

Quantification of intangible benefits of the TSO

Review of a report prepared by CRA on
behalf of Telecom New Zealand

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Executive Summary

1. This report provides a review of the quantification of intangible benefits of the Telecommunications Service Obligation (TSO) prepared by Charles River Associates (CRA) on behalf of Telecom New Zealand (Telecom). The CRA report is based on the methodology developed by PHB Hagler Bailey Asia Pacific Limited (PHB) when establishing the intangible benefits of the Kiwi Share Obligations, which was considered by the Commission to provide an appropriate framework. Our report takes the PHB methodology as a starting point, but also considers the specific assumptions made in establishing commercially non-viable customers and their potential impact on the quantification of intangible benefits.
2. Overall, CRA follows the PHB methodology very closely. Where changes are made (for example by replacing the repeated sampling methodology used by PHB in order to establish life cycle benefits with an average revenue calculation), these changes are unlikely to affect the overall results to any significant extent.
3. However, we find some problems with the quantification of crucial variables used in the calculation of ubiquity and life-cycle benefits, namely the parameters that capture the impact of serving TSO customers whilst unprofitable on the probability that these customers choose to use Telecom as their service provider once becoming profitable (either because they are moving to a different area, or because they are reaching a different stage in their life cycle). In particular:
 - the use of market shares as a proxy for preferences may overstate the probability that customers who have not used Telecom before would choose Telecom; and
 - the failure to take account of customer inertia and switching costs may understate the probability of customers who have been served whilst unprofitable *staying* with Telecom.
4. These two effects together would tend to understate in particular life-cycle benefits, which account for the bulk of intangible benefits reported by CRA. However, there may be good reasons for questioning the relevance of life-cycle benefits in the case where clusters of CNVCs are established on the basis of average revenues and costs. This is because average revenues from a group of customers in a particular location may be a very good proxy for the average revenue of any individual customer over its lifetime. Therefore, the understatement of life-cycle benefits may not be material.
5. We also find some unexplained differences in the use of information for the quantification of ubiquity and life-cycle benefits. More generally, we note that there are also some methodological inconsistencies between the quantification of ubiquity and life-cycle benefits. Given that these benefits are closely related, it would be desirable to ensure as much consistency as possible.

6. CRA appear not to consider ubiquity benefits from moving to areas without local access competition even though call services are contestable in these areas and having been served by Telecom previously might increase the probability of choosing Telecom over a competing indirect access operator. Moreover, even though CRA note that with mandatory access wholesaling there should be no regions where access is not at least potentially competitive, they maintain as far as we are aware the distinction between areas with and without local access competition, largely ignoring the latter. Nevertheless, the impact of this may not be material assuming that Telecom would earn a similar margin on wholesale access provision as it would on serving customers directly under the retail-minus approach in operation in New Zealand.
7. We also note that there are strong links between ubiquity and life-cycle benefits on the one hand, and benefits from enhanced reputation and brand image on the other, namely with regard to the impact of the TSO on preferences and choice probabilities. These links are not addressed by CRA (nor, indeed PHB), but might warrant further investigation.
8. There are a number of benefits that CRA have deemed to be insignificant (enhanced reputation and improved access to market information) or, in line with PHB, have not explicitly addressed (reduction in cost through volume discounts and ubiquity benefits from attracting profitable customers who value wide geographic coverage). Although many of these are likely to be immaterial, ubiquity benefits from being able to offer services across a wide geographic area are potentially relevant and should ideally be quantified.
9. Overall, however, the problems we found with CRA's analysis (in some instances relating back to the PHB methodology) do not appear to result in a significant and material understatement of intangible benefits.
10. With regard to benefits from network externalities, we note that the proportion of these benefits accruing to the Telecommunications Service Provider (TSP) are reflected in call termination revenues and thus included directly in the quantification of TSO costs. Additional network benefits may accrue to customers being able to communicate with those who are served because of the TSO. To the extent that these benefits can (partly) be captured by operators through exploiting a higher willingness to pay, they might be considered under the heading of intangible benefits.
11. However, conceptually there appears to be a difference between intangible benefits such as those arising from, for example, ubiquity, and network benefits. Whilst the former by definition accrue to the TSP, all operators may benefit from the latter, with benefits being reflected in higher revenues (and profits). It would therefore appear to be appropriate not to include such benefits in the calculation of the net cost of the TSO, provided they are captured in the calculation of liable revenues which affect the extent to which different operators contribute to the recovery of the TSO costs.
12. Overall, our analysis leads to the following recommendations:

- As the Commission is likely to use average revenues for customers in particular locations (probably exchange areas) when establishing CNVCs/NLAs, it would not appear to be necessary to consider life-cycle benefits as separate intangible benefits.
- Although this would tend to decrease intangible benefits and thus increase the net TSO costs (everything else being equal), the use of average revenues in combination with other changes in the Commission's cost modelling approach may lead to a significant reduction in the number of CNVCs/NLAs, which would reduce the net TSO cost.
- Ignoring intangible benefits from brand enhancement and improved information appears to be appropriate, given that such benefits can be expected to be small or already reflected in ubiquity benefits.
- Ubiquity benefits that arise from the TSP being able to provide wide geographic coverage, which could in principle be estimated, have been ignored by both PHB and CRA. In the absence of a reliable estimate of such benefits, CRA's estimation of ubiquity benefits should be treated as a lower bound.

1 Introduction and background

13. The Telecommunications Act 2001 requires the Commission to determine the net cost incurred by Telecom New Zealand (Telecom) as a result of its Telecommunications Service Obligation (TSO), which involves the supply of certain services to customers that are commercially non-viable and who would not be served absent the TSO.
14. In the determination of the net cost of the TSO, one has to take account of intangible benefits that accrue to Telecom as a result of being the TSO provider (TSP). Previous studies undertaken for telecommunications operators and regulatory bodies¹ have identified a number of potential sources of intangible benefits, the potentially most important being:
 - Ubiquity benefits: these are benefits arising from the TSP having a ubiquitous network. Two main sources are usually identified for ubiquity benefits, namely that customers moving from commercially non-viable to commercially viable areas where competition exists are more likely to choose the TSP than any of its competitors, and the TSP is likely to attract customers who require services in both commercially viable and commercially non-viable areas and prefer to have a single supplier (e.g. businesses with a presence in commercially non-viable areas).
 - Life cycle benefits: these are benefits arising from the fact that customers who are currently commercially non-viable may at some future date become commercially viable, and may then choose the TSP over competitors.
 - Brand name and reputation benefits: these are benefits arising from an enhancement of brand value and corporate reputation as a result of being the TSP.
 - Access to market information: these are benefits arising from being able to collect information from a larger sample of customers and a wider range of areas.
 - Volume discounts: these are benefits related to the fact that being the TSO provider will generally increase the TSP's volumes and thus its bargaining power relative to, for example, equipment providers.

¹ See, for example, Wissenschaftliches Institut für Kommunikationsdienste (October 1997), *Costing and financing universal service obligations in a competitive telecommunications environment in the European Union*; Wissenschaftliches Institut für Kommunikationsdienste (April 2000), *Study on the re-examination of the scope of universal service in the telecommunications sector of the European Union, in the context of the 1999 Review*; Oftel (July 1997), *Universal Telecommunications Services*; and Australian Communications Authority (January 2000), *Estimate of net universal service costs for 1998/99 and 1999/2000*.

15. Distinct from these intangible benefits that potentially accrue to the TSP are benefits to commercially viable customers that might arise out of the TSO ensuring the supply of certain services to commercially non-viable customers. These latter benefits arise to the extent that there are network externalities, i.e. that all users connected to a network benefit from an increase in the network's size because this increases the range of communication possibilities they are facing. Put simply, commercially viable customers (who would be served in any case) – and their suppliers – may benefit from the TSO because the supply of TSO services enables them to communicate with (call and be called by) customers who would otherwise not be connected to the network.
16. Telecom has provided the Commission with a calculation of intangible benefits prepared by Charles River Associates (CRA)² on the basis of the methodology developed by PHB Hagler Bailly Asia Pacific Ltd (PHB) in an earlier study that estimated the intangible benefits associated with providing the Kiwi Share Obligation (KSO).³ The Commission in its Implementation Issues Paper⁴ indicated its broad agreement with the PHB methodology, but noted that the data used by PHB were out of date. PHB have identified four types of intangible benefits that are relevant to New Zealand, namely life cycle benefits, ubiquity benefits, benefits from brand enhancement and corporate reputation, and marketing benefits from access to a full range of usage data.⁵
17. We have been asked by the Commission to review the CRA paper and comment on the impact of changes in and adjustments to the calculations made by CRA, which is based on the Commission's view (as expressed in its Implementation Issues Paper and the Position Paper⁶) that the PHB methodology is appropriate. However, we understand that since the publication of its Position Paper the Commission has revised the way in which it would define commercially viable customers, and we will therefore examine the extent to which the definition of the relevant counterfactual (i.e. what would happen without the TSO) has an impact on the appropriate methodology for establishing intangible benefits.
18. The remainder of this document is structured as follows: In section 2 we briefly discuss the relationship between the quantification of intangible benefits and the definition of commercially non-viable customers. Sections

² Charles River Associates (September 2002), *Intangible Benefits of the Telecommunications Service Obligations*, Report to Telecom New Zealand Ltd.

³ PHB Hagler Bailly Asia Pacific Limited (September 2000), *Intangible Benefits of the Kiwi Share Obligations: Final Report*, Report to Telecom New Zealand Ltd.

⁴ New Zealand Commerce Commission (April 2002), TSO Discussion Paper and Practise Note - Implementation Issues Paper.

⁵ PHB, page 16.

⁶ New Zealand Commerce Commission, (September 2002), *TSO Position Paper*.

3 and 4 deal with the CRA quantification of ubiquity benefits and life-cycle benefits respectively. In section 5, we briefly review the treatment of benefits from enhanced reputation and brand image and access to a wider range of information (which have been discussed by PHB and CRA), and comment on benefits from volume discounts arising as a result of the TSO. Section 6 provides some conclusions.

2 Intangible benefits and commercially non-viable customers

19. In general terms, intangible benefits associated with the TSO arise from the TSP providing services to customers who could not otherwise be served – so called commercially non-viable customers (CNVCs). Thus, the way in which CNVCs are defined is an important determinant in the quantification of intangible benefits.
20. We understand that, in the Commission's view, CNVCs should be identified by assuming that there is a provider subsidy for economic costs exceeding the residential price cap (which implies that all current residential customers will continue to be served). Thus, CNVCs are customers that fail to generate sufficient revenue to cover the efficient cost of serving them. The Commission further considers that costs cannot be sensibly attributed to individual customers, as customers are typically served by a telephone network in groups or clusters connected to the same feeder cabinet or wire centre. The bulk of the costs of serving a cluster are costs such as trenching that are shared between customers in the cluster. The Commission therefore intends to estimate net CNVC costs on a cluster basis. Each cluster of customers generated by the cost modelling exercise will thus be identified as either viable or non-viable.
21. In this context, it would be inappropriate, in the Commission's view, to consider a counterfactual in which CNVCs would not be served (as implied in Telecom's approach of successively removing CNVCs from the network). However, this does not imply that such a counterfactual will be irrelevant for the quantification of intangible benefits. Although intangible benefits accrue to the TSP from keeping CNVCs connected rather than cutting them off, and all of these customers would continue to be served under the TSO, these intangible benefits are still relevant. The relevant question therefore is what intangible benefits arise from serving unprofitable customers at subsidised prices rather than charging them the full price and risk pricing them off the network.
22. Considering the intangible benefits of serving customers at subsidised prices may, at first sight, appear not to impact on the net cost of the TSO. However, this is not necessarily the case. Consider the two principal ways in which the impact of intangible benefits on the net cost of the TSO can be assessed:
 - by calculating the net losses from serving CNVCs (i.e. the extent to which costs exceed revenues) and subtracting intangible benefits from these net losses; or
 - by identifying commercially non-viable customers for whom costs exceed revenues ***including the intangible benefits*** of serving them, and then aggregating the respective net losses.
23. The number of CNVCs is likely to be smaller under the second approach than under the first approach. This is because there may be some customers who appear commercially non-viable on the basis of a comparison of costs

and revenues, but who become commercially viable once one takes into account the intangible benefits generated by serving these customers. However, the relative impact on the net TSO cost is unclear. Reducing the number of CNVCs reduces both losses and intangible benefits, and the overall impact depends on the extent to which margins (the difference between revenues and cost) decline faster than intangible benefits (in which case the net TSO cost would be greater under the second approach), or more slowly (in which case the net TSO cost would be lower).

24. Under the second approach, it is necessary to quantify the intangible benefits associated with serving particular customers or clusters of customers. This must be done on the basis of customer characteristics rather than whether or not these customers are CNVCs, as the quantification of intangible benefits is an input in determining whether or not these customers are commercially viable, and would thus be served without a subsidy. Whilst PHB have used this approach in the context of life-cycle benefits, there is no reason why it should not also apply to ubiquity benefits (or, indeed, any other potential source of intangible benefits).

2.1 Implications for quantification of benefits

2.1.1 Ubiquity benefits

25. Ubiquity benefits arise from two main sources:
- The fact that some customers who move from an area with a high cost of service provision to a low cost of service provision are more likely to stay with the operator who served them in the high-cost area.
 - The fact that some customers may have requirements that cover multiple sites and prefer an operator who is present in all locations in order to be able to procure services from a single supplier.
26. In order to capture ubiquity benefits arising from the first source, one would need to establish:
- the probabilities associated with customers in any particular area moving to another area;
 - the difference in the margins of providing the services across areas; and
 - the extent to which a customer moving from one area to another area is likely to re-connect to the same provider rather than choosing a different provider. This will be determined both by the customer's preference for the TSP and his awareness of competitive operators.
27. In very simplistic terms (ignoring that customers purchase a range of services which may have different margins and where competition may be of different intensity), the ubiquity benefits serving a customer in a particular area can be expressed as:

$$\sum_{\substack{j \neq i \\ m_j > 0}} p_{ij} s_{ij} \Delta m_{ij}$$

where p_{ij} is the probability of a customer in unprofitable area i moving to profitable area j ; $\Delta m_{ij} = m_j - m_i$ is the difference in the margins made on serving a customer in area i and area j ; and s_{ij} is the probability that a customer moving from area i to area j stays with the provider.

This is the expected value associated with serving a customer in area i taking into account the probability that they may move to a profitable area.⁷ Ubiquity benefits are larger the greater the margin difference, the greater the extent of loyalty (i.e. the probability that a customer continues with its previous provider) and the greater the probability of migration from high-cost to low-cost areas.

28. Assuming that margins in profitable areas are small and that the probability of staying with the provider is low, this would indicate that the more effective competition for profitable customers is, the lower the value of ubiquity benefits. With intense competition for customers, the size of ubiquity benefits is likely to be very small.
29. The methodology outlined above is similar to (albeit less detailed than) the PHB approach to the quantification of ubiquity benefits. Similar information would be required in order to estimate the likely size of benefits that result from the prospect of customers living in unprofitable areas potentially becoming profitable as a result of migrating to other areas, **and** choosing Telecom as their supplier in these areas as a result of having been served previously.
30. The second source of ubiquity benefits is related to the geographic and population coverage achieved by an operator rather than the operator being the TSP, and should in principle be reflected in the operator's roll-out decision. However, as a result of the TSO the TSP may win customers with premises in both profitable and unprofitable areas because competitors, who might otherwise be the chosen supplier, cannot provide services in unprofitable areas and the customer prefers to have a single supplier.
31. It is unclear why PHB and CRA have no attempt to quantify ubiquity benefits from this source, which could potentially be significant. In order to establish the size of these ubiquity benefits, one would need to obtain information on:

⁷ The reason for looking only at profitable areas is that unprofitable regions in all likelihood will not be served by competitors, and will be covered by the TSO subsidy. Customers who are being served in areas that are margin-positive upon moving to margin-negative areas would not have any choice but the TSP provider, and would become the TSP provider's customers regardless of whether they had been served previously. Including movements towards loss-making regions would imply that there is a spill-over cost of the TSO even on currently commercially viable customers as it presupposes that serving them whilst profitable might have a negative impact should they move to unprofitable areas. However, this is not the case as in this instance they would become TSP customers anyway.

- the number of businesses (and their expenditure on telecommunications services) with premises in both profitable and unprofitable areas; and
- the extent to which such businesses choose Telecom as their supplier in profitable areas rather than a competitor. This might be proxied by looking at the market share of Telecom with regard to businesses of similar size but without sites in areas only served by the TSP and comparing this to Telecom's market share with regard to businesses that require services in both profitable and unprofitable areas.

If the TSP wins most of the business of customers with sites in NLAs because it serves these areas, then ubiquity benefits could be sizeable (even though in this case it might become increasingly attractive for other operators to extend their coverage in order to cater for multi-site businesses).

2.1.2 Life-cycle benefits

32. Like ubiquity benefits, life-cycle benefits arise from the fact that some customers may become profitable in the future, and that to the extent that serving them whilst unprofitable increases the likelihood of serving them whilst profitable, these are benefits that need to be taken into account. PHB captures this by identifying customers who are currently unprofitable but economically viable (i.e. customers who are currently unprofitable but NPV positive **and** their NPV is greater if services are being provided whilst the customer is unprofitable).
33. Based on the Commission's approach of identifying clusters of CNVCs, there are good arguments to suggest that average revenues and average costs for a particular cluster fully capture life-cycle benefits. This is because a cluster of customers contains customers at various stages of their life-cycle, and therefore average revenues should be fairly representative of individual customer NPVs capturing the potential for future profitability. To the extent that customers would become profitable when moving to another cluster, this would be captured by ubiquity benefits.

2.1.3 Benefits from brand enhancement

34. The quantification of benefits from brand enhancement should be based on an analysis of how serving particular customers increases brand awareness and sales elsewhere. In order to avoid double-counting, this should not include any of the effects that are captured in the probability of choosing the provider when moving to another area (or, to the extent that an explicit analysis of life-cycle benefits is being attempted, when becoming profitable). Quantification should therefore focus on how much additional profitable business an operator can generate from serving unprofitable customers over and above the benefits that arise from such customers potentially becoming profitable (either because they move to a different area or change their spending pattern). In this regard, benefits from brand enhancement are the benefits of being a large provider with large reach.

35. We understand that the Commission, in line with OFTEL, considers that an appropriate approach for quantifying these benefits would be to look at the amount that would otherwise have to be spent in order to achieve the same level of brand recognition. This is a notoriously difficult task, and presupposes that, if direct marketing expenditure were required, the TSP would wish to achieve the same level of brand recognition. This is by no means certain – for example, it may be the case that the additional value of brand recognition generated by the TSO does not provide much additional value in terms of increased sales and profits, and would therefore not exist otherwise; it would in this case be a relatively valueless by-product of the TSO rather than a major benefit.

2.1.4 Improved information

36. Serving CNVCs could potentially improve the quality of the information available to an operator for marketing and product design purposes. This should therefore be considered in the same way as potential benefits from brand enhancement and reputation. However, we agree with PHB (referring to other studies) that the value of additional information from serving particular groups of customers is likely to be small.

2.1.5 Network benefits

37. As noted above, additional intangible benefits might be considered to arise from the fact that serving TSO customers increases the size of the telecommunications network, which in the presence of positive network externalities will increase the value all users place on telecommunications services.

38. Part of these benefits is reflected in termination revenues generated by commercially non-viable customers and included in the revenues associated with supplying these customers. To the extent that such calls generate **additional** profits from commercially viable customers, or that the option value of being able to contact a greater number of customers (without actually making or receiving calls) leads to a higher willingness to pay for telecommunications services of (already) profitable customers, further benefits may exist that are not reflected in the revenues and costs associated with providing services to uneconomic customers.⁸

39. However, these benefits appear to be conceptually different from other intangible benefits in that they accrue to all providers of telecommunications services rather than just the TSP (by definition). They would be reflected in

⁸ A higher valuation of services that is not reflected in additional profits is an intangible benefit that does not accrue to the TSP, but rather to its customers. Such an intangible benefit should not be considered when calculating the net cost of the TSO (although it would play a potentially important role in assessing the overall costs and benefits of a TSO from a public policy perspective).

each operator earning higher revenues (and profits) from providing services (both access and call services) to commercially viable customers than would be the case if TSO customers were not connected, and would accrue to each operator in line with its market share.

40. Thus, these benefits should be reflected in 'liable revenues', which determine how the net cost of the TSO is shared amongst 'liable persons'. It would therefore seem unnecessary to consider network benefits in the calculation of the net TSO costs. Furthermore, using network benefits in the calculation of the net TSO costs would result in distortions which increase with the extent to which competitors win market shares from Telecom. A simple numerical example may help to illustrate this point.
41. Assume that network benefits as a result of the TSO raise the total profits available from serving profitable customers from \$180 to \$200. Assume that the loss made in serving unprofitable customers is \$20. If Telecom had a market share of 100%, it would not matter whether network benefits were to be taken into account when determining the net cost of the TSO (which in this case would be zero), or whether Telecom had to bear 100% of the loss of serving unprofitable customers.
42. By contrast, assume that Telecom's market share is 50%. In this case, liable revenues would be \$100 for Telecom and \$100 for competitors. This would suggest that Telecom is liable for 50% of the net loss incurred in serving unprofitable customers, and it would therefore earn $\$100 - \20 (loss) + $\$10$ (contribution towards TSO cost from competitors) = $\$90$. Similarly, competitors would earn $\$100 - \$10 = \$90$.
43. If increased revenues due to network benefits were to be subtracted from the loss incurred in serving unprofitable customers, the calculation would be as follows:
 - Net TSO cost (using only network benefits accruing to Telecom): $\$10$ ($\$20 - \10)
 - Liable revenue for competitors: $\$100$
 - Liable revenue for Telecom: $\$90$ (to avoid double-counting)
 - Contribution from competitors towards net cost of TSO: 52.6% of $\$10 = \5.26
 - Net revenues earned by competitors: $\$94.74$
 - Net revenues earned by Telecom: $\$85.26$
44. Thus, to the extent that network benefits are reflected in liable revenues, there are strong arguments for not including such benefits in the calculation of the net cost of the TSO. We conclude that:
 - it is not necessary to quantify network benefits;
 - it is not necessary to establish what proportion of these benefits accrues to Telecom; and

- changes in market shares do not lead to distortions of the way in which TSO cost are shared amongst liable persons.

2.2 Replacement revenues

45. Replacement revenues are revenues that would accrue to the provider were an unprofitable consumer no longer to be served. For example, if a customer lost access to a fixed line (because it were considered to be unprofitable and the provider was not under a TSO), a greater number of calls may be made both to and from that consumer on a payphone and/or mobile. If a TSP operated the payphones or a mobile network, then it would earn additional revenues relative to a situation where the customer had access to a fixed telephone line. Thus, replacement revenues (or more appropriately: the margins made on replacement services) are opportunity costs of providing the TSO service, and should affect whether a particular customer is considered to be commercially viable.⁹
46. However, given that replacement services are likely to be services that are not subject to a TSO, one might expect competitive pressure to limit margins (even if competition in the provision of such services is not perfect). Therefore, one may reasonably assume that the impact of replacement revenues on the number of CNVCs is limited.

2.3 Summary

47. In summary, assessing what intangible benefits arise from serving unprofitable customers at subsidised prices is directly equivalent to asking what benefits other than direct revenues an operator would take into account when deciding whether or not to serve a particular group of customers. Thus, the overall approach should be similar to the one developed by PHB in establishing the intangible benefits associated with the KSO. An efficient operator would take account of beneficial spill-over effects in their decision making process, based on a comparison of current costs and revenues on a forward-looking basis.
48. This implies that the assessment of intangible benefits may affect the number of CNVCs. In particular, including intangible benefits in assessing whether a customer is, in PHB's terms, economic (rather than profitable), will tend to reduce the number of customers who are considered to be commercially non-viable. The impact on the net cost of the TSP compared to assessing the total intangible benefits separately and making a global adjustment, however, is ambiguous. This is because the reduction in the

⁹ More specifically, rather than considering whether the revenues (plus intangible benefits) exceed the cost of providing TSO services to a particular customers in order to determine whether or not this customer is commercially viable, the correct assessment would look at whether the margin made on providing TSO services would be greater than the margin made on providing replacement services.

number of CNVCs reduces not only the losses made in serving these customers, but also the global measure of intangible benefits that would otherwise be set against the pure financial losses from serving a larger number of CNVCs. However, if intangible benefits are small compared to the financial losses made on serving CNVCs, the overall effect can be expected to be a decrease in the net cost of the TSO.

3 The CRA quantification of ubiquity benefits

49. As noted above, ubiquity benefits arise if customers who move from an area where serving them is unprofitable to one where they could profitably be served are more likely to stay with the operator who served them in the original area. A second source of ubiquity benefits is that some customers may have multiple sites and prefer to procure services from a single operator who is present in all locations (including high-cost unprofitable ones). PHB (and consequently CRA) focus only on the first of these two sources.
50. PHB and CRA define ubiquity benefits as arising from customers who move from a net loss area (NLA) to a profitable area with local access competition (LAC) and then choose the TSP for one of two possible reasons:
- *Lack of awareness* – the customer is unaware of the alternative provider and would have chosen the alternative had they been aware; or
 - *Increased preference* – regardless of whether a consumer is aware of competitors, he/she would choose the TSP as a result of having been served by the TSP whilst in the NLA.

The benefit is quantified by looking at customers moving from NLAs to profitable areas with local access competition and summing up the lack of awareness benefit and increased preference benefit for these customers. CRA fully agree with and therefore adopt the methodology developed by PHB.

3.1 Methodology

51. The PHB approach considers three main types of areas:
- unprofitable (Area A);
 - profitable without local access competition (Area B); and
 - profitable with local access competition (Area C).
52. Customer movements between areas are determined from population data and ubiquity benefits are calculated from the choices made by customers moving between areas. CRA assume that ubiquity benefits only derive from consumers moving between net loss areas and profitable areas with local access competition.
53. The *lack of awareness* benefit is calculated by multiplying the average value of customers in profitable areas with local access competition by the number of customers who move from NLAs to profitable areas and are unaware of competitors and the share of those who would otherwise have gone to

competitors (labelled 'preference for competitor').¹⁰ The share of customers who would have signed up with competitors had they been aware of their existence is measured by the market share of the competitive local access provider(s), which is assumed to reflect the average level of preferences shown by customers in areas with local access competition for competitors.

54. The ubiquity benefit from preference differences is calculated by multiplying the average value of customers in profitable areas with local access competition by the number of customers moving from NLAs to profitable areas with local access competition and the difference in preference for the TSP, measured by the difference in stated preferences for the TSP between NLAs and profitable areas with local access competition. This supposes that the preference for the TSP is higher in NLAs than it is in profitable areas with local access competition, so that migration increases the average preference for the TSP in profitable areas.

3.2 Data

55. CRA follow PHB in using the following data and assumptions:¹¹
- the annual number of people moving from uneconomic areas to profitable areas with local access competition, constructed from Statistics New Zealand population data;
 - brand awareness and preference data for the various telecommunications operators in NLAs, profitable areas without local access competition, and profitable areas with local access competition, from Telecom's Consumer Market Monitor surveys;
 - market share of the TSP within profitable areas with local access competition;
 - an appropriate discount rate for the NPV calculation – the rate used is the cost of capital for the TSO net cost calculation, 13.2%;
 - the average annual value of a customer in profitable areas with local access competition, from Telecom's net cost analysis;
 - the rate at which any lack of awareness of a competing provider dissipates after the consumer has moved from an NLA to a profitable area with local access competition; and
 - the rate at which any preference differences dissipate after the consumer has moved from an NLA to a profitable area with local access competition.

¹⁰ See the formulae in paragraphs 50 and 51 of CRA, page 18. CRA calculate the NPV of this value.

¹¹ CRA, page 20.

3.2.1 Migration data

56. In the initial study, PHB have used migration data from Statistics New Zealand's 1991 and 1996 Census to construct an annual transition matrix of migration probabilities between Exchange Service Areas (ESAs). PHB then applied the annual transition matrix to the population distribution of 1991 in order to obtain an initial estimation of the 1992 population distribution, and scaled this initial estimation in order to ensure that the total population across all location categories was equal to the total population for that year recorded by Statistics New Zealand. This process was then repeated for each subsequent year to 2021 (using forecast total population figures for scaling where actual figures were not available). Migration from NLAs (location category A) to profitable areas with competitive local access providers (location category C) is the product of the population in A and the transition probability from A to C. In order to obtain the number of Telecom customers migrating from A to C, PHB simply scaled down the number of people migrating from A to C by the ratio of the total number of residential first lines in all NLAs to the total population figure for all NLAs, which was found to be 30.9%.
57. CRA followed PHB's methodology, but used data from the 1996 and 2001 Census to determine the transition matrix of migration probabilities between ESAs, extending the analysis to 2026. CRA found that the appropriate scaling ratio (i.e. the number of residential first lines in NLAs divided by the total population in NLAs) has fallen to 26.6%, which might be a result of increasing household size in NLAs, but is more likely the result of a reduction in the number of fixed line customers in these regions.

3.2.2 Awareness and preference

58. Telecom regularly carries out a Consumer Market Monitor survey. Data from this survey was used by both PHB and CRA to determine the components of the ubiquity benefit calculation discussed in sections . The consumer survey allocates a location code which PHB asserts provides sufficient accuracy to be able to map consumers into ESAs. PHB used ESAs in the Wellington area as representative for profitable areas with local access competition; CRA also included the Christchurch area.
59. The consumer surveys used by CRA asked respondents whether each of the major telecommunications operators was: (a) the preferred supplier; (b) a supplier the respondent would be willing to use; (c) a supplier about which the respondent did not know much; or (d) a company that the respondent would not want to use. At the time the surveys were undertaken, TelstraClear was the only local access competitor to Telecom.

- Awareness was calculated by subtracting the proportion of respondents who responded (c) from 100%.¹²
- A measure for preference was defined as the proportion of responses which were clearly more favourable for one company than for the other.

PHB used statistical tests in order to establish whether differences in preference and awareness were significant.

60. CRA found an increase in awareness of Telstra-Clear since 2000, implying a reduction in ubiquity benefits. They also found a reduced preference for Telecom in NLAs, which in the framework chosen would suggest a disbenefit from migration of customers from NLAs to profitable areas with local access competition, reducing the average preference for the TSP where it faces competition. However, rather than calculating negative benefits from preference differences, CRA treated the difference in preferences as zero, thus restricting ubiquity benefits to those arising from lack of awareness.

3.2.3 Dissipation

61. PHB note that there is unlikely to be any data for awareness and preference dissipation, and therefore assumptions will have to be made. Specifically, PHB assumes that the number of consumers moving into a profitable area who are unaware of the competition dissipates over two years, on a straight line basis. CRA adopts the PHB assumption with regard to awareness, and use a two-to-five year dissipation for preference differences (although this is immaterial as they assume preference differences to be zero – see above).

3.2.4 Average customer value

62. The average value of a customer in a profitable area was obtained directly from Telecom's net cost analysis.

3.3 Results

63. CRA estimated ubiquity benefits from providing TSO services to the end of the current year to be in the range from NZ\$645,052 to NZ\$3,776,217 with a base case estimate of NZ\$1,380,264. Sensitivity analysis shows that assumptions about awareness and preference differences are an important driver of estimates. CRA note that the relatively low benefit is consistent with the conclusion internationally that ubiquity benefits are likely to be immaterial and benefits are more likely to accrue from being a large national operator.

¹² By contrast, PHB calculated awareness by looking at the proportion of respondents who mentioned 'Saturn', 'Telstra', 'TelstraSaturn' or 'TelstraClear' in response to a question asking for an unprompted listing of telecommunications companies operating in New Zealand (see PHB, page 25).

3.4 Assessment

64. Taking the underlying methodology as given, we have the following observations on the approach taken by CRA:
65. With wholesale access provision, one would expect the number of areas without local access competition or at least the potential for local access competition to be low. Indeed, one would expect there to be at least one alternative provider in any profitable area. Although CRA discussed the effect of wholesale access provision in estimating life-cycle benefits (see below), they have chosen to ignore the potential for resale of local access services because of the ambiguity in the effect wholesale provision would have on the ubiquity benefit. CRA's reasoning is as follows:
- If wholesale of access services were taken into account, there would be no areas without local access competition. This would result in an increase in estimated ubiquity benefit, as all those people moving from unprofitable areas to those that are profitable but without local access competition would also now be taken into account.¹³ In this context, it is interesting to note that the CRA estimates of the number of customers who provide ubiquity benefits are much higher than those provided by PHB. CRA note that this is "*mainly due to increased migration from NLAs to profitable areas with access competition, since the areas with access competition have expanded from Wellington only to Christchurch and Wellington.*"¹⁴
 - On the other hand, introducing wholesale access into all areas will increase competition and therefore awareness of alternative providers. This may result in fewer customers who are moving from NLAs choosing Telecom at their new location.
66. We would question whether it is appropriate to ignore profitable areas without local access competition in order to correct for the fact that, as a result of wholesale access, awareness of alternative providers might increase. There may be good reasons for ignoring areas in which competing access is provided on a resale basis, namely that under the retail-minus approach used in the setting of wholesale charges Telecom would earn roughly the same margin on wholesale access services as it would earn in the provision of access services to end customers.
67. We understand that wholesale access services are currently not being used in order to provide competitive access. However, even though TSO costs have to be determined for the present period, ubiquity benefits result from the possibility that customers might move to profitable areas in the future. It is therefore appropriate to consider wholesale access as a potential source of competition.

¹³ CRA, page 19.

¹⁴ CRA, page 29.

68. We also note that both PHB and CRA have used the awareness of competitors in NLAs as a measure of the awareness of competitors after the customer moved to an area with competitive access provision. Customers who move may be more likely to become aware of alternative providers simply because of the need to obtain a new telephone connection. This is likely to result in lower benefits from lack of awareness.
69. Furthermore, it is unclear why in the calculation of ubiquity benefits no distinction has been made between access services and contestable call services, for which ubiquity benefits could exist in areas where there is no local access competition. This is surprising as such a distinction has been made with regard to the quantification of life-cycle benefits (see below). Not considering this potential source of ubiquity benefits would tend to lead to an underestimation as even in areas without local access competition customers may choose to use a competing operator for their call services, and lack of awareness or preferences for the TSP could result in benefits that would not be enjoyed if the operator were not to provide TSO services.
70. In calculating benefits from lack of awareness, the preference for a competitor is assumed to be reflected in the market share of the competitor in the profitable area. However, this approach is likely to under-estimate preferences for competitors. Market shares are to a large extent affected by historic developments. Customer inertia implies that the erosion of an incumbent's market share may be relatively slow, even if new customers who are not subject to any form of inertia or switching costs overwhelmingly choose a new entrant. Thus, market shares may over-state the preference for the TSP. If preferences were to be based on share information, it would be more appropriate to look at the share of new connections rather than the share of total connections.
71. We note that the share of new connections is not necessarily a perfect measure, but would expect that it more accurately reflects preferences for Telecom/competitors than overall market shares. Ideally, one would want to look at the share of new connections for those customers who genuinely had a choice between Telecom and a competitor (e.g. competitors in those areas where alternative access network have been built out and who could have been connected - e.g. 'homes passed' by an alternative access provider) rather than shares of new connections in an area where only a proportion of customers could have been connected to an alternative network. However, information on shares of new connections on this basis may not be readily available. In this case, using some rough measure of the proportion of customers in any given area that do have a choice of access providers might help to correct for the problem (for example, if a competitor had 30% of new connection in an area where about 50% of customers had a choice, then this would suggest a preference for the competitor of 60% and consequently a preference for Telecom of 40%).
72. We also note that CRA have collected information about preferences from the Consumer Surveys, but use a different measure in the lack of awareness estimation. There are no obvious reasons why different preference measures should be employed in the different calculations, in particular as

the data on awareness are based on the Consumer Market Monitor survey that is used to generate the preference information.

4 The CRA quantification of life-cycle benefits

73. Whilst ubiquity benefits are based on the assumption that customers may become profitable because of moving to a different location where the cost of providing the services is lower, and that serving customers whilst living in an unprofitable area will increase the likelihood of retaining them after moving to a profitable area, life-cycle benefits are based on the assumption that customers, even though currently unprofitable, may become profitable in the future as their spending patterns change.
74. This indicates that the notions of ubiquity benefits and life-cycle benefits are closely linked, and suggests that a common framework and consistent assumptions should be applied to these two issues.
75. In order for life-cycle benefits to exist, it must be the case that there are customers whose profitability increases over their life time, **and** that an operator can increase the probability of serving the customer whilst profitable by serving the customer whilst unprofitable. This is clearly reflected in the definition of life-cycle benefits used by PHB and CRA.
76. As noted above, there are good arguments why one should not be concerned about life-cycle benefits in a set-up where, in establishing CNVCs, average revenues over a cluster of customers are being used. This is because the customer population at any time will consist of a mix of customers at different stages of their life-cycle, and will thus include customers who have become profitable (without moving location) as well as those who are still unprofitable. A simple example may help to illustrate this point:
- Assume that a typical customer remains on the network for two periods of equal length (say one year). For the first year, when the customer is 'young', assume that she is unprofitable and generates net loss of 5. By contrast, in the second period, when the customer is 'old', she generates a net profit of 10. For the sake of simplicity ignore discounting, so that we can simply add up profits and losses over the customer's lifetime. This gives us $10 - 5 = 5$ overall, or 2.5 per period.
 - Now assume that we are looking at a group of customers in a particular period. Given that customers stay on the network for 2 periods, we would expect to find around 50% of 'young' and 50% of 'old' customers. The average net profit per customer is the weighted average, or $50\% \times 10 - 50\% \times 5 = 2.5$, which is the same as the average net profit over a customer's lifetime.
77. More generally, as long as the make-up of a particular customer group does not change significantly – e.g because 'old' customers move to another area, average revenues over a customer's lifetime correspond to average revenues across a group of customers. This may not be true when customers migrate from one area to another as they become profitable, but this should have been addressed in the ubiquity benefits calculation.

78. Notwithstanding this general point, in the remainder of this section we review the CRA quantification of life-cycle benefits.

4.1 Methodology

79. In order to quantify life-cycle benefits, CRA (following PHB) compare the expected value of the consumer if served whilst unprofitable (EV_U) with the expected value of the consumer if only served whilst profitable (EV_P).

80. These values are defined as:

$$EV_U = V_U + P_U V_P$$

$$EV_P = P_P V_P$$

where P_U is the probability of Telecom being chosen once the consumer is profitable if the customer was served whilst unprofitable, and P_P is the probability of Telecom being chosen if there was no previous customer relationship. V_U and V_P denote the value whilst unprofitable and profitable respectively. The difference between the two expected values can then be written as:

$$\Delta = V_U + (P_U - P_P)V_P$$

81. Life-cycle benefits arise whenever Δ is positive, i.e. when the loss made in providing services whilst unprofitable is outweighed by the increased probability of serving the customer whilst profitable. We note that such customers would also be served in the absence of a TSO.

82. To obtain V_U and V_P , CRA use information on different customer segments defined by location and expenditure band.¹⁵ Using the number of customers in different expenditure segments as a starting point, CRA apply probabilities of migrating from one segment to another in order to establish the number of customers in different segments over time. Expected net revenue per customer in each of these segments is then multiplied by the number of customers in order to establish total net revenues and added to unallocated access costs in order to establish TSO profits. If TSO profits including net

¹⁵ See CRA, paragraph 11. This is a different approach from the one used by PHB, which simulated customer choices by using a distribution of customers within areas based on information about revenues and costs on a line-by-line basis. The reason CRA use a different approach is that the line-by-line information is not available as part of the TSO cost calculation (paragraph 19). In any case, CRA point out that the repeated sampling approach used by PHB for the distribution of profits for each customer segment will, over a sufficiently large number of simulations, produce the same result as is obtained by using average profit from each segment (paragraph 13). We would consider the use of average profits for each segment to be a reasonable simplification.

business revenues are positive, then the amount of TSO profits is added to V_p ; otherwise the amount is added to V_U .¹⁶

83. CRA/PHB further distinguish between access services and potentially contestable call services. Thus, the difference is expressed as:

$$\Delta = V_{UA} + V_{UC} + (P_{UA} - P_{PA})V_{PA} + (P_{UC} - P_{PC})V_{PC}$$

where a subscript of A denotes access services, and a subscript of C denotes contestable call services.

PHB further split the analysis for those areas with and without local access competition. By contrast, CRA stated that “[w]e do not consider that it is necessary to continue with this distinction: the mandatory wholesaling provisions in the Telecommunications Act mean that all services (including local access) are contestable.” However, CRA then proceed by making the same distinction and providing estimates of the probability of using Telecom for contestable services probabilities for both areas with and without local access competition. It is thus unclear whether CRA have considered all areas to be identical and subject to local access competition, or whether they have treated some areas differently. We also note that given the procedure described above for calculating V_U and V_p , it is unclear how CRA apply their method in order to establish the corresponding values for access services and contestable call services.

84. Intangible life-cycle benefits are then obtained by simply summing the net cost that would be included in the TSO calculation for each customer for whom Δ is positive. This has the effect of removing these customers from the TSO calculation. Effectively, therefore, Telecom is defining CNVCs as only uneconomic customers.

4.2 Data

85. In order to calculate the life-cycle benefit, CRA (following PHB) uses the following information:¹⁷
- the proportion of customers belonging to different customer segments (distinguished by expenditure), and the probability of customers moving from one segment to another over time;
 - for each loss-making part of the network: the number of customers in each segment, net revenues for access and contestable services for

¹⁶ We note that, according to footnote 8 on page 13, CRA use business revenue in determining which areas are profitable, but do not use the size of business revenues in calculating the size of the life-cycle benefit, although the description in paragraph 11 of the CRA report is somewhat unclear.

¹⁷ In addition to an appropriate discount rate for the NPV calculation; see CRA, paragraph 23.

residential customers, net revenues for business customers, and unallocated access costs;

- local access market share for Telecom and preference of customers for Telecom and its competitors in areas where there is access competition; and
- market shares for contestable services in areas with and without local access competition.

Preferences

86. In order to establish the probability that a customer chooses Telecom as the access provider once becoming profitable conditional on having been served whilst unprofitable (P_{UA}) CRA use three sources:
- relative preference for Telecom relative to TelstraClear []%-[]%;¹⁸
 - market share for Telecom in areas with local access competition, []%¹⁹; and
 - the market share for Telecom implied by TelstraClear's claim that in some areas it has "up to 65% penetration", i.e. 35%.
87. Given the clear difference between the first two and the last measure, CRA pick the mid-point between the highest and the lowest value, i.e. []%.
88. With regard to an estimate of P_{PA} , CRA follow the approach used by PHB and assume that customers would randomly choose one of two alternative access providers, thus using a value of 50%.
89. Taken together, these two values imply that serving a customer whilst unprofitable increases the probability of serving this customer when profitable by [] percentage points.
90. CRA (following PHB) calculate P_{UC} and P_{PC} for areas without local access competition by using the proportion of customers who have Telecom as their access provider as well as their provider of call services based on consumer market surveys. This figure is given as []%. In any case, CRA consider the difference between these two probabilities to be zero, and therefore there are no life-cycle benefits from an increase in the probability of providing call services to customers in areas without a local access competitor.
91. In order to calculate P_{UC} and P_{PC} for areas where Telecom faces competition in the provision of local access, CRA use the following formula:

¹⁸ CRA estimate this from Telecom's Consumer Market Monitor Survey;

¹⁹ From Telecom's Consumer Market Monitor Survey

$$P_{iC} = P_{iA}S_A + []\% \cdot (1 - P_{iA})(1 - S_A); i = U, P$$

where S_A is the share of the access provider's customers who also purchase call services from their access provider. Based on Telecom's consumer market monitor survey, this number is given as []%. CRA also assume (without any further justification) that Telecom would provide call services to []% of customers of other access providers who are not served by their access provider.

92. Table 1 shows the probabilities used by PHB and CRA in calculating life-cycle benefits.

Table 1: Probability estimates for life-cycle benefit estimation

		Probability	PHB	CRA
Areas without competitive access provider	Local access	P_{UA}	100%	N/A
		P_{PA}	100%	N/A
		$P_{UA} - P_{PA}$	Nil	N/A
	Contestable services	P_{UC}	[]%	[]%
		P_{PC}	[]%	[]% - []%
		$P_{UC} - P_{PC}$	Nil	Nil
Areas with competitive access provider	Local access	P_{UA}	[]%-[]%	[]%
		P_{PA}	50%	50%
		$P_{UA} - P_{PA}$	[]%-[]%	[]%
	Contestable services	P_{UC}	[]%-[]%	[]%
		P_{PC}	[]%-50%	[]%-50%
		$P_{UC} - P_{PC}$	[]%-[]%	[]%-[]%

Source: CRA, Table 3

Customer segments

93. CRA distinguished three different geographical areas, metropolitan, urban and rural. Consumers in each area were then divided into deciles on the basis of annual billed revenue, with movements between deciles being determined by using information on the change in each individual customer's

annual billed revenue as at July 2001 and 2002. Total customer numbers for each segment were projected forward on the basis of data from Telecom’s internal databases.

Customer lifetime

- 94. CRA assume the average life time of a customer to be 30 years and therefore calculate life cycle benefits using a 30 year time horizon.

4.3 Results

- 95. Using a weighted average cost of capital (WACC) of 13.2% (which is in excess of the cost of capital used by PHB of 11.3%), CRA obtain an estimate for life-cycle benefits of NZ\$1.659 million under the assumptions listed in Table 2.

Table 2: CRA estimates of annual benefit from life-cycle effects.

Settings	Value
WACC	13.2%
Time horizon	30
Use business revenues in determining profitability of an exchange?	Yes
P_{UA}	[]
P_{PA}	0.5000
P_{UC}	[]
P_{PC}	[]
Result	NZ\$ 1.659 million

Source: CRA, Table 4

- 96. This estimate is considerably lower than the PHB estimate prepared two years previously (by about NZ\$3 million), and CRA provide the following reasons for this difference:²⁰
 - the costs method used in calculating the TSO has been revised and reduced; and
 - the changed customer segments and thus transition probabilities matrix.

²⁰ CRA, paragraph 41

97. CRA carry out a sensitivity analysis on the above result. The result is particularly sensitive to the time horizon and the various respective preference parameters (the probabilities of choosing Telecom conditional on having been supplied with services whilst unprofitable).

4.4 Assessment

98. At first sight, it is surprising that life-cycle benefits are not larger than those established by PHB. A priori, one would expect that broadening the scope for life-cycle benefits by assuming that the potential for local access competition exists in all areas (and thus there are potential life-cycle benefits to be enjoyed from an increased probability of providing access services to profitable customers) would result in an increase in life-cycle benefits (albeit a limited increase to the extent that Telecom would enjoy the same margin on wholesale provision of access). However, it is not clear how CRA have treated areas where there is no direct competitor to Telecom in the provision of access services, and we would seek clarification on this issue.

Use of market shares

99. CRA claim that market shares can be used as proxies for the probabilities in their model, and use both measures of market shares and preferences established through surveys in order to obtain the probabilities that particular providers are being chosen. However, this is misleading as market shares are to a large extent affected by the fact that telecommunications markets were traditionally served by a monopolistic provider, and that customers may show considerable inertia in the face of new entry. Many customers may choose to stay with their provider, and therefore the incumbent's market share is being eroded only slowly.
100. Thus, market shares generally understate the preference for a competitor to Telecom of customers who have to make a choice. At the same time, the inertia phenomenon underlying the slow change in market shares can be expected to boost life-cycle benefits as customers who are being served whilst unprofitable may see little reason to change supplier when becoming profitable, even though they might otherwise have chosen a competitor over Telecom.
101. A more accurate measure of preferences for a particular provider would be obtained by looking at the share of new connections. This would reflect the probability of a customer choosing Telecom or a competitor completely unaffected by switching costs. In order to establish the impact on these preferences from a customer having been served previously by Telecom, one would then need to establish the differences in choice probability between those who have not previously had a connection, and former Telecom customers.
102. However, given the impact of customer switching costs and inertia, the probability of a customer having been served previously by Telecom

choosing Telecom over another provider if it had to make a choice may be the inappropriate benchmark. This is because a customer having been served whilst unprofitable does not have to make a choice which provider to use when becoming profitable. Changing to a competitor would involve the decision to cancel any agreement with Telecom and sign up with a competitor. In the presence of switching costs, the probability of **staying with Telecom** is by definition larger than the probability of choosing Telecom without having had a previous connection. In this context, we note that number portability (which has generally be considered an important factor in reducing switching costs) is currently not available in New Zealand.

103. Thus, whilst the probability of choosing Telecom when not having been served could well be lower (in the case of a strong preference for competitors) or higher (in the case of a better reputation and higher brand value enjoyed by Telecom) than the 50% suggested by CRA, the probability of 'choosing' Telecom if having been served whilst unprofitable is likely to be larger. The overall effect on the size of life-cycle benefits depends on how the difference in probabilities changes. If **new** customers were to choose Telecom and a competitor with equal probability (as suggested by CRA) or with lower probability, taking account of inertia and switching costs for **existing** customers would significantly increase the size of life-cycle benefits.
104. We also note that using a market share of 35% based on TelstraClear's claim that they enjoy 65% penetration in some areas appears to be inappropriate. We understand that the definition of penetration used by TelstraClear focuses on the proportion of connectable households that are taking services. The proportion of 'homes passed' who are taking services from an alternative access provider is very different from market share in any geographic region (unless all of the homes in this region could be connected to the competitor's network) and may be highly misleading.
105. In this regard it is worth noting that the choice of probabilities for choosing Telecom as an access provider impacts significantly on the probabilities of using Telecom as a provider of contestable call services in areas with local access competition (see equations 7 and 8 in paragraph 37 of the CRA report). Thus, any bias in assessing these probabilities will be amplified.
106. We also note a few inconsistencies in the specific preference shares used by CRA:
 - CRA claim that, based on the most recent Telecom Market Monitor Surveys, the relative preference for Telecom over TelstraClear had risen to []% - []%.²¹ It is unclear how these numbers relate to the preference information used in the calculation of ubiquity benefits, where the relative preferences for Telecom in the Wellington and

²¹ CRA, paragraph 35.

Christchurch areas is given as []% to TelstraClear's []%.²² Excluding equals and invalid responses, this would correspond to a relative preference for Telecom of []%. Splitting equals ([]%) evenly across Telecom and TelstraClear would give a relative preference of []% for Telecom.

- When looking at P_{UC} and P_{PC} in areas without local access competition, CRA give a figure of []% as the “*proportion of people that have Telecom as their access provider that also use Telecom as their tolls provider.*”²³ By contrast, the share of Telecom’s access customers in areas with competition who also use Telecom as a provider of calls is given as []%.²⁴ This would suggest that (a) the figure of []% is based on all areas, not just those without local access competition, and (b) that the proportion of Telecom customers who also use Telecom as a provider of call services in areas without local access competition is somewhat lower than []% (albeit not to a large extent as Telecom’s share of access lines remains high). Whilst one would expect the share of customers who use their access provider for the supply of call services to be higher where the customer has chosen the access provider, it is unclear why CRA do not use the corresponding figure for areas without local access competition, but rather a number that seems to have been obtained from averaging across all areas.
- When calculating P_{UC} and P_{PC} in areas with local access competition, CRA assume that Telecom would also serve some of the customers of other access providers, using the same share of an access operator’s own customers (S_a) for Telecom and competitors. To the extent that competitors are not under regulatory obligations to provide indirect access to their customers, this would be inappropriate, and the corresponding number for competitors should be considerably higher than for Telecom. However, the effect of this would be to reduce P_{UC} by less than P_{PC} , and thus increase the gap and the size of life-cycle benefits. The overall impact of this would be small.

Time Horizon

107. CRA note that the choice of time horizon is dependent on the question that needs to be addressed, and in this context would be affected by the period over which a customer’s preferences for the TSP can be expected to dissipate. We would agree with this general approach, but point out that in the presence of inertia and customer switching costs the period over which

²² CRA, table 11 on page 27.

²³ CRA, paragraph 36.

²⁴ CRA, paragraph 39.

life-cycle benefits have to be assessed may well be longer than the five years used by PHB. However, we also note that the 30 years used in CRA's base case are very likely to be an overstatement of the time horizon over which life cycle benefits are to be enjoyed.

5 Other benefits

108. In addition to life-cycle and ubiquity benefits, the TSO might in principle lead to benefits from enhanced reputation and brand image, access to market information and the ability to enjoy volume discounts as a result of network size:

- Benefits from enhanced brand image and corporate reputation arise from positive customer perceptions of the TSP, due to its serving uneconomic areas and customers, which could ultimately lead to increased profits.
- Access to market information benefits accrue if the TSP gains from having a greater pool of information about customer behaviour because of serving uneconomic customers.
- Volume discount benefits are assumed to result from the TSP's improved bargaining position *vis a vis* equipment suppliers due to its larger network size and increased demand.

This section examines CRA's treatment of the first two of these benefits, and concludes with a brief discussion of the third benefit not explicitly addressed by either PHB or CRA.

5.1 Enhanced brand image and corporate reputation

109. The original PHB report argues that benefits through enhanced brand image and corporate reputation are only those that result from people's awareness that Telecom has the obligation to serve uneconomic customers. According to PHB it is important to:

- avoid double counting revenues which have already been included in the net TSO calculation; and
- distinguish between benefits accrued through simply being a large national operator and those due to customers' awareness of the TSO.

110. Double counting may arise because the TSO cost calculation includes revenues from NLAs, some of which may be the result of the enhanced reputation and brand image enjoyed by the TSP. In areas with no competitive local access, additional revenues may arise from additional sales of non-TSO services as a result of customer positive perceptions of Telecom. In areas with competitive local access, revenues from additional sales of both TSO and non-TSO services due to positive perceptions of the TSP. Such additional revenues would have to be excluded from the calculation of intangible benefits as a result of enhanced reputation and brand image.

111. In order to address the second problem, it is important to separate out customer awareness of the TSO obligation from customer awareness of Telecom's nation-wide coverage. Additionally, the extent to which the size of Telecom is a result of its TSO must be understood. This is because it is

essential to determine whether customer spending on Telecom's products is due to it having a nationwide network. If, in the absence of the TSO, Telecom would retain a nationwide network then additional profits due to size are due to nationwide coverage and not the TSO.

112. PHB undertake an econometric analysis of the impact of a range of potential determinants of Telecom's demand, including knowledge that Telecom is the TSO provider. Using a number of techniques, PHB find that there is no evidence to suggest that Telecom's TSP role results in increased demand. Thus, PHB do not include benefits from enhanced reputation and brand image in their quantification of intangible benefits.
113. CRA distinguish a number of ways in which the TSO could result in benefits for the TSP. They note that a rational firm would continue to advertise until the marginal revenue from an extra dollar of advertising is equal to the price elasticity of demand,²⁵ and therefore a positive reputation benefit may:
 - increase demand without changing price elasticity, and so with no change in advertising, the change in profits would equal the size of this benefit;
 - leave demand unchanged at current prices, but reduce price elasticity of demand, so less advertising spend would result in the same profits; or
 - result in a combination of the above two effects.
114. Similar to PHB, CRA note that the existence of an intangible benefit from improved reputation and brand image is conditional on there being a demonstrable and significant impact of customers' awareness of the TSO and the value of their expenditure with Telecom. CRA undertake a somewhat simplified analysis, using cross-sectional data in order to establish whether or not TSO awareness increases a customer's expenditure on services bought from Telecom by looking separately at whether there is an increase in total expenditure and whether there is an increase in the preference for Telecom. They find that none of the awareness variables (consumer is aware of TSO, consumers is aware that Telecom serves unprofitable areas, and consumer is aware that Telecom serves unprofitable customers) has a statistically significant effect on either the total amount spent on telecommunications services, or on whether or not Telecom is a respondent's preferred suppliers. On this basis, CRA reject the existence of material benefits from enhanced reputation and brand image.
115. Whilst this result is not surprising, it is worth noting that it has some bearing on the quantification of life-cycle and ubiquity benefits as the preference of customers for Telecom, or more precisely the impact of having been served

²⁵ CRA, page 31

by Telecom on the preference for using Telecom's service, is a main driver of life-cycle and ubiquity benefits:

- Given that general awareness has no significant impact on preferences, it would be interesting to see whether having been served by Telecom affects customer preferences. Without such an effect, there would be no case for ubiquity benefits (noting that life-cycle benefits are mainly driven by the existence of a customer relationship in the face of customer switching costs and inertia rather than an increased preference for Telecom as a result of having been served whilst unprofitable).
- If CRA had found a statistically significant impact of awareness on preferences, then mere awareness (rather than actual service provision) would have increased the preference for Telecom. In this case, it may well be possible that both ubiquity and life-cycle benefits are smaller because a pre-existing customer relationship is not crucial for increased preference for Telecom.

116. In any case, to the extent that benefits from increased preferences for Telecom are captured in the calculation of ubiquity and life cycle benefits, it would be inappropriate to consider separate benefits from improved reputation and brand image.

5.2 Access to market information

117. The marketing benefit of being the TSO provider is derived from having access to information on a greater proportion of the telecommunications market than all other operators.

118. PHB address this benefit by examining the impact various customer sample sizes would have on the accuracy of the information drawn from the sample. They establish that the accuracy of projections made by a competing firm who obtained data on only 10% of the market is only slightly lower than the accuracy obtained by Telecom from using 90% of the market as its sample. This is due to the non-linear relationship between sample size and accuracy of information.²⁶ Thus PHB conclude that marketing benefits are likely to be negligible, and are in any case more properly a benefit of being a large operator than being due to being the TSP.

119. CRA note that, in line with PHB's findings, the Commission "*propose to... work on the assumption that the value is negligible and should therefore be excluded from further calculations.*"²⁷

²⁶ See PHB, page 67.

²⁷ CRA, page 1

120. We agree with the view that benefits from improved access to information are likely to be small and it is therefore safe to ignore such benefits. In further support we note that information obtained from serving customers under a TSO may have very little value from a commercial point of view, and may not improve the accuracy of commercially relevant information at all.

5.3 Scale economies and volume discounts

121. Additional benefits that are sometimes said to flow from a TSO are related to the exploitation of scale economies by the TSP.²⁸ These are reflected in lower average costs than faced by competitors. These benefits have not been addressed by PHB or CRA. PHB discuss the potential problems with these benefits - mainly their sensitivity to assumptions about the competitiveness of the equipment supply market and the relative bargaining power of equipment suppliers and operators - and conclude that these benefits are likely to be too speculative and insubstantial to be examined:²⁹
122. However, there are a number of arguments to support the claim that such effects should not be included in the quantification of intangible benefits;
- First, economies of scale result from size, not necessarily from the TSO, and it is not clear that the TSO will inevitably increase size. For example, it may well be possible that as a result of the TSO the TSP loses customers to competitors in other areas (e.g. where the TSP effectively faces a requirement to charge geographically uniform prices and thus has only a limited ability to respond to price cuts by competitors in specific areas).
 - Second, and perhaps more important, the impact of scale economies (including volume discounts in the procurement of equipment) on average costs should be reflected in the costs associated with serving potentially unprofitable customers.

²⁸ Australian Communications Authority (January 2000), Estimate of net universal service costs for 1998/99 and 1999/2000, page 51.

²⁹ PHB, page 2. PHB also note that the country where attempts were made to quantify these benefits is Australia, and that it proved impossible to substantiate the existence of such benefits in that case.

6 Conclusions

123. From this review of the CRA report, a number of conclusions can be drawn with regard to how the Commission should approach intangible benefits in its calculation of net TSO costs:

- We understand that the Commission is likely to use average revenues for customers in particular locations (probably exchange areas) when establishing CNVCs/NLAs. We would expect this to result in also averaging revenues over customers in different phases of their life-cycle, and therefore it would not be necessary to consider life-cycle benefits as separate intangible benefits.
- Although ignoring life-cycle benefits would tend to decrease intangible benefits and thus increase the net TSO costs (everything else being equal), the use of average revenues in combination with other modifications in the Commission's cost modelling approach (such as a lower WACC) in order to establish CNVCs/NLAs may lead to a significant reduction in the number of CNVCs/NLAs. This would reduce the net TSO cost, assuming that the reduction in intangible benefits that comes from both ignoring life-cycle benefits and calculating ubiquity benefits on a smaller number of CNVCs/NLAs is smaller than the reduction in losses that would be incurred in serving these customers.
- CRA's approach of ignoring intangible benefits from brand enhancement and improved market information appears to be appropriate, given that such benefits can be expected to be small or already reflected in ubiquity benefits (to the extent that they affect the choice of Telecom as a provider where competition exists).
- Both CRA and PHB have ignored ubiquity benefits that arise from the TSP being able to provide wide geographic coverage, and thus attracting customers in profitable areas who require services across a number of sites. It should be possible to estimate these benefits, but in the absence of a reliable estimate this suggests that CRA's estimation of ubiquity benefits should be treated as a lower bound.