-in inaccuracies that are inherent in hypothetical networks (i.e., those which employ unrealistic assumptions about network design and the conditions under which an entrant would be building a new network in today's environment).

4.1.3 The model also fulfills the fundamental criteria for estimating TSLRIC+. It estimates the cost of providing the totality of ULLS to all of the customers that it can reach with a network capable of providing this service on unconditioned copper loops from a Telstra exchange building. It fulfills the long run requirement by estimating the cost of replacing the entire network to provide this service, and, by

using the engineering guidelines and fact-based costing information cited above, the structure of the model is capable of doing so with a realistic level of efficiency using forward-looking technology. Finally, the model accounts for other costs in a complete and reasonable manner by applying factors that are based upon information submitted to the ACCC in the RAF reports cited above.

4.1.4 In addition to employing a realistic network design, the data structure of the TEA model is sufficiently detailed to reflect all categories of costs, yet flexible enough to examine costs across reasonable ranges of values for key inputs, and organized in a manner that is open to examination and verification. No internal inconsistencies were uncovered in my analysis, and changes to a wide range of input values drove changes in costs estimated by the model that are in line with economic intuition and experience. In summary, the TEA is a model suitable for accurately estimating the TSLRIC+ of ULLS and focusing the examination of the issues related to costing and pricing this service.

4.2 Trade Practices Act criteria and ULLS pricing

4.2.1 I have reviewed Sections 152AH and 152AB of the Trade Practices Act, as well as discussions of those legislative criteria in various reports of the ACCC. If estimated correctly, ULLS prices based on TSLRIC+ would comply, in my opinion, with all of the relevant criteria of the TPA.

4.2.2 To meet TPA criteria, however, TSLRIC+ cost estimates must pass three tests. First, the cost model must be based on sound economic principles and realistic network design assumptions. Second, the model must be structured to accurately account for and calculate all relevant network components and costs, as well as the costs of maintaining and operating the network. Third, all input values must lie within a range of economic reasonableness and must reflect actual conditions and forward-looking assumptions.

4.2.3 In my opinion, the TEA cost model clearly passes the first two tests. The network design assumptions on which it is based are realistic, yet efficient and forward-looking. In contrast, "scorched node" network design assumptions, as typically employed, are not appropriate for estimating the TSLRIC of ULLS, and prices based on such cost estimates would not comply with the TPA criteria. Such unrealistic assumptions do not reflect the cost of an entrant and understate the cost of building and operating an efficient, forward-looking network. Estimating ULLS costs by assuming away the reality of installing an extensive network under actual conditions may favor the short run interests of a subset of competitors and provide the illusion of competition, but it will undermine the incentives necessary for future investment and innovation by both entrants and incumbents.

4.2.4 The third test of a cost model requires the use of input values, such as cost of capital, depreciation lives, and operating expense factors, that are based on sound economics and realistic assumptions about the construction and operation of an efficient, forward-looking network. Because the TEA model allows users to choose input values of a very large range, there is no question that it allows for the use of reasonable input values. It is important to note, though, that because so many of the input values are user variable, the costs estimated by the TEA model are only as reasonable as the input values used to run the model.

4.2.5 Prices for ULLS that are based on cost estimates from the TEA model, when the model is run with input values selected from within a reasonable range, based on sound engineering information and economic principles, will promote the long-term interests of end-users in Australia.

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Professor Robert G. Harris

21 December 2007