FINAL REPORT

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Domestic transmission capacity service exemptions—response to Optus submission

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1. SUMMARY

1 In November 2007, Optus made a confidential submission to the ACCC concerning Telstra's exemption application for the DTCS, which criticised the 5% distance threshold for geographic market definition (the "5% rule"). The 5% rule was derived from critical loss analysis prepared by CRA International on behalf of Telstra.

2 The Optus critique indicates a misunderstanding of several key planks of the derivation of the 5% rule, and it makes several important errors. In order to assist the ACCC evaluate the critical loss analysis, this note clarifies the apparently misunderstood aspects and corrects the Optus errors.

2. INTRODUCTION

3 My name is Michael Smart. On 23 August 2007 I prepared an expert report[1] ("my earlier report") that was submitted to the ACCC by Telstra in support of its application for exemption for the DTCS on certain capital – regional routes. My report employed critical loss analysis to derive a heuristic rule for determining the geographic scope of any given regional market for the Declared Transmission Capacity Service ("DTCS"). The rule I derived was that any firm that owned a fibre optic transmission route emanating from the relevant capital city and running within a specified maximum distance from the relevant reference point in the regional centre should be included in that capital city – regional centre DTCS market for the purpose of counting the number of actual and potential competitors in that market. The specified maximum distance was 5% of the minimum road distance between the capital city and the regional centre.

4 Optus[2] has criticised my earlier report on several grounds:

a) my assumption that the average cost of transmission varies linearly with route distance is said to be incorrect [Optus par. 2.55];

b) I am said to have incorrectly assumed that the SSNIP test is a short run test, when a long run test should have been used [Optus par. 2.9];

c) I am said to have incorrectly understood the meaning of the Lerner Index, on which the critical loss analysis relies [Optus par. 2.10];

1 "Economic report on domestic transmission capacity service exemptions," Mike Smart, CRA International, 23 August 2007.

2 Optus submission to Australian Competition and Consumer Commission on Telstra's Exemption Application for the Domestic Transmission Capacity Service, November 2007 (confidential version).

d) The lead times, the significance and the sunk nature of competitor investments in building new fibre optic spur lines is said to rule out the possibility of supply-side substitution by these firms [Optus pars. 2.18 – 2.23, 2.28];

e) It would not be appropriate to apply the SSNIP test to assess the likelihood of a competitor making an entry decision [Optus par. 2.47].

5 This note responds to these criticisms as follows:

a) Empirical evidence is presented to support my assumption that both transmission prices and costs are linearly related to the route distance;

b) The critical loss is recalculated adopting a more conservative long run value for the marginal cost, and this change is shown to make no difference to my earlier conclusions;

c) Optus has made two mistakes in its own interpretation of the Lerner Index, so its criticism of my earlier report on that ground is invalid;

d) The 5% rule ensures that any competitor investments required for supply-side substitution are not significant, either in terms of the proportion of total costs, in relation to the revenue opportunities, or in respect of asset lives. Lead times are not large in comparison to typical transmission contract lengths, and are small in comparison to asset lives. Optus places too much weight on the sunk character of investments;

e) My earlier report did not contend that the SSNIP test should be used to assess the likelihood of a competitor making an entry decision.

6 In my view, the conclusions of my earlier report remain valid. I agree that the calculation of the critical loss should be updated to reflect a long run view of marginal costs.

3. LINEARITY OF PRICES WITH DISTANCE

7 The Optus submission questions my assumption that transmission costs and prices are linearly related to the length of the route [see Optus paras. 2.49 – 2.55]. Optus states, in particular, that my claim of a linearity between posted transmission prices and route distances is not supported by the wholesale transmission prices currently available in the market [Optus para. 2.53].

8 The assumption of linearity is important to the critical loss analysis, so in this section and the next I consider the available evidence in order to test it. This section considers the linearity of prices with distance. The next considers the linearity of costs with distance.

3.1. TELSTRA'S POSTED TRANSMISSION PRICES AS A FUNCTION OF DISTANCE

9 My earlier report notes at para. 27 that, "*casual inspection of posted transmission prices shows them to be strongly and approximately linearly related to route distance.*" The price set upon which I based this observation is reproduced in the table below.

[Table deleted – C-I-C]

10 The implied price – distance relationship is plotted below in the form of a scatter chart.

[Chart deleted – C-I-C]

11 Apart from three routes labelled on the chart above: [C-I-C][3] Telstra list prices for the set of 60 regional routes conform to a strong linear relationship with distance. The y-intercept for the best fit line to the remaining 57 routes is $[C-I-C].

3.2. OPTUS' TABLE OF WHOLESALE TRANSMISSION PRICES ON SELECTED ROUTES

12 The Optus confidential submission presents information on the wholesale transmission prices charged by Telstra to Optus on selected routes. This tabulated information was not previously available to me. Optus states [para. 2.54] that the price-distance table at para. 2.53 shows the lack of high correlation between the final transmission price and the radial distance of the link. Optus arrives at that conclusion by dividing the price by the distance for each link and observing that this ratio is not constant.

13 The ratio of price to distance would only be constant with a linear relationship if the y-intercept were zero. My analysis of the Telstra list transmission prices indicates that the y-intercept is not zero, but rather a figure of approximately $[C-I-C]. In other words, the lack of a constant ratio does not rule out a linear price-distance relationship.

14 The chart below plots the prices and distances in Optus' table graphically, and the best fit line is superposed.

[Chart deleted – C-I-C]

15 While there is some scatter around the best fit line, this chart shows that the price data presented by Optus is consistent with a linear distance relationship with a y-intercept slightly below $[C-I-C]. This y-intercept is consistent with the y-intercept derived from analysis of Telstra list transmission prices, as discussed above.

3 I do not know why these three routes exhibit a different price-distance relationship than the other 57. I understand that [C-I-C].

16 Contrary to Optus' denial at par. 2.53, it is evident that Telstra's transmission list prices give strong support to the notion of a linear price – distance relationship over the vast majority of routes. The linearity of the price – distance relationship is also evident in the information presented by Optus to refute it.

4. LINEARITY OF COSTS WITH DISTANCE

17 My earlier report explained that the price level that should be used in critical loss analysis was the competitive price level which, for practical purposes, would closely approximate the average cost of serving the A – B transmission market [CRA, par. 13]. The algebraic development of the 5% rule in my earlier report from equation (2) to equation (9) relied on the linearity of fibre optic cable costs with distance. Because of this emphasis on cabling costs, the linearity of transmission prices is not essential to the analysis in my earlier report. Clearly, though, the linearity of costs is essential. On that point, Optus states [par. 2.55], "*the average cost of serving a transmission route depends on a number of factors, of which distance is only one—hence it is incorrect to assume that cost is a simple linear function of the length of the route.*"

18 Information presented by Telstra in its response to the ACCC's information request of 4 January 2008 [section 3 (c)] is consistent with the cost formula used in my earlier report (equations (2) and (3)). According to Telstra's document, the distance-dependent cost elements comprising the coefficient "K" are unit costs per kilometre of ploughing and of the fibre itself, which are constant for a given route. The distance-independent cost elements comprising the term "E" are the cost of terminating equipment and equipment accomodation, and the cost of ducting. Ducting costs depend on the length of ducting, but that length is related to the ground conditions and other infrastructure in the immediate vicinity of the exchange or other building housing the termination equipment. It is generally unrelated to the route distance.

19 Cost information presented by Optus in footnote 12 is consistent with constant unit costs per kilometre for fibre: $[C-I-C]/ [C-I-C] km = $[C-I-C]/km. It is also consistent with constant unit costs per kilometre for ploughing:

$[C-I-C]/ ([C-I-C]km X [C-I-C]% of route ploughed) = $[C-I-C]/ ploughed km.

20 In conclusion, it is evident that while fibre optic cabling costs tend to be route-specific to some degree, it is common practice among telecommunications carriers to employ rules of thumb for general costing purposes in which cost for a given route is a linear function of route distance, acknowledging the existence of some distance-independent costs associated with terminating equipment. The cost-distance relationships on which the critical loss analysis is founded are validated by the information presented by Telstra to the ACCC, and also indirectly by the cost information presented by Optus.

5. SHORT TERM OR LONG TERM ANALYSIS

21 Optus says that the critical loss analysis contains two errors, apart from the assumption of cost linearity. The first error is said to be an assumption that the SSNIP and resultant critical loss should be based on a short run test [Optus para. 2.8]. It is the case that the critical loss analysis assumes a marginal cost of zero.[4] I do not claim that the SSNIP should be a short run test. However, on reflection, a Lerner Index of unity, corresponding to zero marginal cost, is not a conservative assumption. The question Optus raises is best resolved by revisiting the critical loss analysis adopting a Lerner Index that reflects the long run marginal cost of fibre, which I do in this section.

22 The long run marginal cost faced by an entrant would be the cost of building a new spur from the entrant's existing fibre route to the new termination point plus the cost of terminating equipment there. The average cost price would be the cost of termination equipment at both ends of the route plus the cost of the fibre route. Using the nomenclature in my earlier report, this marginal cost would be Kz + E, where K is the capital cost of installed fibre per unit distance, z is the length of the new spur, and E is the terminating equipment cost. The average cost price would be Kx + 2E. The Lerner Index evaluated at average cost prices would then be:

$$m = (p - c)/p$$

$$= (Kx + 2E - Kz - E)/(Kx + 2E)$$

$$= (x - z + E/K)/(x + 2E/K) \qquad (1)$$

23 When the route distance is sufficiently large that x >> E/K, the Lerner Index, m, would approach (x – z)/x, which must be greater than 0.95 for markets that satisfy the 5% rule because z cannot be greater than 5% of x under that rule.

24 When the route distance is very short, so that equipment costs dominate (x << E/K), the Lerner Index, m, would approach (E/K) / (2E/K) = 0.5. All possible values of the Lerner Index would be intermediate between these limits.

25 The most conservative (i.e., lowest) value for the Lerner Index, 0.5, arises when marginal cost is greatest, and would correspond to the case where x << E/K. The critical loss CL for a 5% SSNIP in that case is:

$$CL = SSNIP / (SSNIP + m) < 0.05 / (0.05 + 0.5) = 9.1\%$$

4 Optus agrees that the short run marginal cost is close to zero [Optus para. 2.9].

26 Consequently, if one were to adopt the most conservative assumption concerning marginal cost, leading to the most conservative value for the Lerner Index, the threshold critical loss would increase from 4.8% to 9.1%. My earlier report noted that, given the properties and large capacity increments of optic fibre, it appears likely that if a competitor were to enter the transmission market at all then it could carry substantially more than 4.8% of the incumbent's traffic. The same observation would apply if the critical loss were 9.1% of the incumbent's traffic, because of the high capacity of fibre. In the appendix, I present analysis of information regarding capacity on SDH rings and transmission traffic on Telstra's network on the routes in question that supports this contention.

27 In other words, an increase in the critical loss from 4.8% to 9.1% would not affect any of the subsequent analysis in my earlier report, nor alter its conclusions, because entry even at minimal scale (i.e., a single fibre-optic cable) would create enough fibre capacity to carry all of Telstra's transmission traffic on any of the specified capital-regional routes. The statement of [Telstra employee, name withheld] [par. 18] supports this conclusion:

> "*The theoretical maximum transmission capacity (measured in terms of theoretical maximum bandwidth per cable) comfortably exceeds demand along each of the specified 20 capital-regional routes, in Telstra's Exemption Application where 'demand' refers to the existing capacity to serve all bandwidth requirements running on all of the transmission systems that are used to serve that route (including other routes on the same transmission ring, where applicable) over a given period of time.*"

28 Furthermore, this most conservative valuation for the critical loss only arises when the route distance is extremely short. The Optus submission focused on long distance routes. For long distance routes, x >> E/K, and the Lerner Index is closer to 0.95 than 0.5. On these routes, the critical loss approaches:

$$CL = SSNIP / (SSNIP + m) < 0.05 / (0.05 + 0.95) = 5.0\%$$

which is immaterially different from the 4.8% value employed in my earlier report.

6. MEANING OF LERNER INDEX

29 The second error Optus says I make in the critical loss analysis is an "*overly simplistic and incorrect approach to the interpretation of the Lerner Index.*" [Optus para. 2.8] Optus makes the following further statements about the interpretation of the Lerner Index:

> "*The Lerner Index measures the profits of the industry and the interaction of profits and price levels*." [Optus para. 2.10]

> "*The derivation of a Lerner Index close to unity implies a market in which competition is highly effective and alternative suppliers greatly constrain the ability of any one supplier to raise prices.*" [Optus para. 2.11]

30 Neither of these statements is correct. As regards the first, the Lerner Index compares the difference between price and marginal cost to the price. The numerator is the contribution margin—the amount which price contributes to fixed costs and profits. It is not the same as profit. The divergence between contribution margin and profit is greatest for firms that have significant fixed costs.

31 As regards the second statement, it is quite misleading. Contrary to Optus' statement, price tends toward marginal cost in markets in which competition is highly effective. As the price approaches marginal cost, the Lerner Index approaches zero, not unity.

32 In my view it is Optus that has incorrectly understood the calculation and application of the Lerner Index.

7. MATERIALITY OF SUNK COSTS

33 In its discussion of the standard approach to competition analysis, Optus quotes a report prepared by Dr Padilla for the European Commission [Optus pars. 2.19, 2.20, 2.22]. The gist of these quoted passages is that in Dr Padilla's opinion, supply side substitutes must involve the supplier already owning all the assets needed to produce the new product, no sunk costs in redeploying assets, and prompt entry.

34 In my opinion, the ACCC's merger guidelines better reflect the standard approach to competition analysis than Dr Padilla's report. While there is common ground between the merger guidelines and Dr Padilla's report, there are subtle differences in emphasis which are relevant in the present context.

35 The ACCC merger guidelines discuss supply side substitution at pars. 5.52 and 5.53:

> "*On the supply side the Commission will consider which suppliers could, without significant investment, switch their production and/or distribution facilities to supply a substitute product to that supplied by the merged firm, or switch from supplying another geographic area to that supplied by the merged firm. If, in the event of a significant price rise or equivalent exercise of market power by the merged firm, these suppliers would switch their supply to the extent of defeating the price rise, these suppliers will be included in the relevant market.*
>
> *"Market entry is distinguished from supply side substitution by the requirement for significant investment in production, distribution or promotion."*

36 Importantly, the merger guidelines do not rule out sunk costs in supply side substitution. Optus' own preferred distance threshold of 4 or 5 kilometres [Optus par. 2.42] is not consistent with Dr Padilla's requirements. The cost of the 4 to 5 km of cabling would be sunk. It is the significance of the investment required for substitution, rather than its irreversability, that is determinative.

37 As regards promptness of substitution, the merger guidelines note at par. 5.71:

> "*The time dimension of the market refers to the period over which substitution possibilities should be considered. …The Commission will consider substitution possibilities over the longer term, but still in the foreseeable future, that will effectively constrain the exercise of significant market power by the merged firm."*

38 The merger guidelines do not appear to rule out substitution possibilities that may take 6 – 12 months to come to fruition.[5] Optus notes that while transmission contract terms vary, one year is considered a short term and longer term contracts are typically of three to five years duration [Optus par. 2.58].

39 As regards the significance of the investment required for supply side substitution by a nearby fibre owner, the 5% distance threshold guarantees that the redeployment cost is no more than 5% of the total fibre cost. While this fibre cost is sunk, it is long-lived.[6] Over the long life of these assets significant opportunities may arise for the profitable sale of transmission capacity.

40 In conclusion, the ACCC merger guidelines require that supply side substitution involves redeployment costs that are not significant. The 5% rule proposed by Telstra ensures that redeployment costs are not greater than 5% of total costs of serving the route. While supply side substitution does involve lead times of 6 – 12 months, that timeframe appears to sit within the ACCC's temporal dimension of the market and is short in comparison to standard transmission contract durations. Optus' preferred "standard approach" to market definition, that of Dr Padilla, is significantly more stringent than the merger guidelines, and even Optus' proposed distance threshold does not satisfy it.

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5 [Cited reference for 6-12 month construction time is removed for confidentiality reasons].

6 The ACCC's Transmission Cost Model by Gibson Quai-AAS employs a life of fibre optic cable of 24 years and a life of trenches and tunnels of 25 years. See, for example, tab "Annualised Cost Calc", cells H191 – H280.

8. PREDICTION OF ENTRY DECISIONS

41 Optus criticises my earlier report because the 5% rule does not represent a reasonable means of predicting entry decisions [Optus paras. 2.44 – 2.47]. It was never my intention to predict entry decisions with the 5% rule. The critical loss analysis was focused solely on the question of how many competitors and potential competitors would be capable of disciplining the DTCS pricing behaviour of Telstra on exempted routes.

9. REASONABLENESS OF 5% RULE

42 I have considered Optus' criticisms of my earlier report. As noted above, empirical evidence affirms the assumptions I previously adopted (linearity of prices and costs with distance). Other criticisms were based on incorrect economics (Lerner Index of unity and competitive markets).

43 In this note I have reconsidered the one assumption that was not conservative (zero marginal cost), and demonstrated that adopting the most conservative assumption instead does not alter the prior conclusions.

44 Therefore it remains my view that the 5% rule is a valid basis on which to assess the extent of competitors on a regional DTCS route.

10. APPENDIX

45 This appendix compares the theoretical maximum transmission capacity of a minimal entry scale fibre optic deployment to the amount of Telstra transmission traffic on the routes in question. The finding is that even a minimal scale entrant could, by deploying a single optic fibre cable, create sufficient transmission capacity to carry all of Telstra's current traffic on any of these routes.

10.1. CAPACITY OF MINIMAL FIBRE DEPLOYMENT

46 I assume that a pair of fibre strands would be capable of carrying [C-I-C] or [C-I-C] X 2Mbps equivalent services using termination equipment that is in widespread use. This assumption is conservative because the statement of [Telstra employee, name withheld] indicates, at par. 14 (a), that Telstra currently deploys up to [C-I-C] over a fibre pair. It also excludes the use of DWDM equipment, which could support between [C-I-C] to [C-I-C] channels, with each channel capable of carrying [C-I-C] worth of traffic [statement of [Telstra employee, name withheld], par. 14 (b)].

47 Consistent with the statement of [Telstra employee, name withheld], par. 15 (a), I assume that, for regional routes, a typical fibre optic cable would contain at least [C-I-C] fibre strands, or [C-I-C] pairs, of which [C-I-C] pairs would be available to carry traffic (leaving one pair spare for maintenance and other functions). On this basis, a typical minimal fibre optic cable deployment (i.e., one [C-I-C] fibre cable) would be capable of carrying [C-I-C] or [C-I-C] X 2 Mbit/s equivalents using termination equipment that is in widespread use.

10.2. AMOUNT OF TELSTRA TRANSMISSION TRAFFIC ON RELEVANT ROUTES

48 The statement of [Telstra employee, name withheld] contains an attachment in the form of a spreadsheet which contains an extract of data on capacity and utilisation of the fibre cable ring for seven capital-regional routes.

49 A summary of the table attached to the statement of [a second Telstra employee, name withheld] is presented below. Note that the middle six columns have been omitted and the rows have been sorted in order of decreasing number of CCA_SIO. This summary table shows that the [C-I-C] routes selected in [Telstra employee, name withheld]'s capacity and utilisation analysis are among the [C-I-C] with the largest number of SIOs in the CCA associated with the regional centre, as noted by the highlighting in the table below.

[Table deleted – C-I-C]

50 The number of used 2 Mbps equivalents on each of these [C-I-C] routes was inferred by subtracting the number of unused 2 Mbps (E1) equivalents from the total capacity provided in the spreadsheet attachment to the statement of [Telstra employee, name withheld]. The results are shown in the table below. The data was extracted on 1 February 2008.

[Table deleted – C-I-C]

51 This table shows that a single [C-I-C] pair cable would be sufficient to carry all of the traffic on Telstra's network on any of these [C-I-C] regional routes. A [C-I-C] pair cable is smaller than (half the number of fibres) the current minimum sized cable deployed by Telstra in regional areas. The addition of one spare fibre pair for fibre maintenance purposes would not alter the conclusion that the minimum sized cable deployed by Telstra in regional areas would be capable of carrying all of Telstra's transmission demand on any of these routes.

52 This calculation is, if anything, conservative for the following reasons.

a) Telstra's ring-based data for a given origin and destination includes traffic that passes between them on its way to more distant destinations. It is likely, for example, that the [C-I-C] route carries traffic that is ultimately bound for [C-I-C]. This through-traffic leads to an overestimate of the actual point-to-point transmission traffic on some routes.

b) The assumption employed here is that a fibre pair's transmission capacity is [C-I-C], but Telstra currently makes wide use of transmission equipment that would permit a fibre pair to carry [C-I-C].

10.3. ROUTE REDUNDANCY

53 It is common practice to deploy fibre optic cable in a ring formation to provide route redundancy. If the level of reliability provided by route redundancy were important to an entrant, then the minimal fibre deployment would be two cables, rather than one, linking the two endpoints of a transmission route.

54 This fact does not alter the conclusion reached here that a minimal fibre deployment would be capable of carrying 100% or more of Telstra's current transmission traffic on any of the regional routes the subject of the exemption application.