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Response

to “Application of a TSLRIC Pricing Methodology”

issued by the

New Zealand Commerce Commission on 2nd July 2002

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Prelude

1. PriceWaterhouseCoopers Consulting (PwC C), advisors of Telecom New Zealand (TCNZ), welcomes the opportunity to provide comments on the document entitled “Application of a TSLRIC Pricing Methodology – Discussion Paper” issued by the New Zealand Commerce Commission on 2nd July 2002, henceforth referred to as The Discussion Paper.
2. The first part of this document summarises the main issues, from an economic perspective and the main principles affecting the issues under discussion. The second part of the document provides PwC’s responses to the specific issues raised by the Commerce Commission.
3. The absence of comment in a particular area does not imply our agreement or endorsement of the position set out in The Discussion Paper.

1 General Comments

1.1 Main issues arising from the Discussion Paper

4. PwC, as TCNZ's advisor, welcomes the Commission's initiative to take steps with a view to implementing a fair interconnection regime which fully complies with the Telecommunications Act and which is designed to implement an efficient allocation of resources, thus maximising the welfare for all players and, in particular, for consumers of telecommunications services.
5. Clearly, the level of interconnection charges will play a vital role for the development of the telecoms industry in New Zealand. Unless the costs of interconnection are determined accurately one can hardly assume that a fair level-playing field for competition would result (for more detail see sections below).
6. The obvious key questions in this context are:
 - How should the detail of the TS LIRIC costing methodology be defined?
 - Given the choice of costing methodology, what is the most suitable way of implementing it / of quantifying the costs of service based on this methodology? Should a bottom-up model be used or a top-down model, or a combination of both?
 - What should the details of the model specification and assumptions surrounding allocations, model parameters etc. look like, especially for a bottom-up model?
7. These questions are treated in the following three sub-sections.
8. PwC notes that the Commission's plans to use the TSLRIC methodology, calculated on a forward-looking basis. Whilst PwC agrees that this method is conceptually most suited to calculate the costs an efficient operator would be likely to occur in the future (which is the right benchmark for efficient investment signals), PwC would emphasize that (i) TSLRIC would need to be calculated in such a way that TCNZ has the opportunity to recover its costs, and (ii) that 'forward looking' would have to be defined in a prudent and realistic way (cost calculations cannot, for instance, be based on untested or yet unavailable technologies or on hypothetical conditions, network structures etc.).
9. As far as the quantification method is concerned, PwC believes that bottom-up models have an inherent tendency to underestimate costs an operator would actually incur. Bottom-up models tend to ignore, or not reflect properly, a number of factors including information asymmetries, the costs of updating the network for new technologies, and they are not well suited to the calculation of operating costs.

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10. PwC would further emphasize that, in contrast to the Commission's view on this issue, top-down models can and are used to calculate forward-looking costs¹. Efficiency can be adjusted for separately. Modern technology can be incorporated through MEA valuation. The fact that top-down models are based on the actual network is an advantage in so far as a model based on a hypothetical network and simplifying assumptions may tend to produce an inaccurate cost estimate. Top-down models offer the further advantage of providing a firm basis for operating costs which can hardly be modelled in bottom-up models.
11. PwC believes that interconnection costs should be either based on actual firm accounting data by using a top-down model which is adjusted in such a way that it provides forward-looking costs of an efficient operator, or based on both a top-down and a bottom-up analysis (which should be reconciled with each other as far as possible). For more detail see paragraphs 61 to 66
12. In order for a bottom-up model to provide reasonable cost estimates it is essential that (i) the details of its definition reflect the reality of the provision of telecoms services as much as possible, and (ii) that no necessary costs are omitted from the calculation. Notwithstanding the more detailed comments provided in the second half of the document, PwC would emphasise a number of points upfront.
13. There are three areas where PwC sees a particular danger that full costs recovery might be jeopardised:
 - First, the methodology would have to ensure that all common costs are recovered by appropriate allocation.
 - Second, there is a danger of omissions of costs, especially in the area of non-network costs and operating costs (network and non-network). As bottom-up models are notoriously unsuited to quantify these three (out of four) types of costs the risk of inaccurate results is considerable. In PwC's view, there is a strong case for complementing the network capital costs calculated within the bottom-up model with non-network and with operating costs from TCNZ's own costing systems to ensure accurate inclusion of all relevant costs. If there are concerns that this method might lead to the inclusion of potential inefficiencies, an adjustment could be made for this, in line with the methodology used for the efficiency adjustments in the TSO calculations.
 - Third, there is the risk of underestimating costs (due to assumptions of perfect foresight, due to neglect of dynamic effects (such as the legacy network structure), etc).

¹ A number of examples could easily be quoted in support of this statement, e.g. Ofel (used bottom-up and top-down models and reconciling both in order to arrive at a starting level for interconnection prices) and ODTR (Ireland). Further examples could be given for cases where top – down approaches alone are used, without reference to bottom-up models (e.g. Switzerland, Germany, France, and many other countries have used top-down LRIC models).

14. In order to achieve full allocative efficiency and to avoid cross subsidisation, interconnection tariffs need to reflect, as closely as possible, the actual costs of providing these services. Therefore, any bottom-up model built by the Commission with the intention of estimating interconnection costs should take into account the cost differences between different geographic regions. Based on the same rationale, TCNZ should be free to structure interconnection prices in such a way that the costs variances by time of day as well as set-up costs are reflected.
15. Regarding the question of determining the technology, we do not agree with the Commission's point of view that the latest available technology should be taken as a basis for cost calculations; the reason is that there is little use in basing interconnection cost estimates on a hypothetical snap-shot of demand and technology. In order to obtain accurate and realistic results, the model must take account of the dynamic nature of network planning and operation. The assumption that, at every point in time (!), the very latest and most efficient technology can be used would be inconsistent with the assumption of reasonable asset lives. Take the case of switching or transmission equipment where slightly advanced technology becomes available every one or two years, at the latest. If one assumes that the latest technology is used at all times then the asset lives would have to be reduced accordingly, i.e. to one to two years. Clearly, this would not be efficient. Therefore, the assumptions regarding 'latest' technology should be conservative and realistic.
16. Further potential pitfalls need to be avoided in the area of network dimensioning. A number of factors leading to increased capacity requirements would need to be taken into account, including the following: busy hour traffic, traffic in excess of busy hour traffic, demand growth, resilience, and equipment modularity. The latter must be modelled explicitly.
17. A suitable bottom-up model would also have to ensure that no relevant costs are omitted. One example for costs that are necessarily incurred but, somehow, could easily be 'forgotten' or omitted in a bottom-up model is the cost associated with working capital required by the operator.
18. In summary, PwC would emphasize that (i) the detail of the definition of a bottom-up model would have to reflect a sufficient degree of realism in order to ensure that the results are meaningful in any way, and that (ii) any results from a bottom-up model should be reconciled with the costs figures calculated by reliable top-down costing models.
19. A number of general aspects related to the method of calculating interconnection costs, and the wider implications thereof, are covered in the remainder of section 2.

1.2 The economics of access pricing

20. Economic theory states that best results (full efficiency) are achieved when services are sold at prices that equal the marginal costs of providing these services ('first-best' solution). In the presence of fixed costs (decreasing average costs), however, first-best pricing would not allow operators to recover their costs. Through setting prices based on forward-looking TSLRIC (total service long run incremental cost) a balance can be struck between the two objectives of (i) ensuring that prices reflect the additional costs incurred in providing the respective service, and (ii) allowing companies to recover their costs. TSLRIC refers to the costs incurred in providing one particular service given that all other services that the operator supplies are already provided.
21. TSLRIC values are normally calculated on a forward-looking basis, i.e. cost estimates are based on those costs that will be incurred in the future when providing service and hence relies on current asset values and not historic values.
22. The TSLRIC costs of a service therefore give a "floor" for the pricing of a service. If a service were priced below this floor it would not be possible for a new entrant to the market to be able to provide a competing service on a profitable basis. As to compete, the new entrant would arguably need to price its service below that of the regulated operator and hence would not cover its costs on each unit produced. Conversely, "stand-alone" costs give a "ceiling" for the pricing of a product. Stand-alone costs refer to the costs an entity would incur if only providing one service and hence include all those costs that are common across the firm in the costs of that service.
23. Telecommunications operators incur a number of costs that are fixed and common across a number of, or indeed all, services, and thus would not be included in a measure of incremental or marginal costs. Examples of such costs within the telecommunications arena include the costs of a network management system and the base costs of auditing financial statements. Incremental costs used in the pricing of both retail and interconnection products therefore most usually include a mark-up or allowance for the recovery of these fixed-common costs.
24. The Telecommunications Act defines TSLRIC as including a "reasonable allocation of forward looking common costs". It goes on to define forward-looking common costs as "those costs efficiently incurred by the service provider in providing the service that cannot be attributed directly to providing an additional unit to that service; but does not include any costs incurred by the service provider in relation to a TSO instrument".
25. The Act therefore clearly acknowledges the need to mark-up pure TSLRIC cost estimates to ensure the recovery of fixed-common costs. However, it does not specify a specific approach for how this should be done. There exist a number of different ways of calculating mark-ups. These can be divided into two main groups, namely mark-up methods that aim at achieving maximum allocative efficiency (Ramsey Pricing and

ECPR) and simple but slightly arbitrary methods (equi proportionate mark-up and splits in equal shares). Some of these are described briefly in the following subsections:

- Ramsey Pricing. Here the mark-up on individual services above marginal costs is inversely related to the super-elasticities (i.e. the combined own-price and cross-price elasticities of each service) of the services. So more inelastic services attract the greater mark-up. This is designed to minimise the distortions that are created when prices do not equal marginal costs (as occurs under any mark-up regime) by minimising the impact on the demand for each service. (As the demand for inelastic services will be less affected by a price rise than demand for elastic services). Significant empirical research is required to measure own-price and cross-price elasticities.
- Equi-Proportional Mark-Up. Here the mark-up on each service is proportional to the incremental cost so those services with the greatest share of attributable (incremental) cost also attract the greatest share of fixed-common costs. Whilst having the advantage of simplicity, lower information requirements, and ease of applicability, equi-proportionate mark-ups do not induce efficient final prices.
- Splitting Common Costs in Equal Shares: in some cases, it may be possible to split common costs in equal shares between different groups of services. Take the example of duct being used by access and core services. Arguably, if these services were provided by different profit centres that have to negotiate funding of these ducts, then a 50:50 split would not seem to be an unlikely outcome of such negotiations.

26. PwC believes that the approaches leading to maximum achievable (‘second best’) economic efficiency cannot be easily applied, mainly because of a number of conceptual difficulties. Ramsey pricing entails a number of complications, such as high informational requirements, uncertainty relating to elasticity estimates, the question whether point elasticities are appropriate, etc. For these reasons a simpler approach such as allocation of fixed and common costs through equi-proportionate mark-ups and / or direct allocation of fixed and common costs in equal shares is often used.
27. It should also be noted that the term “costs” must be taken to include an allowance for “normal profit”. This should be based on the rate of return that the company under consideration is required to earn in order to be able to attract capital. Thus the cost base used in determining unit costs should be the economic and not the accounting cost base of the firm under consideration. Without this allowance, competitors will not receive the correct market signals whilst the regulated operator will be unable to attract the capital it needs to progress its business. If the necessary rate of return is overstated the regulated firm will earn “super-normal” profits and its prices will not be reflective of costs. The calculation of this rate of return is discussed briefly in this paper and dealt with in more detail in a separate submission by CRA.

1.3 Efficiency objectives

28. The objective of pricing interconnection services at TSLRIC is to mimic the costs that an efficient operator would incur if it were to provide that service. In a competitive market supernormal profits would be competed away so that operators just recover their costs. Inefficient operators would not be able to survive. The attempt to mirror the outcome of a perfectly competitive market must therefore be based on the costs of

efficient service provision. Thus, when using a “top-down” approach to costing many regulators have seen fit to include an efficiency adjustment within the service costs.

29. However, in making any such adjustments it should be realised that attaining a level of hypothetical perfect efficiency is impossible within the telecoms environment for the following reasons:

- The telecoms industry is characterised by a high level of sunk costs (i.e. costs that can not be recovered were the operator to leave the industry). An operator does though still require a return on these sunk investments and as such these need to be included within regulated service prices. New entrants would also incur these sunk costs and thus the exclusion of these costs from interconnection prices would result in an inaccurate presentation of “build-or-buy” signals within the market.
- The telecoms industry is characterised by a high degree of uncertainty and asymmetric information in particular with regard to future technology changes and demand growth. When designing a hypothetical network such uncertainties are not reflected whereas they are within the business planning of a “real world” operator. These are costs that would be incurred by new entrants and do not indicate avoidable inefficiencies in the [regulated operator]. Whilst the risks / likelihood of technological change is increasingly reflected by operators using shorter asset lives (thus attempting to ensure that costs are recovered over a shorter timeframe before the asset becomes obsolete) it is not possible for an operator to act with perfect information with regard to when new technology will make an existing asset obsolete.
- As assets become obsolete an operator will be faced with additional costs related to the disposal of these assets. These costs are not a sign of inefficiency but are costs that are incurred only as a result of the operator being in business through a time of changing technology. These costs would be incurred by any operator who had been in place at these times and thus form a valid part of any interconnection cost base. It would not be efficient to use the latest, fully efficient, technology at every point in time – as this would involve that assets are stranded long before an economically rational person would replace the asset - which would lead to a cost increase (dynamic view).

1.4 The costs to the economy of setting prices too low

30. A regulator will, obviously, be keen to ensure that interconnection tariffs do not exceed costs in order to ensure that efficient allocations and investment signals are induced.

PwC would emphasise that there is, however, another pitfall that is to be avoided. Not only is there a risk in excessively high interconnect tariffs but also in excessively low interconnect tariffs.

31. If interconnection tariffs were to be set below costs, the viability of the regulated firm would be at risk. If affected significantly, this could clearly have an impact on the future development of telecoms within the country concerned. This can lead to an inability to invest in the most up-to-date equipment and infrastructure (thus preventing the introduction of leading edge services).

32. The incentives of all firms in the market will be distorted. Accurate cost-based interconnect prices yield correct “build-or-buy” signals to new operators (i.e. whether it is more efficient for the new entrant to buy interconnect services from another operator

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or to build its own network). Inaccurate signals will lead to an inefficient outcome as the signals lead to the operators undertaking the inefficient strategy

33. If interconnection services provided by a regulated operator are priced below the cost of an efficient operator there will be no opportunity for a new entrant to compete in the provision of interconnect to third parties. Thus even if a new entrant were to be able to provide interconnect services more efficiently than the regulated operator it may not choose to do so as it is still unable to undercut the price offered by the regulated operator. Thus third parties will only be able to seek interconnect from a less efficient provider thus leading to inefficient production and also to under investment, not only by the regulated operator but throughout the industry.
34. This scenario would effectively force the regulated operator to cross subsidise competitors.
35. If interconnection prices are too low new entrants will be able to “cherry pick” profitable services and concentrate on the provision of these. For example, if there is no attempt to recover fixed-common costs and any access deficit new entrants would concentrate on profitable services (such as outgoing international calls) and thus reduce the ability of the regulated operator to provide less profitable services such as local access and calls. Although “cherry picking” usually results from unbalanced retail rates, having too low an interconnect charge creates a distortion as operators provide whichever service provides the subsidy.

1.5 Conclusions

36. PwC agrees with the Commission’s view that a bottom-up network – if constructed with a sufficient degree of realism – can provide a useful reference point for the estimation of TCNZ’s interconnection charges. This reference point, though, should not be used in isolation from actual costs and accounting data. The ideal and pragmatic approach followed in a number of jurisdictions is to combine a bottom-up and a top-down analysis and to reconcile these with each other as far as possible.
37. In constructing a bottom-up model a number of factors tend to lead to underestimating the costs of service. These factors can be divided into (i) omissions of costs and (ii) underestimating costs. Great care should be taken to avoid both of these pitfalls. The critical factors that need to be taken into account include, but are not limited to, the following: sufficient capacity allowing for demand growth, resilience, equipment modularity, imperfect information, etc. Further, in order to obtain a reliable result, the network capital costs calculated within the bottom-up model would have to be complemented with network operating costs as well as non-network capital and operating costs. These are most reliably derived on a top-down basis. The change in economic value of assets would also have to be captured in a way that is consistent with the assumptions surrounding the use of efficient technology.

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38. It is essential that a bottom-up model is based on assumptions that reflect the real world and include dynamic effects (such as, for instance, the fact that an efficient network operator needs to take into account the legacy network structure resulting from earlier demand patterns and technologies).
39. The dilution of costs through the application of an arbitrary trench sharing factor to existing trenches which is not achievable in reality represents a arbitrary denial of normal returns to the operator which it could never recover regardless of the action it took. Aside from issues of equity such a treatment would have a detrimental effect on investments in telecommunications infrastructure. It is difficult to perceive any rationale for such a treatment aside from a desire to reduce interconnection rates.
40. Detailed comments on these issues as well as on a number of further issues raised by the Commission in the Discussion Paper are dealt with in the Annex.

2 Annex: Specific Comments on the Commission

41. This section contains PwC's comments on a number of the Commission's preliminary views expressed in the Discussion Paper, as well as responses to the specific questions raised by the Commission in that document.
42. In each case, we summarise the Commission's opinion, state whether or not PwC agrees with it, and provide the reasons for PwC's view.
43. Our comments follow the order in which issues are raised in the Commission's Discussion Paper. Paragraph numbers from the Discussion Paper are used as reference for our comments.

2.1 Estimating TSLRIC using a bottom-up approach

2.1.1 Comment on Commission's 'preliminary view' of scorched node (38)

44. The Commission's preliminary view is that:
 - (i) A bottom-up model should be based on a scorched node assumption, and
 - (ii) Equipment at some network nodes would change in a forward-looking view, affecting whether the element is included in the TSLRIC calculation.
45. Regarding point (i), PwC agrees with the Commission's view that a scorched node assumption should be used as it would be inefficient to build a new network from scratch (scorched earth assumption), therefore the network structure (nodes) should be taken as given. It should be hard to find anyone who would argue that it would be ideal to ignore the existing network structure and, again and again, build new, marginally more efficient networks, depending on changes in demand, technology etc. Efficient use of resources requires that the legacy network structure is taken into account for purposes of network planning and operation.
46. But also PwC believes that there are certain aspects between the scorched earth or node approaches that warrant careful consideration. These are discussed below:
47. Practicality and objectivity are important considerations in any modelling task. PwC has a great deal of experience in constructing economic-engineering models and is acutely aware of the complexity and subjectivity introduced by a scorched earth approach. The specification of a modelling framework cannot afford to ignore such mundane considerations.
48. As the adoption of a scorched node assumption constrains the way in which the modelled optimised network is configured, the total costs of such a network can never be less than the costs of a network modelled without that constraint. It is possible, but unlikely, that the two approaches would yield the same total costs if the application of the constraint is never binding, that is if the optimal nodal structure of the network were

identical to the existing nodal structure. We recognise the improbability of this outcome in a world where both demand side and supply side factors have been subject to substantial change during the evolution of the network.

49. However, it is not possible to conclude that the application of a scorched node approach will result in higher modelled costs of interconnection services or of switched transport network services in general. This is because these services are a subset of the total network services provided. The optimal network structure, unconstrained by the scorched node assumption, may result in a redistribution of costs between switched transport network services and other network services.
50. Indeed, there is strong evidence to suggest that this is the case. The development of newer access technologies and the economics of optical and copper transmission media are driving a trend for extending the traffic sensitive portion of the network closer and closer to the end customer. This has the effect of increasing the traffic sensitive network costs, which relate to the provision of interconnection and other switched transport services but reducing the costs of the line sensitive local loop to yield overall cost savings and provide for enhanced local access services. This situation is described graphically in the Figure 1.

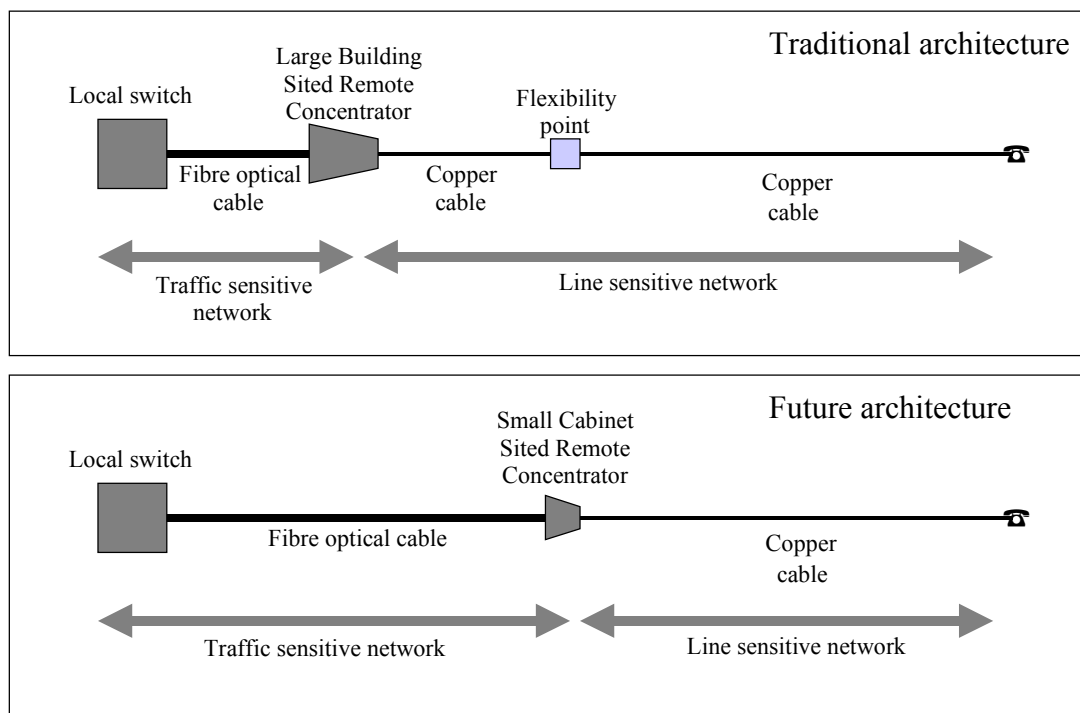


Figure 1: Traditional and future access architectures

51. It is notable that flexibility points in the access network are in fact network nodes (albeit not currently in the traffic sensitive portion of the network) so that the replacement of the flexibility points with cabinet concentrators is not inconsistent with a scorched node approach.

52. In addition to offering a reduction in overall network costs through cost savings in the line sensitive network, albeit at the expense of increased investment in the traffic sensitive network, such architectures facilitate the future deployment of higher bandwidth access technologies such as VDSL.
53. Notwithstanding the practical modelling difficulties that have already been noted PwC believes that it is important that the network topology assumptions and modelling approach adopted should be sensitive to the trends in network development. The trend for the extension of the traffic sensitive network towards the customer is perhaps the most important of these that can be foreseen with any degree of certainty. Consequently, a TSLRIC model should allow for the possibility of its inclusion.
54. As to the appropriate equipment issue, it is possible that equipment at some nodes would be replaced by more efficient (smaller) equipment (conceptually, MEA valuation). However, this would not automatically imply that the space used for housing this equipment can be reduced. A significant proportion of the costs of the network node under consideration may therefore remain unchanged. Secondly, equipment may become redundant in some cases (example of remote concentrators or switches being replaced with customer access transmission systems). In this case the network node cannot be omitted from the model unless it is feasible to decommission the node in practice (by selling the building and / or land etc.). Thirdly, in some cases, the node (building etc.) may need to be retained to house other equipment (e.g. transmission equipment). Finally, it should be noted that even if the building would no longer be required as a result of removing equipment that has become redundant, the decommissioning costs should be taken into account.

2.1.2 Comment on Commission's 'preliminary view' on forward looking costs (39)

55. It is the Commission's preliminary view that forward-looking costs should reflect the costs of providing services using best-in-use technology with modern equivalent assets.
56. PwC agrees with the broad principle that forward looking costs are most suited to provide efficient signals to the market. PwC would emphasize, however, that great care needs to be taken in the application of this principle. The dynamic aspects of operating a network must be taken into account. It would not be efficient to replace all network elements as soon as some new technology is offered (unless extremely short asset lives are used – which would drive up costs dramatically).

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2.1.3 Comment on Commission's 'preliminary view' on excl of TSO costs (46)

57. It is the Commission's preliminary view that TSLRIC in relation to interconnection services provided by Telecom should not include:

- (i) any net losses for non-viable exchange areas recovered via the TSO provisions; and
- (ii) any costs attributable to the access network.

58. PwC agrees that there should be no over-recovery of costs, e.g. through TSO and interconnect charges at the same time. However, PwC would emphasise that, likewise, there should be no under-recovery of costs.

59. PwC believes that there is no overlap or double counting between TSO costs on the one hand and interconnection costs on the other. Interconnection tariffs should reflect the full (TSLRIC) costs of providing these services. The calculation of the TSO costs will then quantify the costs of serving unprofitable customers and/or areas. In doing so, the TSO model calculates the NET costs of providing universal service, i.e. the difference between long term avoidable costs and resulting revenue shortfalls. The revenue shortfalls would include revenue shortfalls from interconnection services that would no longer be provided if there was no TSO. Therefore, there is no double counting of costs: if TCNZ (conceptually) withdraws from an unprofitable area, it would save, among other things, the costs caused by interconnection services as well as the revenues from interconnect services provided in this area. As interconnect tariffs are cost based, the two cancel each other out. Only the remaining shortfall of costs attributable to services other than interconnect (minus the corresponding revenue shortfall) would be recovered through TSO.

60. For PwC's view of the treatment of common costs in this context see paragraphs 67-72.

2.1.4 Comment on Commission's 'preliminary view' on BU (63 and 71)

61. The Commission preliminary view is that:

- (i) a bottom-up model is most suited to estimating TSLRIC as defined under the telecoms Act whilst also
- (ii) providing consistency with its approaches to determining the costs of TSO
- (iii) top-down models are unable to project forward-looking costs (as defined within the Act) accurately (as they are based on an actual network model, albeit with a modern equivalent asset valuation) whilst also including inefficiencies present in the operator's business.

62. Regarding issue (i), PwC believes that the development of a reliable bottom-up model requires calibration with the level of costs actually incurred and reliably quantified on a top-down basis (albeit adjusted for potential inefficiencies and technological change) because:

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- Bottom-up models have an inherent tendency to underestimate costs an operator would actually incur as only those costs explicitly modelled are included in the end result.
 - Bottom-up models do not naturally take account of the information asymmetries and associated additional costs that are present in the telecoms arena.
 - Additionally, given the nature of investment in the telecommunications industry (i.e. long term, sunk investments) it is not possible for an operator to run an optimal network at every point in time. To do so would require much investment to be stranded before it has reached the end of its useful life and thus result in perennial high levels of investment and disposal costs. This may well be less efficient than an operator accepting a level of network inefficiencies over the short-medium term until it becomes realistic to reconfigure and “update” its network.
 - Bottom-up models tend to ignore these effects by assuming that an operator can switch, without cost, to an optimal network every time the technology advances. Therefore, such a model is clearly likely to underestimate the actual costs of an operator who makes use of optimal network topology and technology.
 - Finally, it should be noted that bottom-up models are extremely weak in modelling operating costs.
63. A number of approaches exist to at least partially alleviate the potential a bottom-up model has to underestimate costs. These include:
- allowing for uncertainty with regard to demand / usage forecasts and technology; and
 - building in costs to cover spare network capacity modelling
64. Regarding issue (ii) PwC agrees that a bottom-up approach would – assuming similar assumptions – facilitate comparisons with and linkages to the TSO model. However, in PwC’s view this would not justify the use of a bottom-up model in isolation from reliable top-down results.
65. Regarding issue (iii) PwC disagrees with the Commission’s position. Top-down models could be used to calculate forward-looking costs. This is exactly what all the top-down LRIC models - used by operators across the globe - do. Efficiency can be adjusted for separately. Modern technology can be incorporated through MEA valuation. The fact that top-down models are based on the actual network is an advantage in so far as a model based on a hypothetical network and simplifying assumptions is bound to produce an inaccurate cost estimate. Top-down models offer the further advantage of providing a firm basis for operating costs, which can hardly be modelled in bottom-up models

66. PwC believes that interconnection costs should be either based on actual firm accounting data by using a top-down model which is adjusted in such a way that it provides forward-looking costs of an efficient operator, or based on both, a top-down and a bottom-up analysis (which should be reconciled with each other as far as possible).

2.1.5 Question 136 – Services to be included in the model

67. The Commission seeks comment on:

- (i) the services that should be included in the network model;
- (ii) any practical difficulties in including particular services (such as ISDN services) in the network model; and
- (iii) approaches to allocating common costs between interconnection services and services excluded from the network model.

68. The Commission gives three options regarding the treatment of other services:

- **Option 1:** Under this option, the cost of providing the total PSTN service is estimated assuming the operator provides no other services. As a result all common costs will be fully allocated to PSTN services. The Commission is of the view that excluding services that share network elements with interconnection services will most likely not result in a reasonable allocation of costs.
- **Option 2:** Here, the other services are explicitly included in the calculations of the cost of providing the total service as part of the network model. The method identifies the core network elements shared by PSTN services and the other services, determines their costs and splits them between services on the basis of a determined allocation mechanism (e.g. on the basis of the relative level of directly attributable (incremental) costs).
- **Option 3** is similar to Option 2 in the sense that other (non-PSTN) services are taken into account. The difference is that, under option 3, the volumes and costs attributable to other services are eliminated and only the residual volumes and costs are included in the model itself.

69. Re issue i) an advantage of option 1 is that a considerable reduction in complexity could be achieved through the omission of non-PSTN services. However, PwC agrees with the Commission's argument that other services like ISDN and Leased Lines should be taken into consideration on calculating the cost of the total service. Otherwise, the model would calculate the stand-alone costs of PSTN services. Re option 3, PwC would note that the exclusion of other services would make it difficult to allocate a suitable proportion of common costs to these services. In our view, Option 2 would result in increased model complexity and informational requirements but would lead to the most useful results. Common practice is to include in the network model all material services that have economies of scope with PSTN services

70. Re issue ii) practical difficulties of including non-PSTN services will arise in a number of areas, mainly in (i) deriving appropriate allocation principles which, most likely, would involve a conversion from minutes into the equivalent capacity, and (ii) in increased model complexity and informational requirements resulting from the inclusion of other services.

71. The Commission identifies a difficulty in determining the usage of the network elements by different services (PSTN, LEASED LINES, ISDN) services, because of the different ways of expressing traffic (Mbps for Leased Lines & ISDN and Minutes for PSTN). PSTN traffic would have to be converted into Mbps, taking into account the peak hour effect. In this way network costs could be split between services.
72. Re issue iii) If non-PSTN services were to be excluded from the network model then a proportion of common costs should be allocated to these services. However, PwC believes that it would be relatively hard to do this outside the model on an accurate basis. This is the main reason why option 2 tends to be more common practice.

2.1.6 Question 147 – Access transmission and traffic concentration systems

73. The Commission seeks comments on the appropriateness of including access transmission and traffic concentration systems as nodes within a TSLRIC model.
74. PwC believes that the best definition of the difference between access and conveyance is at the end of the subscriber loop cable. The costs of the access network are driven by the number of customers (lines) and do not vary with the amount of traffic generated by a particular customer. The costs of the core network are traffic sensitive. Therefore, the border-line between access and core is the point where concentration occurs. Therefore, PwC believes that access transmission and traffic concentration systems should be treated as part of the core network if and when this equipment becomes the MEA (modern equivalent asset) and, hence, be included in the TSLRIC model in this case.

2.1.7 Question 157 – Busy Hour

75. The Commission seeks comments on appropriate rules for dimensioning the core network to meet demand during the busy hour. The Commission particularly seeks comment on (i) the appropriate way to define average busy hour traffic; and (ii) the provisioning to allow for traffic in excess of average busy hour traffic.
76. Regarding (i), PwC believes that the Busy Hour assumption has a significant impact on the overall costs of the network and therefore on the resulting interconnection charges. Busy Hour traffic levels cannot be based on a theoretical assumption, but must use the measured busy hour traffic. PwC believes that a reasonable way of dimensioning the network for busy hour traffic volumes is to measure the traffic of a number of busiest hours of the year and take their average. The number of busy hours to be considered should be in line with the operators dimensioning rules. Starting from this traffic volume, a number of further factors should be taken into account (see part ii).

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77. Regarding (ii), PwC believes that allowances must be made for a number of effects leading to increased capacity requirements, in excess of the (average) Busy Hour. These effects include, but may not be limited to, the following:
- Demand growth: the Busy Hour traffic would need to be determined for each network element. Demand growth would then be determined by (i) the growth of the services making use of the network element in question, and (ii) the life time of the asset (network element) concerned.
 - Network resilience / provisions for equipment outages
 - Grade of service / Acceptable blocking rates
 - Equipment modularity.

2.1.8 Question 158 – Provisioning for network resilience

78. The Commission seeks comments on whether capacity is required to ensure network resilience. If parties consider that such provisioning is consistent with efficient network design, then the Commission seeks comment on: (i) whether network capacity is required to ensure network resilience, (ii) which network elements require such provisioning; and (iii) the appropriate provisioning ‘margin’ for each of these elements to provide for network resilience.

79. Regarding issue (i), PwC believes that overall network quality of service cannot be achieved without network resilience. Resilience is best achieved by rings. When there is a failure in a segment of the ring, the corresponding traffic should be re-directed through the other segments. All systems are assumed to be ring based from RLU upwards.

80. Regarding issue (ii) In order to achieve appropriate standards of network resilience, TCNZ will have to ensure that even if one link of the network breaks down the affected traffic can be rerouted in such a way that a large proportion of those calls will be successful. Again, this proportion of traffic should be specified as part of the operator’s planning and dimensioning rules and PwC believes that this value would provide the firmest basis for a reasonable estimate of extra capacity requirements for network resilience. Therefore, all network elements affected will have to accommodate the surplus traffic and therefore need to include extra capacity margins for this purpose. These network elements would include, but not be limited to, switching and transmission equipment. On the other hand, network elements such as land and buildings would not be affected directly but only in so far as bigger equipment would need to be stored due to resilience requirements.

2.1.9 Question 163 – Appropriate capacity margins

81. The Commission seeks comments on the appropriate capacity margins for demand growth for each type of equipment in the core network. In detailing these margins the Commission is interested in the underlying assumptions concerning the (i) anticipated

rate of demand growth; and (ii) the length of time before additional capacity will be required.

82. Regarding issue (i) PwC agrees with the Commission that capacity margins need to be incorporated in the network design as it would be highly inefficient to upgrade the network every year (or more frequently) to accommodate demand growth.
83. Regarding issue (ii) Appropriate capacity has to be provided to cater for the forecast growth in the period from planning through to implementation. The length of the time frame will differ by equipment type. Transmission systems, for instance, can be exchanged relatively easily. On the other hand, duct size, for instance, cannot easily be increased. In general, the planning time frame will be given by the life of the asset in question.

2.1.10 Question 170 – Spreading provision for demand growth

84. The Commission is of the preliminary view that the network should be dimensioned to include provisioning for demand growth. The difficulty is spreading the cost of this capacity over the period in which it is used. Over time the capacity installed ahead of demand will differ. One approach is to assume that one half of the efficient capacity for demand growth is being used at any one time. The Commission seeks comments on this approach.
85. PwC agrees with the Commission's view that the network should be dimensioned to include provisioning for demand growth.
86. PwC disagrees with the Commission's view that only 50% of the costs of providing the required spare capacity (in year 1) should be taken into account. Demand does not tend to grow as a linear function but as a constant growth rate function, which implies that average spare capacity over the planning horizon would be in excess of 50% of initial spare capacity. Further, the Commission's view is flawed in that it appears to assume zero capital costs: the operator would incur cost short-falls in the early years and, arguably, a small surplus in the later years. This surplus, clearly, would have to be discounted.
87. PwC believes that the best approach for calculating the costs for this additional capacity should be based on the rationale of calculating the costs of an efficient entrant. The efficient entrant would design a network today that would be able to handle expected demand for the coming year plus the expected demand growth (for each network element over the time of the respective asset life). This is the only way of ensuring that the efficient entrant is able to recover its costs in year 1.

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2.1.11 Question 174 – How spare capacity should be modelled

88. The Commission seeks comment on: (i) whether each of the factors that necessitate the provisioning of spare capacity should be modelled separately; or (ii) whether an ‘aggregate’ fill factor should be used to capture the effects of all of the factors.
89. PwC believes that, if an aggregate fill factor were to be used, the methodology would have to ensure that this factor correctly and fully incorporates each of the factors that necessitate the provisioning of spare capacity (demand growth, resilience, modularity, etc.). In some cases, it may not be straight-forward / possible to combine all factors into a single one: the mark-up for equipment modularity, for instance, will depend on the next available equipment type / size available and cannot simply be included in some percentage mark-up.
90. In short, the fill factor for modularity does have to be a separate one. Others may be aggregated, but only if the aggregated fill factor is linked with the individual effects in a clear way (link can be made outside the model).

2.1.12 Question 177 – Relationship with TSO

91. The Commission’s preliminary view is that costs common to both the access and core networks related to a TSO instrument should be entirely excluded from TSLRIC calculations. The Commission seeks comment on this approach.
92. PwC believes that the over-riding principle must be that costs are recovered: neither over-recovered nor under-recovered. It would certainly be wrong to exclude relevant costs from the TSLRIC model that are not recovered through the TSO mechanism
93. Consider the example of a trench shared between TSO related and other services. All costs of the trench should be recovered. Common costs should be split between services in such a way that the allocation is proportionate to the avoidable costs of each service. It would certainly be wrong to exclude all common costs from, say, interconnect services on the basis that some common costs are recovered through the TSO instrument.

2.1.13 Question 181 – Sharing of trenches

94. The Commission seeks comments on the: (i) scope for the sharing of trenches in the core network with other telecommunications companies and utilities; and (ii) appropriate approaches to sharing the cost of trenches between the access provider and other parties using the trenches.

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95. Regarding issue (i): PwC believes that in most cases it will be not practical to share trenches with different operators. The rationale for this is expressed below:
96. Trench sharing is not widespread. One should not reject the relevance of this present reality on the basis that it is somehow not a reflection of ‘efficient cost of construction today’. To the contrary, it is very much a consequence of the true costs of construction today.
97. Firstly, a distinction must be made between green fields and brown fields build. In green fields subdivisions, trench sharing is the norm, as the developer provides trenches for all services. This is not particularly significant for the construction of a new network, applying to only some 15,000 to 20,000 lots per year.
98. For all other build, trench sharing is rare for entirely practical reasons:
1. Limited opportunity: buried plant has a very long asset life (20+ years), and new trenching undertaken by the regulated operator utilities is generally undertaken only for capacity or maintenance purposes.
 2. Costs of co-ordination: generally result in only major trench works being co-ordinated between utilities. A significant proportion of new trenching by particularly telecommunications, power and gas utilities is small scale work, for which in practice there is little value in seeking trench sharing arrangements with other utilities.
 3. Timing: trench sharing often involves the installation of plant which is not required now, but is expected to be required in future. It thus often represents an advancement of capital investment, which has a cost. Even in the case of a theoretical new network build, such timing issues would add significant cost. Timing issues also affect the cost of co-ordination.
 4. Alignment: practical experience has demonstrated that one utility’s trench route in some instances is not suitable for another utility’s use – the use of such a route would add sufficient cost so that sharing becomes un-economic.
 5. Cost: Even if trench sharing were on a true cost share basis, sharing can add significantly to the cost of the trench due to clearance requirements between services. For example, clearances between power and telecom plant can increase the trench size by 50% to 100%.
99. It is therefore entirely unreasonable to assume that ‘efficient cost of construction’ for trenching could be assessed on the basis of nth share of the aggregate of all utility’s trenching as proposed in the paper. Such costs would be unachievable for any network operator in practice.
100. Regarding issue (ii) PwC believes that the fact that duct sharing between operators is not observed in practice provides a good indication that the assumption of trench sharing between operators is not realistic. Therefore, PwC would not propose any methods of allocating costs between operators.

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2.2 Valuation of assets

2.2.1 Question 199: Optimized Replacement Costs

101. The Commission proposes to use an optimized replacement cost methodology to value assets in estimating the TSLRIC of providing interconnection services.
102. Whereas PwC agrees with the CC's view that an optimized replacement cost methodology is the appropriate method to be used in the formulation of forward-looking TSLRIC costs it would emphasize that great care must be taken in the application to ensure accurate and realistic results. Optimized Replacement cost methodology takes into account both price changes that have occurred since assets were originally purchased and also technological improvements by basing asset values on the present-day cost of acquiring an asset to efficiently provide the required quantity and quality of service. It thus considers the prices of assets that an operator would use presently if building out its network. However, Optimized Replacement Costs must not be speculative and make use of unproven technology that the operator has no plans to introduce. The type of asset used in the valuation should be based on the network plans of the access provider over the forthcoming 2-3 years. Care should be taken to accurately reflect cost savings from later technology and not to underestimate the cost of using later technology (transition costs, shorter asset lives, etc.).

2.3 Depreciation

2.3.1 Question 215: Tilted Annuity Method

103. The Commission seeks views on (i) whether the tilted annuity approach is the appropriate depreciation methodology in the event that it is considered appropriate to value assets on the basis of optimized replacement cost. The Commission also seeks views on (ii) whether other methods of depreciation may be more appropriate. Such approaches should be consistent with the approach taken to the valuation of assets.
104. The tilted depreciation method (to approximate to the stream of annual capital costs - the sum of economic depreciation and cost of capital) is linked to the asset lives and the valuation trends of assets. The annual depreciation charge on each asset should reflect its change in economic value. The CC is correct in attempting to set a depreciation policy that ensures that the costs of investment can be recovered.
105. The validity of the results of using a tilted annuity is critically dependent on the application of appropriate parameters. It is in this area that PwC has grave concerns about the proposed approach to the estimation of key parameters, namely useful economic life and 'price' trend. We will return to the matter of parameter estimation but first it is useful to consider economic depreciation and its determinants in a little more detail.

106. To a considerable extent discussion of depreciation has been the domain of accountants. However, the subject has also been the subject of economic analysis and it is the recognition of economic depreciation that concerns us here.

107. Hulten and Wykoff introduce the concept in the following way: ‘Most capital goods are used up in the process of producing output. Machine tools wear out, trucks break down, and electronic equipment becomes obsolete. When an asset reaches a point at which it is no longer economical to repair and maintain, it is withdrawn from service. As the physical deterioration and retirement of assets cause the productive capacity to decline to zero, parallel loss in asset financial value occurs. This depreciation of value is a cost that must be subtracted from gross revenue in order to determine the income accruing to the asset. It is the amount that must be added to the balance sheet to keep wealth intact.’² Hotelling defined economic depreciation as the change in value of an asset from one period to the next³.

108. Baumol, in a discussion of economically efficient depreciation and optimal depreciation policy, puts it terms of the investment decision. ‘Acquire an asset if the discounted present value of its expected returns exceeds the present value of its costs, including the cost of capital tied up in the asset.’⁴

109. This gives us a description of the economic value of the asset in terms of the present value of expected net returns and of the change in value or economic depreciation as the change in expected net returns in a given period. In a competitive market the economic value at any point in time would be the same as the asset’s second hand market value or the future discounted net present value of cash flows generated by the asset.

110. Economic depreciation is, therefore, a function of the following factors and their pattern over time:

- the operating costs associated with the asset;
- the revenues generated by the asset, being the product of output (which may have both quality and quantity components) and selling price;
- the alternative cash flows associated with the next generation or *challenger* asset; and
- the physical life of the asset which may or may not be a binding constraint but in practice is seldom binding in the case of assets characterised by rapid technological progress.

111. The case of the challenger asset is highly relevant for the telecommunications industry, which is characterised by high rate of technological change. Hulten and Wykoff (1996) define obsolescence as follows. When new vintages of capital are

² Charles R Hulten and Frank C Wykoff. 1996. “Issues in the Measurement of Economic Depreciation, Introductory Remarks.” *Economic Enquiry*, 34, pp 10-23.

³ H Hotelling. 1925. “A General Mathematics Theory of Depreciation.” *Journal of the American Statistical Association* 20 (September): 340-53.

⁴ William J Baumol. 1971. “Optimal depreciation policy: pricing the products of durable assets.” *The Bell Journal of Economics and Management Science*, 2, pp. 638-656.

introduced into the market they often contain new ‘state of the art’ technology. If this technology is superior, then the arrival of the new vintages of capital will depress prices of existing old vintages of capital, which do not contain the new technology. This decline in value of old vintages is obsolescence, the decline in price resulting from the introduction of new vintages of capital. Thus, obsolescence is the effect on old vintages of capital of the introduction of new technology embodied in new vintages of capital. In other words, embodied technological change results in the obsolescence of older vintages of capital if the new change cannot be grafted onto the older assets.

112. In short the introduction of technologically superior assets will reduce the useful economic lives of older assets and indicate the need for an accelerated depreciation schedule and shorter useful economic lifetimes.
113. It is readily apparent from the above that there are significant informational difficulties in estimating economic depreciation directly. The tilted annuity method described in The Discussion Paper provides a practical method for approximating economic depreciation (plus cost of capital) if appropriately parameterised.
114. The variables in the tilted annuity are the cost of capital, the useful economic life of the asset and periodic rate of change in the ‘price’ of the asset. The first of these, the cost of capital is discussed in the next section and is not considered here. We know from our earlier discussion that the other variables, life and ‘price’ change, are a function of the demand and supply side cash flows associated with the asset and of the influence of challenger technologies.
115. This brings us to a consideration of how useful economic life and ‘price’ change should be estimated. The Commerce Commission seeks comments on how estimates of useful economic life should be derived, and it suggests that ‘price’ trends be based on historical data of Modern Equivalent Asset (MEA) prices. PwC believes that the recommended estimation methods will result in biased or inaccurate estimates of economic depreciation.
116. One other issue of concern is that one would need to ensure any approach adopted for the calculation of depreciation charges (in a CCA context) also accurately reflects the correct treatment of back-log depreciation. Two different approaches can apply for the treatment of backlog depreciation charges and changes in asset value. Under Financial Capital Maintenance (FCM, favoured by the EU) an increase or decrease in the current cost of assets will form part of the reported profit or loss. Under Operating Capital Maintenance (OCM) holding gains or losses relating to price changes on net operating assets are capital adjustments and thus do not show up in the profit and loss account..
117. There is concern regarding the Commission’s statement that “it is likely that ORC will decrease in real terms over time”. Whilst it is true that equipment costs are declining the Commission must ensure that it takes account of likely increasing labour costs, especially in areas such as ducting and trenching where labour is a substantial proportion of total costs.

2.3.2 Question 224: Economic Lives of Assets

118. The Commission seeks comments on practical ways and difficulties in estimating the economic lives of assets. If it is impractical to estimate the economic lives of assets, the Commission seeks comments on alternative approaches to determining asset lives.
119. Asset lives should be based on the economic life of the assets. The economic life of the asset refers to the time period over which the asset generates an income stream. The technical life of an asset should be used as the upper bound for this estimate with an adjustment made which relates to the current rate at which new technologies are replacing existing assets at New Zealand's telecoms operators.
120. Although necessarily subjective, the use of economic lives is necessary in developing forward-looking cost estimates and thus the Commission must attempt to overcome practical difficulties. The calculation of an adjustment to technical lives should encompass a measure of how quickly replacement technologies have been brought into a network over recent years and also (if available) on supplier's plans for the development of new technologies.
121. PwC would emphasize that it is essential to ensure consistency between technological progress rates on the one hand and the assumptions surrounding the technology used on the other. If an assumption were to be made that the operator always uses the very latest switching technology then the technological progress rate used in calculating the tilted annuity based depreciation rate should be consistent with this assumption, i.e. should reflect the full decrease in economic value implied by the rapid technological progress.

2.3.3 Question 226: Rate of Change of Replacement Costs

122. The Commission suggests that the rate of change of the replacement cost of assets should be based on recent trends in the purchase prices of capital equipment. The Commission seeks comments on this approach and how it could be best implemented in practice.
123. PwC believes that the use of recent trends to estimate the rate of change of the replacement cost of assets may not result in forward-looking cost estimates.
124. Recent trends incorporate historic, not forward-looking price and technology trends. For example, if a step change in technology has taken place this is likely to have resulted in a large one-off price reduction that may not be repeated over the forthcoming years. Including this change in the calculation of price trends would then overestimate the likely price reductions. PwC further notes that price trends need to be considered for both labour and material costs.

125. Labour cost projections should be based on available third party projections of inflation and labour cost – inflation differentials. (If projections of this differential are not available, historic levels can be used and added to the projected inflation to generate projected labour costs).

126. Material cost trends should be based on industry expectations. Furthermore, it should be recognized that operators often have Framework Agreements with suppliers for the provision of network equipment. Such agreements are likely to stipulate the price that the operator will pay over the length of the contract (typically a number of years) and these prices may well be constant over the period. Any such agreements that TCNZ have should therefore be reflected in the rate of change of replacement cost.

2.4 Return on Funds

127. Please see the separate submission regarding the proposed calculation of the cost of funds.

2.5 Network and Non Network Operating and Maintenance Costs

2.5.1 Question 405: Network Costs: Actual vs. Benchmarking

128. The Commission seeks feedback on

- (i) which of these approaches (access providers actual costs, benchmarking and percentages used by other regulators) are likely to provide the most accurate estimates of forward-looking network O&M costs;
- (ii) conceptual issues in implementing these approaches;
- (iii) the availability of data and information to implement these approaches; and
- (iv) the time frames within which the approaches could reasonably be implemented.

129. In PwC's view, bottom-up models are not well suited to model O&M costs and therefore extreme care needs to be taken in developing cost estimates.

130. The first approach based on TCNZ current costs is considered the most defensible. The methodology can be applied in two ways: TCNZ O&M costs should be used either in absolute value or percentages of O&M costs of Capital Investment.

131. PwC does not consider the other two approaches as justifiable. However, if the second approach is used, the benchmarking exercise needs to recognise the inherent inaccuracies in simple benchmarking procedures. PwC does not agree with the proposal to base the O&M costs simply on estimates made by other regulators.

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132. It is recognised that using percentage “mark-ups” is a practical way of estimating O&M costs due to the time-consuming and impractical first best approach of modelling cost drivers. However, care does need to be taken with this approach.
133. The most accurate approach for deriving this mark-up is to use the actual O&M costs of the access provider. Although not forward-looking [indeed, none of the approaches suggested by the Commission is truly forward-looking] this approach avoids the difficulties of a benchmarking approach as it ensures the costs do reflect the situation of the access provider. However, it is acknowledged that TCNZ would be unable to provide the necessary granularity of information at the present time. TCNZ are though able to identify O&M costs that relate to switching and transmission separately to other O&M and this information may complement the benchmarking to be undertaken.
134. Until access providers are able to provide such information a benchmarking approach based on similar networks is favoured. However, the estimates must be adjusted to take account of, amongst other factors:
- Differing network sizes and structures;
 - The use of different network technologies (where one technology may for example require less maintenance);
 - Differing labour costs.
 - Such a benchmarking approach could be conducted with relative ease and within a reasonably short timescale by the CC.
135. The third approach, consisting in using other regulators’ percentages, it is considered as unacceptable. The reasons are that those percentages would reflect different market conditions and the method is not forward looking.

2.5.2 Question 428: Non - Network Costs: Actual vs. Benchmarking

136. The Commission seeks feedback on:
- Which of these approaches (access providers actual costs, benchmarking and percentages used by other regulators) are likely to provide the most accurate estimates of forward-looking non-network costs;
 - Conceptual issues in implementing these approaches;
 - The availability of data and information to implement these approaches; and
 - The time frames within which the approaches could reasonably be implemented.
137. PwC’s view is that Bottom-up models are not well suited to capture O&M costs and therefore extreme care needs to be taken in developing these cost estimates.
138. The first approach is considered most sound and the Commission should take into consideration Absolute value of costs or percentages derived from them.
139. PwC does not regard the other two options as justifiable, but if option 2 is to be used, any benchmarking exercise needs to recognise the inherent inaccuracies in simple

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benchmarking procedures. All approaches require careful consideration of the likely cost driver of each non-network cost category. As with the determination of network O&M, PWC would not favour an approach based entirely on what regulators elsewhere have done.

140. Reason: It is recognised that using percentage “mark-ups” is a practical way of estimating O&M costs due to the time-consuming and ill practical first best approach of modelling cost drivers. However, care does need to be taken with this approach.
141. The most accurate approach for deriving this mark-up is to use the actual O&M costs of the access provider. Although not forward-looking [indeed, none of the approaches suggested by the Commission is truly forward-looking] this does negate the difficulties of a benchmarking approach as it ensures the costs do reflect the situation of the access provider. TCNZ would be willing to discuss with the Commission how its current non-network costing architecture can be used to derive non-network O&M estimates for the bottom-up model.
142. PWC would favour a benchmarking approach based on similar networks as a second best method of estimating non network O&M costs. However, the estimates must be adjusted to take account of, amongst other factors:
 - Differing network sizes and company structures;
 - Differing labour costs.
143. Such a benchmarking approach could be conducted with relative ease and within a reasonably short timescale by the Commission.
144. PWC does not favour the third approach based on percentages used by other regulators for the same reasons implied at question 405.