

**FINAL REPORT PRIVILEGED AND
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Economic Report on domestic transmission capacity service exemptions

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Date: 23 August 2007

CRA Project No: D11410-00

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1. INTRODUCTION

- 1 My name is Michael Smart. I am a Vice President of the economics consulting firm CRA International. I have been asked by Mallesons Stephen Jaques ("MSJ") solicitors, who act for Telstra, to provide my opinion on two questions concerning the economic basis for exemption of the declared Domestic Transmission Capacity Service ("DTCS").
- 2 The context of these questions is the exemption criterion previously applied by the ACCC to DTCS on certain capital – regional routes. Routes on which there were three or more providers of transmission services over optical fibre were eligible for exemption. Where a carrier's fibre network was within 1 km of the GPO of a regional centre it was considered eligible for inclusion in the competitor count employed in the exemption decision.
- 3 The questions I have been asked to consider are:
 - a) Would a rule for counting competitors that included only those with a fibre network within 1 km of the GPO be consistent with accepted economic principles of market definition?
 - b) If not, what alternative rule for counting competitors would be more consistent with accepted economic principles of market definition?
- 4 My curriculum vitae, including relevant qualifications and experience, is included in **Appendix 1**.
- 5 I have read the Federal Court's practice direction 'Guidelines for Expert Witnesses and Proceedings in the Federal Court of Australia' and prepared this report accordingly, making all inquiries I consider to be appropriate, having regard to the instructions from MSJ.

2. BACKGROUND

- 6 The ACCC considers that a carrier competes in a regional transmission market if its fibre network passes within 1km of the GPO of a regional centre. The selection of the 1km cutoff appears arbitrary, and fails to take account of the likelihood that competitors would be prepared to build longer spur lines if these were perceived to be sufficiently lucrative. In my view, the market definition tool Critical Loss Analysis (CLA) could be used to derive a more objective market definition. On this basis the ACCC's present approach appears unduly conservative.

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- 7 CLA is a quantitative method of determining market boundaries for antitrust purposes. It addresses the question of what percentage loss of custom would be necessary to make a given price increase unprofitable. It is relevant to antitrust market definition because it identifies limits to the extent potential competitors can discipline the pricing behaviour of a hypothetical monopolist. Competitors that can impose effective constraint should be included in the market definition.
- 8 The report is structured as follows. First, the essential elements of CLA are noted and applied to the business activity of data transmission. Second, the respective average costs of (1) a hypothetical monopolist over point-to-point transmission and (2) a potential entrant with fibre nearby are considered. These observations are combined to derive an objective market definition rule based on CLA. Third, some practical implementation issues are noted.

3. HOW MUCH SUBSTITUTION IS NEEDED?

- 9 The standard critical loss formula is given in O'Brien and Wickelgren:¹

$$CL = X/(X + m) \quad (1)$$

where X is the percentage price increase, $\Delta p/p$, and m is the Lerner Index, $(p-c)/p$. "c" is defined in this context as the marginal cost. CL is the smallest percentage loss of sales, $\Delta q/q$, that would make the price increase unprofitable.

- 10 Fibre optic transmission involves cables and termination equipment. The costs are overwhelmingly one-off capital costs, with an extremely weak dependence in the short term on traffic volumes. It appears likely (and is assumed) that the marginal cost for transmission is very close to zero, so that the Lerner Index for transmission approaches unity. Many elements of the calculation presented here are very conservative, so the results are not very sensitive to this approximation of zero marginal cost.

¹ O'Brien, Daniel and Abraham Wickelgren, "A Critical Analysis of Critical Loss Analysis", FTC working paper 254. <http://www.ftc.gov/be/workpapers/wp254.pdf> accessed 24 July 2007. Note that while O'Brien and Wickelgren's paper is critical of the use of CLA in merger analysis, they do state, on pages 10-11 "At the outset, we should note there is nothing wrong with the standard critical loss calculation itself. The calculation is simply algebra, and formula (4) is certainly correct. The problem arises in the interpretation of (4) in light of evidence about the actual loss from a given price increase." The derivation presented here is based on O'Brien and Wickelgren's formula (4).

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- 11 It is relatively standard to adopt 5-10% as the test threshold of price increase in a SSNIP test for market definition purposes.² To be conservative, I focus on 5% SSNIP. Given the assumptions just made, the critical loss would be approximately $0.05/(0.05 + 1) = 4.8\%$. In other words, if a hypothetical monopolist over transmission from capital city A to regional centre B were to lose 4.8% or more of its traffic as a result of a 5% SSNIP, then that SSNIP would be unprofitable for the monopolist.

4. HOW MUCH SUBSTITUTION IS LIKELY?

- 12 For purposes of antitrust market definition, the key question is whether it is likely that a hypothetical competitor could capture 4.8% or more of the traffic in response to such a SSNIP. Given the properties and large capacity increments of optic fibre, it appears likely that if a competitor were to enter the transmission market from A to B at all then it could carry substantially more than 4.8% of the market's traffic. The question is whether a hypothetical competitor with a nearby fibre network would be motivated to enter as a result of a 5% SSNIP. If so, then it would almost certainly enter with sufficient capacity to carry an amount of traffic that exceeds the critical loss.

² A SSNIP test involves the 'thought experiment' of considering the likely response by potential entrants to a small but significant *non-transitory increase in price* by a hypothetical monopolist. As to the standardness of the 5-10% range, the New Zealand Commerce Commission's Mergers and Acquisitions Guidelines state, (p. 15), "*The Commission generally considers a SSNIP to involve a five to ten percent increase in price that is sustained for a period of one year.*" A copy of the guidelines can be found at <http://www.comcom.govt.nz//Publications/ContentFiles/Documents/MergersandAcquisitionsGuidelines.PDF> (accessed 21 August 2007).

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- 13 Before considering that question it is important to note that the base price level against which the SSNIP is measured must be the competitive price level. Failure to observe this requirement would be to fall into the so-called “cellophane fallacy”.³ For convenience, we take the average cost of serving the A – B transmission market (assuming a prior presence at point A that is independent of the decision to enter the A – B market) as the competitive price level.⁴ The average cost of transmission for the incumbent from capital city A, at which it already has facilities, to a regional centre B, would likely take the form:

$$AAC_i = Kx + E \quad (2)$$

- 14 where x is the distance from A to B, K is the capital cost of installed fibre per unit distance,⁵ and E is the capital cost of termination equipment at point B. We assume AAC_i is the competitive price.

4.1. ENTRANT’S AVERAGE COSTS

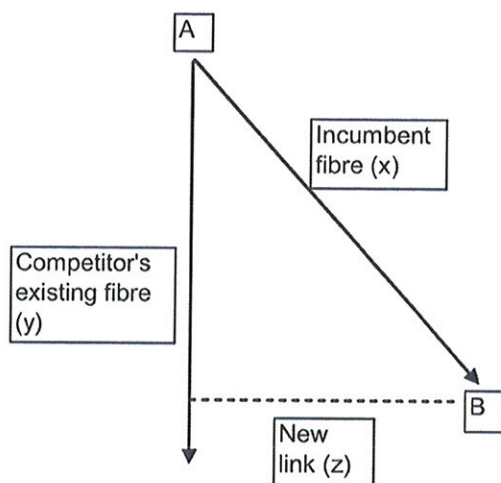
- 15 The diagram below illustrates the entrant’s cost position geometrically:

3 In a famous antitrust case, cellophane manufacturer Dupont successfully argued that other types of packaging were in the same market as cellophane, despite the fact that cellophane’s average variable costs of production were substantially lower than the marginal costs of other packaging types. The erroneous implication of this finding was that makers of higher cost alternatives were capable of preventing cellophane from earning supernormal profits. The error arose because the current market price of cellophane was used as the benchmark. Against that benchmark, it was found that cellophane could not be sold profitably at a still-higher price. What was overlooked was the fact that the limit pricing strategy of Dupont ensured that cellophane was capturing rents at the current market price.

4 This assumption that competitive prices equal average costs for the link may be somewhat simplistic in that it overlooks network effects. However, the current focus on point-to-point routes and the ACCC market definition that treats each point-to-point route as a separate market relies on the absence or immateriality of network effects. If network effects can be ignored, then link prices that just allow average cost recovery are consistent with the absence of rents.

5 It is worth commenting briefly on the fact that fibre-optic transmission networks are generally built to a ring topology in order to provide route redundancy in case of an outage at an isolated point in the network. The ring topology does not alter the basic cost calculus implicit in equation (2). Two cases need to be considered: (a) when fibre is constructed from A to B, a dual fibre run is employed in order to provide the ring topology, with both fibre runs situated relatively close to each other (although obviously not in the same trench or conduit); or (b) when fibre is constructed from A to B, the ring topology is created by a separate fibre run that may go far afield and connect via a distant third point, C. In the first case, the dual fibre run’s costs would be reflected in a value of K that was approximately double the value of K that would apply to a single run. In the second case, the redundant route is presumed to exist already and would not factor into the cost of connecting A to B. In either case, equation (2) would remain a valid method for calculating the costs.

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- 16 The entrant must build a new link of distance z to connect point B to an existing fibre route, of which a length y would be used to serve the route A – B. The entrant would also need to install termination equipment at point B. Therefore, the entrant's average avoidable cost of transmission would be:

$$AAC_e = Kz + Ky + E \quad (3)$$

- 17 This formulation is very conservative. The cost of length y of existing fibre is sunk. It does not depend strongly on the entrant's decision to serve the A – B market. Nevertheless, the decision to enter the A – B market may lead to some opportunity costs associated with the existing fibre route. Entry may preclude use of some of the capacity on the existing fibre to serve new demand on other routes. The full replication cost of the length y , being Ky , represents an upper bound to this opportunity cost. For this reason, equation (3) is likely to significantly overestimate the entrant's average cost of serving route A - B. This overestimate will serve to make the market definition rule derived below conservative (in the sense of underestimating the maximum distance z for which an entrant should be included within the A – B transmission market).

4.2. APPLICATION TO MARKET DEFINITION

- 18 Returning to the SSNIP test, the definition of the A – B transmission market should include all potential entrants who have fibre networks located within a critical distance z^* of point B. This critical distance is the largest distance over which a competitor could enter, charging its own average avoidable cost, and undercut the hypothetical monopolist incumbent's SSNIP price. Algebraically, this criterion can be expressed like so:

$$AAC_i (1 + s) = AAC_e \quad (4)$$

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where "s" is the amount of the SSNIP, expressed as a fraction, and AACe depends on z^* . Equation (4) asks at what spur distance would the entrant's costs be the same as the incumbent's revenues when the incumbent earns 5% SSNIP more than its competitive costs.

19 It is important to recognise that this analysis, which is intended to determine the outer boundaries of substitution possibilities, does not rely on any assumptions or theories about behaviour of firms. No inference can be drawn that a firm with fibre located within z^* of a regional centre would actually enter on the basis of a 5% SSNIP. All that can be inferred is that such an entrant could capture a volume of traffic exceeding the critical loss at a price that was no lower than its own average cost.

20 Substituting for the average avoidable costs using equations (2) and (3):

$$(Kx + E)(1 + s) = Kz^* + Ky + E \quad (5)$$

21 This equation can be simplified to:

$$1 + s + Es/(Kx) = z^*/x + y/x \quad (6)$$

22 As the entrant is presumed to have flexibility to select the point at which the spur line joins the existing fibre route, it will select a junction point such that, $y < x$ so $y/x < 1$. Given these points, equation (6) leads to the inequality (7):

$$z^*/x = s(1 + E/(Kx)) + 1 - y/x > s(1 + E/(Kx)) \quad (7)$$

23 Since z^* is defined as the critical value of z , any z satisfying:

$$z/x < s(1 + E/(Kx)) \quad (8)$$

will satisfy $z < z^*$. The last term in equation (8), $E/(Kx)$ which is positive, may be difficult to evaluate without detailed knowledge of the costs of termination equipment and unit costs of laying cable. It seems reasonable to suppose that over relatively long distances the distance-based cost element Kx will tend to dominate the fixed cost of termination equipment, so a simpler rule of thumb will provide a conservative benchmark for market definition purposes:

$$z/x < s < s(1 + E/(Kx)) \quad (9)$$

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- 24 Taking the standard SSNIP level of $s = 5\%$, this rule boils down to the requirement that a carrier with fibre within a distance z of the reference point⁶ for regional centre B would be in the A – B transmission market if z is less than 5% of the A – B route distance.
- 25 This calculation embodies three simplifying assumptions that are all conservative (in the sense of reducing the critical distance z^*):
- The maximum possible opportunity cost for the entrant's use of its existing fibre, K_y , is adopted;
 - The length, y , of existing fibre used is assumed equal to the A – B route distance, x , despite the geometric likelihood that a connection point for the new spur would be selected so that $y < x$;
 - The term $E/(Kx)$, which will tend to increase the critical ratio z^*/x , has been ignored.
- 26 It is immediately apparent that this rule would expand the scope for carriers to be included in regional transmission markets relative to the arbitrary 1km rule of thumb. For example, if the A – B route was 100 km in length, then a carrier with a network within 5km of the reference point of city B would be able to constrain the hypothetical monopolist.
- 27 In essence what is proposed here is a market definition rule based on the ratio of the spur length to the entire route distance, rather than on the absolute length of the spur line. The intuition behind this approach is related to the fact that casual inspection of posted transmission prices shows them to be strongly and approximately linearly related to route distance: the longer the route, the higher the price. On higher priced routes, all else being equal, a longer (and therefore more expensive) spur construction would be justified to enter the market. The linearity of relationships between posted transmission prices and route distances on one hand and between spur construction costs and spur distances on the other gives rise to the proposed rule based on distance ratios.

⁶ The reference point may be the GPO of city B or, alternatively, it may be the location of Telstra's transmission node nearest city B. While the choice of reference point may affect the competitor count in any specific city, it does not affect the logic of the argument developed here.

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5. PRACTICAL IMPLEMENTATION

- 28 If the proposed market definition rule were adopted, it would be necessary to estimate the route distance between the capital city and the regional centre in order to implement the rule. If information is available on the actual length of the fibre run for an incumbent carrier, then that would naturally provide the requisite route distance. However, if that information is not readily available, then it is my opinion that the shortest road distance between the two endpoints would serve as a reasonable and unbiased proxy for the route distance. In forming that opinion, I have had regard to the statement of [REDACTED] dated 23 August 2007, which provides a number of reasons in support of that conclusion.
- 29 Additionally, I am aware that there may be practical difficulties in ascertaining the precise route taken by a carrier's fibre-optic network. These difficulties may, in turn, make it difficult to determine whether a carrier's network lies within a specified distance of the reference point. Given this problem, it may be more practical to base a competitor count on the number of carriers that have a POP within a specified distance of the reference point. It is important to note that a count based on competitor POPs, rather than on the location of the competitor fibre network, is likely to understate the actual number of competitors in a given market. At any rate it will not overstate the number. That is because a competitor POP is, by definition, on the competitor's network, but it may not be the closest point of that network to the reference point. For this reason, a POP-based count will be conservative.
- 30 Finally, it should be recognised that any distance-based rule for counting competitors requires the establishment of a precise reference point from which distances are measured. The Commission suggested that the regional centre's GPO should be the reference point. This approach has merit, in my view, because the GPO location is largely independent of specific network location decisions taken by individual carriers and may on average approximate the centre of population. On the other hand, the long-term existence of Telstra transmission POPs at particular locations may have tended to influence the development of complementary telecommunications infrastructure so that the Telstra POP represents some form of geographic centre of telecommunications-specific activity. I have no opinion on whether the GPO or Telstra's POP represents the preferable reference point for the purpose of counting fibre-optic transmission competitors.

6. CONCLUSIONS

- 31 Turning to the first question I was asked, it is my view that a rule for counting competitors that includes only those with a fibre network within 1 km of the GPO is unlikely to be consistent with accepted economic principles of market definition. The reason for my view is that this rule may understate the number of competitors in the market if the route distance of that market is greater than 20 km (as most are). One km is 5% of 20 km.

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- 32 Turning to the second question, a preferable rule would be that any carrier with a fibre network closer to the reference point for the regional centre than 5% of the route distance should be counted as a competitor in the market. I note that my calculation has included a number of conservative assumptions, one of which is a 5% SSNIP. A 10% SSNIP is also routinely used in market definition exercises, so the possibility should not be dismissed that any carrier with a fibre network within a distance of 10% of the route distance should be counted as a competitor in the market.