APPENDIX G-A:

Detailed CostQuest Comments in regard to

Telecom New Zealand's Report
to
the Commission
on
Modelling of the TSLRIC toll-bypass interconnect cost
31 August 2004

(For ease of reference we have inserted our comments within the text of Telecom's report and have highlighted them in blue. We would recommend the reader have a printed copy of Telecom's report for reference).

Public Version

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A: BACKGROUND

Section 45 Notice

1 The Commission issued a section 45 notice to Telecom on 30 April 2004 (the "**Notice**"), requiring Telecom to calculate the price payable for interconnection with Telecom's PSTN in accordance with section 45(1) of the Telecommunications Act 2001 (the "**Act**"). Section 45(2) also requires delivery of a 'statement' that sets out how the interconnect price was calculated, and all information on which the calculation of the price was based (the "**Statement**"). The Notice reiterates the statutory requirement for a Statement.

2 To assist the Commission with the price review process, the Commission has suggested that Telecom's Statement should include the following:

2.1 an explanation of all input and output values and processing steps in the calculation including the relevant metric and, when appropriate, the relevant time period;

2.2 a statement as to whether the calculation relies on particular models or input files to provide values;

2.3 all assumptions and formulae used in calculating the price and logic flow diagrams for each step of the calculation and, where possible, cross-reference to the relevant parts of the calculation;

2.4 step by step instructions on how to calculate the price payable.

3 This Report, and the associated CostPro model on the CD, form Telecom's Statement. As part of Telecom's commitment to working with the Commission on TSLRIC modelling we have made every effort to follow the Commission's suggestions for the Statement, as set out above.

4 The main model is the CostProNZ model developed by the Commission to calculate the 01/02 TSO cost (the "**model**"). The input files and values used are as supplied by the Commission except where specified in this Report. All assumptions and formulae used are also as supplied by the Commission except where specified in this Report and detailed in the accompanying model.

5 We have recorded and explained every change in the CostPro model – either in this Report or as notes and comments on spreadsheets. Logic -flow diagrams remain as in the original CostPro model. Step by step instructions on how to run the model are provided in **Annex 6** to this Report. Note that we have not attempted to explain input values and assumptions that have not been changed from those in the CostPro model given to us by the Commission.

6 We have also used the output of the models underlying the Commission's 02/03 draft TSO determination, in order to calculate the extent of the TSO/TSLRIC overlap. These models are described in detail in the Commission's 02/03 TSO Draft Determination (30 June 04) and this detail is not repeated here.

7 In addition to the above list, the Commission has suggested Telecom should

include in its Statement:

7.1 all input values;

7.2 the source of each input value;

7.3 a breakdown of costs including -

(a) annual costs by major cost category,

(b) capital investment by element type and LICA group,

(c) per minute cost by cost element,

(d) analysis of variance in per minute rates by LICA group; and

7.4 information demonstrating the model is capable of performing sensitivities on traffic volumes, WACC, tilted annuity parameters, allocations of shared and common costs, and percentage mark-ups of operating expenses.

8 Telecom confirms that:

8.1 the information sought by the Commission is contained either in this Report or in the spreadsheets within the model. (Again, we have not attempted to provide a source for input values that have not been changed from those in the CostPro model given to us by the Commission. However, we have identified and sourced all input values that Telecom has either added or changed);

8.2 the model can provide the breakdown of costs by major cost category; and

8.3 the model is capable of performing the sensitivities specified.

Choice of model

9 The requirements of the Notice, unlike the requirements issued by the Commission for the TSO modelling under section 83, do not stipulate what model Telecom must use to calculate the TSLRIC price. In theory, at least, Telecom had a choice about whether to use the Commission's CostPro model or to develop its own model.

10 At the outset of these proceedings, Telecom expressed a view to use the Commission's CostPro model. Telecom was compelled to this position for two interrelated reasons:

10.1 **Commission familiarity with the CostPro model:** Telecom recognises that Commission staff have been actively involved in developing the CostPro model, have subjected the CostPro model to extensive testing and appraisal, and the Commission has now used the CostPro model in at least two draft determinations and one final determination; and

10.2 **the TSO precedent**: in the TSO context, the Commission has required Telecom to use the Commission's models when calculating the TSO net cost each year, despite Telecom's concerns over the appropriateness of the models under the Act. In the TSLRIC context, the Commission has already stated it intends to use the CostPro model for its calculation of the TSLRIC price. Given Telecom's TSO experience, Telecom felt constrained to also use the CostPro model for its calculation of the TSLRIC price, or risk substantial (unnecessary) expenditure developing a model that the Commission was likely to render worthless for calculating the TSLRIC price.

11 The CostPro model is large and complex. Not surprisingly it has errors. Where possible Telecom has sought to rectify the errors in the current model. The errors in the spreadsheets have been easy to rectify. However, errors in the source code could not be rectified by Telecom. The Commission's consultants have agreed that the CostPro model is in error, but have not supplied Telecom with a corrected recompiled version of the CostPro model.

As with any large, complex model, there is a potential that errors exist in the model. Based upon our review of the Telecom comments, Gibson-Quai comments, and Commission Staff comments, a number of errors has been discovered (and corrected in the adapted version of CostProNZ). However, <u>none of the errors in the TSO version of the model have had a significant impact on investment values</u> as used by Telecom. CostQuest believes the model's output is a valid measure of cost.

During the period leading up to Telecom completing its TSLRIC calculation, CostQuest provided suggestions on modifying the source code in response to several issues raised by Telecom. However, CostQuest did not agree that every point raised by Telecom was a valid issue worthy of accommodation. Although CostQuest acknowledged that a few specific issues existed, CostQuest did not agree that the overall model was invalid and has advised the Commission that the overall impact of these issues is minimal.

12 To get around the source code problem we have done a series of 'workarounds' in the spreadsheets and the database. While these fixes are far less elegant than correcting the source code, they work the same. These workarounds are detailed in **Annex 5**.

General approach

13 The Commission has stated that the document '*Implementation of a Total Service Incremental Cost (TSLRIC) Pricing methodology for Access Determinations under the Telecommunications Act 2001: Principles Paper'* (the "***Principles Paper***"), is an appropriate guide for Telecom's TSLRIC calculation. We have therefore followed the *Principles Paper* closely. In particular:

13.1 the model used is the CostPro model developed for the Commission to measure TSO call costs. Though this has necessarily been revised to account for differences between a TSLRIC approach and that required for the TSO, the revisions are not major and do not affect the basic structure and assumptions of that model. Revisions made to convert the CostPro model to a TSLRIC model are detailed in **Annex 1**;

13.2 the CostPro model uses the scorched node approach, is based on Modern Equivalent Assets, is a bottom up model, is element based, and is geographically de-averaged. It therefore fulfils the requirements of Section 4 of the *Principles Paper*;

13.3 the CostPro model separates the access and core networks at the line card as required in Section 5 of the *Principles Paper*;

13.4 the TSLRIC calculation uses the tilted annuity approach with the same tilt, time -to-build, and asset life parameters as for the Commission's TSO modelling as required in Section 6 of the *Principles Paper*. We have added further parameters to cover the software cost category which was excluded from the TSLRIC model. Parameters used are shown in **Annex 1**;

13.5 the calculation of the cost of capital follows the guidelines in Section 7 of the *Principles Paper*. The cost of capital calculation is summarised below and detailed in **Annex 3**;

13.6 we have followed the guidelines as specified in sections 8 to 10 of the *Principles Paper* on: services included in the CostPro model, common cost allocations, and operating costs. The parameters used are covered in more detail in this Report;

13.7 equipment costs have been updated to take account of two factors – (i) changes in the original unit costs provided by Telecom, reflecting both a better understanding of how these are used in the model and correction of errors in our original data supplied to the Commission. Details of the unit cost changes are provided in **Annex 2**; and (ii) we have updated costs to 2002/03 nominal values. The method used to update values is described in Section B;

13.8 we have allowed for the potential double recovery of costs under the TSO and TSLRIC regimes as required in section 11 of the *Principles Paper*. Details of our methodology are provided in **Annex 4**.

14 In a number of areas the *Principles Paper* is either silent or ambiguous. Where this is the case, Telecom has developed its own numbers, and these are discussed as relevant in this Report.

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B: MODELLING ISSUES

Asset prices

15 We have used the asset prices the Commission used in the 2001/02 version of the CostPro model apart from a small number of specific cases where these are considered to be in error. Those are detailed in **Annex 2**.

16 The CostPro model contains asset price data used in the TSO calculations but this is priced for the Dec01-June 02 period. We have followed the NERA report for the ACCC[1] and allowed for the asset prices to be valued at the start of the relevant period i.e. November 2002. To do this we have applied the tilt for seven months (end of March to beginning of November). Since that is a measure of real price change, we have then increased that by the rate of inflation for the period (1.7%). The resultant factors are shown in the second to last column of the Table below. The last column shows which table these factors were applied to in the model.

CostQuest agrees that the incorporation of Tilt and Inflation is required if the original inputs in the TSO proceeding do not represent November 2002 prices. Since Telecom did not provide the vintage of the original TSO data, we must assume that the recommended 7 month adjustment is correct. In regards to the general inflation factor recommended by Telecom, CostQuest is not in a position to evaluate the value (1.7% for 7 months) as it relates specifically to New Zealand. However the value appears reasonable compared to other industrialized countries. In regard to the tilt values, we have verified that the values used by Telecom do reflect the Commission's tilt inputs into the TSO version of the model, except for Software and Trench. We recommend that Software should match the Switching account, since this is the capital account it falls within. We recommend that Trench should be adjusted to match a blend of Buried and Underground accounts, since these are the capital accounts it falls within.

17 Land and Building mark-up factors in the tblSwMiscFactors and tblTRMiscInvestFactors tables were also adjusted for 1.7% inflation.

The inflation plus/minus tilt (i.e., asset-specific price change factor) is a valid approach to produce asset-category specific nominal prices over time. However, when the price change factor is applied to factors (that are themselves multiplied times asset values, e.g., land and building) it can lead to double counting of the price change factor.

[1] NERA: Estimating the Long Run Incremental Cost of PSTN Access: Final report for ACCC, January 1999.

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[ ]CRI

We recommend that the adjustments for asset categories be accepted. The impact of the combined inflation and tilt adjustments that we implemented was an approximate 2 - 3% REDUCTION in interconnect costs (as compared to the initial input values).

We do NOT recommend the acceptance of the adjustments for the factor categories. As we noted, the adjustment of factors in addition to asset categories my lead to a double counting of the price change factor. Based on our experience, factors, such as land and building factors, are typically not adjusted solely for inflation. Any single adjustment is not sufficient since other characteristics change over time. For example, as switching equipment becomes smaller over time, smaller buildings and less land are required.

Indeed, while we did not adjust the Telecom recommended land and building factors in the TSO proceeding, the current Telecom factors for land a building are much higher than generally exist in TSLRIC studies we have developed or reviewed. We typically see a land and building *with* common (common building structural elements, e.g., air conditioning), factor of 10-15% in the U.S.[2], while Telecom is recommending a [ ] TNZRI land and building factor.[3] If New Zealand land and building factors are different (from those in the U.S.), we expect the land and building factor would be lower rather than higher. This is based on our expectation that the base equipment (switching equipment and circuit equipment) would be imported and relatively expensive in New Zealand– while land and buildings (largely constructed using local materials and capitalized labour) would be relatively less expensive. (i.e., both the numerator and the denominator of the factor calculation should work to make the land and building factor smaller in New Zealand). If the land and building for all purposes are included in Telecom's development of the factor (including land and building for general administrative purposes), then the factor is overstated since these administrative buildings are typically captured in a true common factor (often applied to a per-period cost estimate and not an investment value).

We recommend that the Land and Building factors be reduced to between 9 and 13% (we have used a combined value of 11%). This range likely reflects New Zealand-specific ratios of land and building to equipment prices and is consistent with what we have seen in other jurisdictions.

Services included in the model

18 The model includes all fixed PSTN calling services. As in the CostPro model account is taken of data services in the cost sharing/common cost assumptions. It should be noted that the model includes ISDN traffic but this is modelled as analogue traffic. The CostPro model appears to be partially setup to dimension and cost ISDN separately. However for some reason it does not appear to have been completed or used. We have removed this ISDN dimensioning section of the model to provide greater clarity to the changes in the switch dimensioning we have proposed below. However we would be happy to discuss with the Commission how to include

[2] This is applied as a gross investment to gross investment factor in the model. For example, if the foreward-looking initial investment for the switch is $1 million, the land and building gross investment is between 10%-15% in the U.S., or between $100,000 and $150,000.

[3] It is possible that Telecom is applying an investment factor to a NET booked value of the equipment (i.e., to the partially depreciated value of the equipment on the books) to obtain a [ ]TNZRI factor. If this is the case, such a net-book factor may not be substantially different from a 10% - 15% gross investment to gross investment factor as used in the model.

ISDN as a separate service at a later date. We believe that the way ISDN is currently handled probably means costs are lower than they should be.

We do not believe that if ISDN calls are modelled as analog traffic it will have any significant impact on call type costs. Where it may have greater impact is on the line side termination, which is not including in the Call Type costs.

The "total service" the model builds for includes: the traffic from the call type services based upon the line demand fed in from the HCPM Access model and per line call type demand from a Telecom provided file. The call types included are: 800 call, 900 call, By-pass interconnect – incoming, By-pass interconnect – outgoing, Dial-up internet, Direct dial local call, Mobile to fixed, International, Local interconnect – incoming, Local interconnect – outgoing, and Misc. To this, the model adds in all data traffic, based upon a file feed from Telecom.

If traffic has been omitted, it is due to the fact that a) the HCPM line counts are incorrect or exclude a service, and/or b) the demand file from Telecom for Call Services is not complete, and/or c) the Data Traffic file from Telecom is not complete. If any of these are true, then 'total' service demand may not be reflected in the model. However, unless the missing demand is significant, any effect is likely to be negligible on the reported MOU and Setup costs for interconnection (if traffic is omitted, the per minute of use costs from the model will likely be overstated).

Switch dimensioning

19 The dimensioning of the switch in the SwitchLogic workbook has been improved to reflect our concern that the CostPro model does not dimension the NEAX switch the way it should be dimensioned, and hence does not correctly allocate costs. The changes required to rectify this are detailed in **Annex 2**.

20 The changes do mean some slight changes to overall switching costs compared to the CostPro model. To show the impact of these changes we have compared the original CostPro model with a model that has only changes to the SwitchLogic workbook (i.e. with all other parameters remaining as in the original model and no changes for things like traffic, unit costs etc). These are summarised below. The net effect of the changes, which are essentially dimensioning changes, is an increase in overall costs of just under $60m. However, importantly in the context of the interconnect cost, it is the line related costs that have increased. These are not used in the interconnect calculation. The minutes and call costs have reduced. It is these calling costs that are used in the Interconnect costs.

[ ]CRI and TNZRI

As noted by Telecom, the majority of the changes impact Line costs. These will impact interconnection cost minimally (due to the ~3% reduction in total minute and call investments) but will have a potentially greater impact on TSO. Since we cannot readily implement many of the recommended switching changes (they are not simply input changes but rather dramatic changes to the switch logic and processing of the model), we reference the above table to estimate the impact of Telecom's proposed changes (if all were adopted). Based on current output of the CostProNZ model, the cost of interconnection may be OVERSTATED by $0.00015 and $0.00020 per minute, or less than 2%. (I.e., the bypass interconnection cost of .891/min may fall by .015 to .020c/min if this change is implemented.

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21 The traffic data used is for the period 1 January 03 to 31 December 03, and is summarised in the table below.

[ ]TNZRI

There are some significant differences in traffic between this file and what was previously provided by Telecom. We are concerned about the level of change that Telecom has not adequately explained[4] (e.g., Dial-up MOU increase by twofold) (please see the table below). If parties do agree the file is acceptable, it can be utilized in the Adapted CostProNZ model. The estimated impact of adopting this file into the adapted model is an INCREASE in interconnection cost of ~ 10%. (i.e., the bypass interconnection cost of .891/min does NOT reflect an adoption of this file.) The impact is, therefore, nontrivial. We would recommend that if the file is adopted, further investigation of the impact be undertaken (this is beyond the scope of the current evaluation).

[ ]CRI and TNZRI

ESA-specific Touch Tables

Telecom provided the original file at a New Zealand aggregate level. While the model can be modified to allow touch variation by ESA, will the increased specificity produce more accurate costs. That is, are the values in the aggregate table or the values in the detailed table more statistically valid for use in the model.

While we cannot implement the use of the expanded table fully in the adapted CostProNZ with just input changes, we can determine the total investments that would be produced by the use of the file. In reviewing the total investment produced by the model incorporating Telecom's expanded file versus the simplified Touch table used currently in CostProNZ, the use of the new detailed Telecom file results in a reduction of total core network investment of ~2%. One can then surmise that if one were to implement the expanded Telecom Touch table, that interconnection costs may be reduced by ~2% or ~$0.0002. (i.e., the bypass interconnection cost of .891/min may fall by approximately .02c/min if this table could be adopted).

If both the touch table and traffic table (noted above) are implemented, we estimate the combined impact to be an increase of ~8% in interconnection costs.

22 To comply with the requirement to calculate costs by LICA (Local Interconnect Calling Area), as required by the Notice, it was necessary to change the Touch Table (tblSWTouch). This table contains percentages of Intra-Office, Incoming, Outgoing, Tandem and Gateway calls for each of the 12 Call Types in the CostPro model (800, 900, Local, etc). These percentages are used to split the total traffic volume for each ESA into the 5 categories. In the CostPro model the same national average percentages are used for all ESAs.

23 In reality the percentages are different for each ESA, especially for Toll Bypass Interconnect calls, where some ESAs are Points of Interconnect (POIs), but many are not. Telecom has produced touch tables for each ESA

[4] We note that Telecom's original data for the TSO proceeding do not match the current traffic volume used in the model. The MOU's in the model are ~0.5% higher and the Calls are ~3.9% higher. This is due in part to how Telecom's data was provided and massaged as inputs and actually used in the model. First, Telecom's original input was total volumes and total lines by ESA for only the major ESAs. These usage volumes were then unitized by line and used for the major ESAs and the remote ESAs tied to them. Second, the line counts used on CostPro were based on a feed from the Access model, which may have been slightly different in total than the Telecom line counts provided with the Usage data.

and then made appropriate changes in the CostPro database to enable these ESA-specific touch tables to be used correctly in the calculations. The changes are detailed in **Annex 2**.

Mark-ups for operating costs

We would ask whether these operating costs also support other call services or other activities. If so, they should be allocated fairly.

24 In line with the *Principles Paper* recommendations, mark-ups are made for operating and maintenance costs, indirect operating costs and indirect capex costs. These are sourced from the *Principles Paper* and detailed in **Annex 1**.

25 One operating cost for which the *Principles Paper* provides no guidance is the operating cost directly associated with interconnect[5]. This covers the product management, policy and planning costs incurred in providing other communications providers with interconnect services. They include:

25.1 the interconnect group (being the personnel in Telecom's Wholesale Services Group who deal with interconnect management and operations, and their associated overheads);

25.2 the Telecom regulatory function, insofar as it relates to TSLRIC and interconnect issues;

25.3 external legal and other consulting costs in connection with TSLRIC and interconnect issues;

25.4 network management personnel specifically dealing with interconnect issues.

26 Telecom asked PwC to estimate the cost that Telecom actually incurred performing these functions. As part of this PwC reviewed the recent reports[6] on BT's product management, policy and planning (PPP) costs. The definitions used by PwC in their analysis for Telecom were broadly consistent with those adopted by Ofcom except in two areas:

26.1 BT's PPP charges include an allocation of "general overheads" in accordance with general attribution methods. This includes allocated costs from such areas as the Chairman's Office and BT Group Secretariat. The PwC summary of Specific Interconnect Costs does not include any such allocation of general overheads.

26.2 There is a potential small difference in the treatment of network

[5] The ACCC/NERA report (see Appendix 1 of the Principles Paper) does include, within the indirect opex markup, a markup for 'carrier services' but no further description of what is included here. We presume this is for wholesale services and it is possible that, within this, there is an allowance for the direct interconnect opex. However the amount allowed for seems very low if it is meant to include such an allowance so we have calculated it separately here.

[6] Ofcom's "Review of BT's product management, policy and planning (PPP) charge" June 2004, and a report to Ofcom by Ovum and Robson Rhodes, February 2004, "An investigation into BT's costs of product management, policy and planning".

management costs. PwC have separately identified the network management cost and included this in the Interconnect Cost. It is unclear from the Ofcom and Ovum reports whether similar costs have been included in the PPP definition. However, PwC consider any difference in treatment is unlikely to be material.

27 Where possible, PwC have referred to costs incurred over the period November 2002 to October 2003. However, in some cost categories they have estimated costs over that period, based on the available data from other financial years. The total annual cost is [ ]TNZRI (total takes account of rounding in the component parts) as shown below. This is then divided by the total number of interconnect minutes ([ ]TNZRI from para 21, above) to give the cost per minute. This cost is added to the modelled cost in Section D.

[ ]**TNZRI**

It is appropriate to recover those costs that are prudently incurred to provide service to customers and comply with regulatory requirements for TSLRIC and interconnect. However, Telecom should not be able to recover the full portion of these costs that correspond to litigation and disputation of the methods to be used for TSLRIC and interconnection. Moreover, even if such costs of litigation and disputation were appropriate (which we believe they are not) such costs are likely to be transitory and are not sustainable over longer periods of time. Indeed, such costs should fall in the very next year.

In addition, the costs for some of the items seem unreasonably high. If one assumes that an internal employee represents [ ] TNZRI, then these values indicate that are [ ]TNZRI equivalent employees in the Interconnect group, [ ]TNZRI in Network, [ ]TNZRI in regulatory, and [ ]TNZRI in legal dedicated solely to Interconnection. (While it may not be possible to obtain outside legal assistance for the equivalent of [ ]CCRI.

The values should be adjusted downwards for interconnection, regulatory, and legal to reflect a steady state operation (without additional information, it is not possible to state what values are reasonable with much certainty). Before any values are accepted by the Commission, we would hope Telecom can provide additional evidence as to what level of expenditures are likely to be sustainable in the long run. Certainly, we would expect that the value should be less than four million dollars and perhaps less than three million dollars.

Indeed, compare the [ ]TNZRI c/min operation cost with 0.24 c/min (NZ$) for the entire local interconnection rate for SBC for the state of Kansas (a state with less population, lower population density, lower teledensity, lower local telecommunications penetration, and a much smaller percentage of urban population than New Zealand).[7] The 0.24 c/min value for the state of Kansas includes capital costs, operating expenses and a common cost allocation. SBC Kansas should have higher labour rates than Telecom. Telecom's [ ]TNZRI c/min represents [ ]CRI of the total local interconnection cost for Kansas (as well as [ ]CRI of the total interconnection cost for Arkansas and Oregon).

[7] International Benchmarking Report: A Comparative Review of Interconnection Pricing, 2 September, 2002, Figure 6.

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Even if one considers the [ ]TNZRI c/min as a percentage of the average interconnect cost of 1.71c/min. Even this value is well over [ ]TNZRI. A [ ]TNZRI mark-up for these functions appears unreasonably high, and unsustainable.

Assumptions on structures

Since we relied on Telecom-provided values for the majority of these inputs in the initial proceeding, we cannot dispute the updated values that Telecom now provides (although some appear low). In addition, if Telecom believes that the use of disaggregated density values captures the cost difference, we do not oppose the setting of the density factors to 1.

28 The CostPro model has assumptions on:

28.1 ***the extent of buried, ducted and aerial plant***. We have retained the numbers in the model as provided.

28.2 ***Different trenching conditions***. We have revised the numbers in the model based on our fibre plant records. Our records do not show percentages in asphalt or concrete but do show what is under roadways and what under footpaths. In the revised numbers shown below we have equated 'asphalt' to 'footpaths' and 'concrete' to 'roadway'. These changes will reduce the trenching costs in the model.

It is our understanding that there are virtually no concrete roads in New Zealand. Telecom, by their equating 'asphalt' to 'footpath' and 'concrete' to 'roadway', are simply making a clearer distinction between low and high cost trenching. Telecom's Unit trenching costs table (over page), in section 28.3 of their statement, shows that generally Asphalt / Footpath trenching is of a lower cost than cost per metre than Concrete Trench / Roadway trenching. As such, we do not object to Telecom's suggested approach.

[ ]CRI and TNZRI

28.3 ***Unit trenching costs.*** We have revised the unit costs in the model. to reflect costs the Commission has used in the HCPM model. The revised numbers are shown below.

[ ]CRI

Telecommunications investments are comprised of two major types of components: vendor prices, and capitalized labour. In making comparisons to the costs in other jurisdictions, this distinction is important. For vendor prices, Telecom will likely pay prices similar to other telecommunications providers. In contrast, structure placement is very labour intensive. The issue for such capitalized labour is how the labour rates compare (New Zealand vis-à-vis other countries). In Appendix B, we find that labour rates in New Zealand are still below those in the U.S. and the other countries that were found to be comparable in the International Benchmarking Report[8] This suggests that structure costs (largely reflecting capitalized labour) are likely be lower in New Zealand, compared to other comparable countries.

[8] International Benchmarking Report: A Comparative Review of Interconnection Pricing, 2 September, 2002.

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Metro Plow 10
No change to this value from the original input in the trench costs table. However, Costpro has an additional table ("Density Factors") for adjusting costs based on density zone. Telecom chose to input a value of "1" or 100% to all density zones in this table. In doing so Telecom reduced the total cost in Costpro from $[ ]CRI. New Zealand does have relatively low labour costs, which would indicate lower costs than some other jurisdictions; the value is acceptable but toward the low end of the reasonable range of input values if U.S.-priced labour were used.

Metro Trench & Backfill 25
No change to this value from the original input in the trench costs table. However, Costpro has an additional table ("Density Factors") for adjusting costs based on density zone. Telecom chose to input a value of "1" or 100% to all density zones in this table. In doing so Telecom reduced the total cost in Costpro from $[ ]CRI. New Zealand does have relatively low labour rates, which would indicate lower costs than some other jurisdictions; the value is acceptable but toward the low end of the reasonable range of input values if U.S.-priced labour were used.

Metro Asphalt/Footpath 127
As used by Telecom, this value should reflect the cost of trenching in a sidewalk and increases the costs from the original value of $[ ]CRI. However, Costpro has an additional table ("Density Factors") for adjusting costs based on density zone. Telecom chose to input a value of "1" or 100% to all density zones in this table. In doing so Telecom reduced the total cost in Costpro from $[ ]CRI.

As modified by Telecom, this value is difficult to interpret and compare. If footpath areas or footpath distances reflect areas that contain some concrete sidewalks, some unpaved footpaths, and/or areas surrounding concrete sidewalks, this value is likely to be too high. However, if the value reflects only those areas that are covered by concrete sidewalks, this represents a decrease from the original net (density zone adjusted) value of $[ ]CRI. As such the value would be within the range of reasonable values. New Zealand does have relatively low labour rates, which would indicate lower costs than some other jurisdictions.

Metro Concrete Trench/Roadway 210
Reflects the cost of trenching in a roadway no matter what the surface material is and increases the costs from the original value of $[ ]CRI. However, Costpro has an additional table ("Density Factors") for adjusting costs based on density zone. Telecom chose to input a value of "1" or 100% to all density zones in this table. In doing so Telecom reduced the total cost in Costpro from $[ ]CRI. New Zealand does have relatively low labour rates, which would indicate lower costs than some other jurisdictions; the value is acceptable but toward the low end of the reasonable range of input values if U.S.-priced labour were used.

Urban Plow 10
No change to this value from the original.

Urban Trench & Backfill 25
No change to this value from the original.

Urban Asphalt/Footpath 47
This represents a decrease from the original value of $[ ]CRI. If the proportion of area under consideration contains significant distances that are not concrete footpaths this value may be too high. However, if the distances in question are purely concrete footpaths, this value is acceptable (given the lower labour rates in New Zealand) but

toward the very low end of the reasonable range of input values if U.S.-priced labour were used. See the note regarding metro asphalt/footpath above.

Urban Concrete Trench/Roadway 155
No change to this value from the original.

Suburban Plow 10
No change to this value from the original input in the trench costs table. However, Costpro has an additional table ("Density Factors") for adjusting costs based on density zone. Telecom chose to input a value of "1" or 100% to all density zones in this table. In doing so Telecom increased the total cost in Costpro from $[ ]CRI. New Zealand does have relatively low labour rates, which would indicate lower costs than some other jurisdictions; the value is acceptable but toward the high end of the reasonable range of input values even if U.S.-priced labour were used.

Suburban Trench & Backfill 21
This is a slight change from the original value of $[ ]CRI. However, Costpro has an additional table ("Density Factors") for adjusting costs based on density zone. Telecom chose to input a value of "1" or 100% to all density zones in this table. In doing so Telecom decreased the total cost in Costpro from $[ ]CRI.

Suburban Asphalt/Footpath 44
Telecom reduced the Costpro input value from $[ ]CRI. However, Costpro has an additional table ("Density Factors") for adjusting costs based on density zone. Telecom chose to input a value of "1" or 100% to all density zones in this table. In doing so Telecom decreased the total cost in Costpro from $[ ]CRI. See the notes above regarding interpretation of "asphalt/footpath" values.

Suburban Concrete Trench/Roadway 136
This reflects the cost of trenching in a roadway regardless of the surface material is and decreases the costs from the original value of $[ ]CRI. However, Costpro has an additional table ("Density Factors") for adjusting costs based on density zone. Telecom chose to input a value of "1" or 100% to all density zones in this table. In doing so Telecom reduced the total cost in Costpro from $[ ]CRI. This is within the reasonable range of values.

Rural Plow 10
No change to this value from the original input in the trench costs table. However, Costpro has an additional table ("Density Factors") for adjusting costs based on density zone. Telecom chose to input a value of "1" or 100% to all density zones in this table. In doing so Telecom increased the total cost in Costpro from $[ ]CRI. In some jurisdictions rural plow is less expensive than suburban plow since lower priced subcontractors can be obtained, and obstacles are less numerous. However, it may be that terrain becomes somewhat more difficult in New Zealand, offsetting the otherwise expected reductions. This value is within the reasonable range of input values, depending on the balance of these factors.

Rural Trench & Backfill 21
This represents a slight change from the original value of $[ ]CRI. However, Costpro has an additional table ("Density Factors") for adjusting costs based on density zone. Telecom chose to input a value of "1" or 100% to all density zones in this table. In doing so Telecom increased the total cost in Costpro from $[ ]CRI. This is within the range of reasonable input choices.

Rural Asphalt/Footpath 36

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Telecom reduced the Costpro input value from $[ ]CRI. However, Costpro has an additional table ("Density Factors") for adjusting costs based on density zone. Telecom chose to input a value of "1" or 100% to all density zones in this table. In doing so Telecom decreased the total cost in Costpro from $[ ]CRI. See the notes above regarding interpretation of "asphalt/footpath" values.

Rural Concrete Trench/Roadway 36
Reflects the cost of trenching in a roadway regardless of the surface material and decreases the costs from the original value of $[ ]CRI. However, Costpro has an additional table ("Density Factors") for adjusting costs based on density zone. Telecom chose to input a value of "1" or 100% to all density zones in this table. In doing so Telecom reduced the total cost in Costpro from $[ ]CRI. Despite lower labour rates in New Zealand, this value is somewhat below the expected range of reasonable input values if U.S.-priced labour were used.

28.4 ***Unit cost changes for different areas***. CostPro has a Density Factor table which marks unit trench costs down in rural areas, and up in metro areas. These 'density factors' were originally sourced from Telecom. Given that we have now used the Commission's preferred trenching costs, this weighting is no longer necessary. We have therefore set the density factors to 1. We suspect that the net effect of the unit cost changes and the scrapping of the density factor is probably cost neutral.

While Telecom surmises that the impact of all the structure changes "is probably cost neutral", we have made runs using these inputs and found that the new inputs reduce interconnection costs by ~9-10%. While this is a significant reduction, we do recommend the adoption of these input changes.

Common Costs

29 Common costs are among the most difficult and contentious aspects of TSLRIC modelling, not least because any allocation is inevitably arbitrary. The Commission has indicated it will allocate costs by network usage (*Principles Paper*, para 297). However in some cases, for example trenches shared between the access and transport networks, or trenches shared between different utilities and carriers, there is no common usage measure. This method is therefore not feasible. PwC recommended at the conference, in the absence of Ramsey pricing, an equal shares method as the best option. This is also the option used by NERA in Australia where there was no common usage measure[9].

This equal share technique may be acceptable in some instances, but in other instances (e.g., conduit usage), the degree to which the network and the core networks use up capacity should determine the "allocation". Indeed, in such cases, the issue becomes more than a choice of cost allocation – rather it is a choice between methods that best reflect cost causation. This issue is discussed in more detail in the comments related to paragraphs 33, 36, and A1.11.

30 We have been pragmatic and allowed for both forms. These have been used

[9] NERA: Estimating the Long Run Incremental Cost of PSTN Access: Final report for ACCC, January 1999. page 28

as indicated below.

Common cost allocations in transport network

31 **Sharing with other utilities**: While Telecom does not generally share core network trenches with other utilities, it does share fibre sheaths with, and lease fibre off, other carriers. We estimate this amounts to around [ ]TNZRI of the core network. We have therefore allowed for [ ]TNZRI of trench lengths to be shared 50:50 with others.

We understand that the scorched node approach does not require that other utilities or other providers are "scorched" at the same time; therefore, sharing may not be as high as the proportion of sharing of network structure between access and core networks. However, sharing should provide cost savings for all providers (adjusted for costs of coordination). As such, we would expect a higher level of inter-company sharing than the current value of [ ]TNZRI. For example, we believe the trench sharing should range between 15% and 30% (depending on the density) and aerial sharing should range between 40% and 50%. The details of our recommended sharing inputs are described in the comments related to paragraph 35 below.

32 **Sharing with the access network**: Telecom has good plant records on fibre optic cable plant from which to establish the degree of sharing. For copper cable plant, which comprises the bulk of the access network, the records are less comprehensive. In this case however this is not a major problem. Sharing with copper is only likely with ducted plant, and then only where there are a large number of ducts in a trench. Sharing is unlikely when plant is buried. Hence one would expect that sharing is most likely in the metro areas. Our fibre records already indicate that [ ]TNZRI of the core transport plant shares trenches with access plant in metro areas, so there is very little anyway that could be shared with copper access plant. In other areas some sharing between fibre and copper plant is probable but less likely. We do not have any means to readily identify the extent of this.

Sharing between core and access networks in a scorched node environment clearly should occur more often in a forward-looking network. Unlike the absence of other utilities that are scorched at the same time, both the core network and the access network are assumed to be rebuilt in the same time frame. Under a scorched node assumption, structure sharing can occur when there are coincident (or potentially coincident) routes. We see no rationale for Telecom's statements that: "sharing is only likely with ducted plant", "and then only where there are a large number of ducts in a trench", and "sharing is unlikely when plant is buried." Sharing between core and access networks can occur with each type of structure. Indeed, if inner duct is used, sharing can occur within a single duct. Stating that sharing could only occur when a large number of ducts exist in a trench reflects a sunk cost/existing network perspective. With scorched node cost modeling, existing levels of capacity are irrelevant; the network is sized in the model to appropriately accommodate required levels of capacity.

33 We have interrogated our fibre cable plant records to establish the proportion of core transport trenches that are shared with the access network. This is shown below. We recognise that this probably slightly underestimates the degree of sharing actually occurring because copper plant is not yet included. Where there is sharing we have assumed costs are split 50:50.

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Telecom's suggested 50:50 split does not necessarily correspond to cost causation. For example, with sharing with ducted plant (which Telecom states is the type of plant most likely to be shared) larger cable sizes (those used by the access network) use up the capacity of the plant more rapidly. In addition, the Access network may have both Feeder and Distribution plant using the same structure, with both copper and fiber cables. Therefore, the access network, with more cables, could be assigned a greater apportionment of the share of the ducted plant (and structure in general) since such plant uses up the capacity of the plant much more rapidly than the core network plant. One could view this as not an issue of cost allocation, but rather one of cost causation. Also, beyond the attribution of costs caused, to the extent that any of the costs are truly shared, the better method of cost allocation is one that reflects or mirrors cost causation; i.e., the core network should receive the smaller proportion of the cost.

Therefore, we recommend that an allocation method that better reflects cost causation be used, if possible. We will assume that the Access network will utilize 1.25 units of capacity for each unit used by the core network. These factors can represent a size difference (i.e., Access cables are 25% larger), they can represent cable count differences (i.e., The Access network has on average, 1.25 cables compared to the Core networks 1 cable), or a combination of the two. This conservative assumption leads to a decision that a 50-50 split allocates too many costs to the core network.

[ ]TNZRI

The urban/suburban and rural values are lower than we would expect in a scorched node environment. Moreover, other forms of structure should be shared in a scorched node environment. Our suggested input values are presented under paragraph 35 below.

34 **Sharing between data and PSTN**: We have interrogated our plant records to establish the proportion of 2 Mbps equivalent circuits on the core network that are for voice (PSTN) usage rather than data . This is shown below. In this case we have a usage measure by which to allocate costs. Thus, as per the *Principles Paper*, costs of trenches are allocated according to these ratios.

[ ]TNZRI

The inclusion of the data traffic is addressed in the adapted version of the CostProNZ model. In context of the older version of the model, this adjustment does have merit.

Summary of sharing assumption in transmission network:

35 The table below summarises the impact of these assumptions. This shows the percentage of trench costs which are allocated to the fixed PSTN network.

[ ]CRI and TNZRI

In the adapted version of the CostProNZ model, we have accounted for Data traffic within the structure and inputs of the model. As such, we would need to back out the data sharing to arrive at comparable values. If we do this we show:

	Revised Telecom values (backing out data sharing)
Metro	[ ]TNZRI
Urban / Suburban	[ ]TNZRI
Rural	[ ]TNZRI

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However, these historical values do not reflect any sharing of structure with a forward looking approach, with other carriers including electric companies, cable companies, etc.

In the final analysis, we expect that the values that should be used in the adapted model will be adjusted downward to reflect all forms of sharing. As a result of this, and the above discussion, we recommend the following sharing inputs:

[ ]CRI and TNZRI

36 On the surface there appears to be a big difference between the original CostPro percentages and our revisions. However the original CostPro numbers are used in the context of the TSO and therefore exclude any allowance for common costs. They measure the portion of trenches not shared with access, or other utilities. As would be expected they are low. The numbers used in the Telecom model are higher as allowance is made for common costs.

Telecom's paragraph 36 leads to some confusion. In the classic telecommunications economics sense, a shared facility need not represent a shared or common costs *per se*. In a TSLRIC or TELRIC environment, the costs of these facilities can be attributed on the basis of relative usage (technically, standard TSLRIC or TELRIC calculations imply that the assumptions necessary for the capacity cost theorem (essentially no sunk costs) hold). Therefore, under TSLIRC or TELRIC, costs are aggressively attributed to individual elements or services and the proportion of common costs is relatively small.

We do agree with Telecom that there is a big difference between the Telecom and TSO inputs. However, this reflects the different uses of the model. In TSO, it is necessary to adjust inputs to make sure we do not double count and that we capture all cost of the Access and Core network. Since the current Access network model does not allow or assume any sharing with the Core network, the TSO inputs into the CostProNZ model reflect the portion of structure costs not accounted for in the Access network costs. In the TSLRIC implementation, it is important that a fair allocation of the structure costs be made in order to identify the costs for call-type services. As such, the TSLRIC inputs should represent the sharing levels under this 'fair' and forward-looking approach.

Note: The Commission will need to maintain separate 'scenario' input files for CostProNZ so that costs can be captured appropriately for TSO and TSLRIC modeling. To help users avoid the issue of using TSO inputs in TSLRIC reports or vice versa, the adapted model has been modified so that a user must define the basis of the inputs, either TSO or TSLRIC. Based on this selection, the reports from the model will be limited to how the inputs are defined.

Sharing of Fibre Sheaths

37 The CostPro model does not allow for the sharing of fibre sheaths (eg between the access and core networks). We are not sure why not and this may reflect the Commission's view that such sharing is unlikely in a forward looking network. However in Telecom's network there is a considerable amount of sharing and we have included provision for this in our model as shown below. The numbers indicate the percentage of sheath costs allocated to the fixed PTSN core network.

[ ]CRI and TNZRI

We agree that CostPro does not allow for fibre sheath sharing. While this assumption may be conservative (and leads to higher costs in some instances for the core network), CostProNZ does not include any of the access network in sizing the fibre cables in this core network. Thus, the values that Telecom has provided may overstate the level of forward-looking sharing based on the current model algorithms. Additionally, parties have to consider how to best interpret the forward-looking assumption as it relates to using inputs from the actual network. For example, the routing used in the model will differ from the actual network and the routing used in the Access model.

To estimate the impact of this potential sharing, we can look at what portion of interconnect costs that are represented by fiber. In current runs of the model, fiber makes up ~9-10% of the total cost. If we assume that ~50% of the fiber costs will be assigned to the Core network (we believe this may be an estimate of the total impact after we adjust the model for Access sizing requirements and an assumption of when fibers can be shared in a forward-looking network), we estimate the impact of this change as a reduction in interconnect cost of ~4-5% or ~$0.0004 – $0.0005.

Common cost allocations in switching.

38 Common cost allocations in the switching side of the model have all been made on a usage basis as requested in the *Principles Paper*.

Summary

39 In summary Telecom has followed the Commission's *Principles Paper* and the CostPro model default data closely. We have only moved away from it where no clear guidance was given, or we could source better values.

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C: REASONABLE RETURN ON CAPITAL

CostQuest was not asked to respond to the proper level of WACC for this proceeding. However, we have looked at the impact on interconnect costs of a 50 basis point reduction in the WACC input (from 9% to 8.5%). With this 50 basis point reduction in the current model, the costs were REDUCED by ~2.5%.

40 Telecom has asked PwC to estimate an appropriate cost of capital for interconnect services as at November 2002. The following summarises the inputs to the WACC calculation. A full copy of the PwC report is provided as **Annex 3**.

Version of CAPM

41 PwC have used the simplified Brennan-Lally version of CAPM as specified in para 168 of the *Principles Paper*.

Risk free rate

42 The risk free rate of 6.6% included in the WACC calculation is based on government bonds with maturities of 8 to 10 years, taking the average yield over the six months immediately prior to November 2002, after converting to an annualised yield and rounding. These longest maturity actively traded government bonds are the best available match for typical asset lives used to provide the interconnect service.

Debt premium and gearing

43 The *Principles Paper* is open to how this will be calculated but suggests Telecom's actual premium and leverage will be taken into account (para 230). PwC propose that the gearing ratio is 30% debt to debt plus equity, and debt margin is 2%. They note that a gearing ratio of 30% is consistent with the gearing ratio previously applied by the Commission, it happens to be the average level of Telecom's actual gearing over the past five years to 30 June 2003, and it is not significantly lower than Telecom's actual gearing as at 31 October 2002. The 2% margin is based on actual estimates of Telecom's average debt margin around November 2002.

Investors' tax rate

44 The Commission suggest a rate of 33% (*Principles Paper*, para 235). PwC believe a reasonable investors' tax rate estimate for use in the Brennan-Lally CAPM as at November 2002, and one that accords with best practice in New Zealand, is 28%. PwC have used 28% as their estimate.

Asset Beta

45 The *Principles Paper* recognises that the appropriate beta will be different from the TSO beta (para 217) and provides some guidelines for how it might be determined. In PwC's view, relevant comparators indicate that the asset beta is within a range from 0.75 to 0.85. The mid-point of 0.8 is selected for the WACC estimate.

Tax adjusted market risk premium

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46 PwC propose using 7.5% for the Tax Adjusted Market Risk Premium. They show that this estimate is consistent with both a short term and a long term risk free rate. We believe this is consistent with the *Principles Paper*.

WACC

47 The resulting post corporate tax, nominal WACC for TSLRIC based costing of Telecom's interconnect services as at November 02 falls in the range 10.7% to 11.4%. We have used the midpoint, 11.1%, to calculate the modelled cost. Key parameter values are shown below

Cost of debt before taxes	8.6%
Risk free rate	6.6%
Debt premium	2.0%
Market value of debt	30%
Market value of equity	70%
Investors effective tax rate	28%
Asset beta	0.75 – 0.85
Tax adjusted market risk premium	7.5%

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D: INTERCONNECT COST

48 The average interconnect cost (that is the average of the outgoing and incoming interconnect cost) based on these modelled assumptions is 1.71 c/min. To this we have to:

Obviously, an average of 1.71 c/min for interconnection is toward the very high end of the range of interconnection values for comparable jurisdictions, based on our knowledge of interconnection rates, the benchmark values shown in the September 2, 2002 International Benchmark Report (which represent late 2001/early 2002), and our subsequent research (discussed below and in the body of the report itself).

Recall that interconnection costs are largely caused by switching and transmission investments. As indicated in Telecom's comments, prices for these components (switches and transmission electronics) are expected to fall rapidly over time (with tilts of [ ]CRI and [ ]CRI respectively). Therefore, unlike copper loop costs, interconnection costs should fall rapidly over time.

Given the age of the values in the International Benchmark Report, there should be a tendency for current interconnection rates (especially in jurisdictions with previously above average rates) to fall. In addition, in many instances, the costs and rates in existence in late 2001/early 2002, and shown in the International Benchmark Report, had been established in prior years. This should accentuate the difference between the values in the report and any current estimates (or even estimates during the midpoint of the time period considered for this proceeding).

In regard to the report values, for those values at the lower end of the range in the report, we do not expect the rates have fallen or will fall by any significant amount. The attached excel file (Attachment 1) provides an update of the current values of interconnection rates for the relevant U.S. states.

However, the rates at the higher end of the range shown in International Benchmark Report are likely to fall, if and when they are reevaluated by their relevant regulatory authority. On April 24, 2002, the EU Commission published legislative directives, providing for (among other things) broader NRA powers of regulation. This may lead to lower interconnection rates for complying EU countries over time (either via actions by National Regulatory Authorities, NRAs, or through competition). While we have not exhaustively re-benchmarked interconnection rates, we have found that some rates have fallen significantly. Denmark (while not one of the benchmark countries) had significant rate reductions from late 1999 to early 2002.[10] "On November 7, 2003, ComCom ordered Swisscom to lower its interconnection rates by 25 percent to 35 percent, starting January 1, 2004. The ComCom decision is retroactive for the past three years…"[11] On "15 February 2003: France Telecom has published its 2003 tariffs for

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[10] http://www.itst.dk/wimpdoc.asp?page=tema&objno=95024298. Press release, February, 2002: "*Today the National Telecom Agency decided that TDC's local wholesale rates for other telecommunications providers (known as interconnection rates) are to be reduced by 20 per cent. The overall price reduction since the autumn of 1999 will then be 41 per cent.*"

[11] http://www.ustr.gov/assets/Document_Library/Reports_Publications/2004/2004_National_Trade_Estimate/2004_NTE_Report/asset_upload_file809_4798.pdf

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double-tandem traffic, with a decrease of 7%."[12] In Ireland, between March 2000 and March 2003 four different levels of interconnection rates were establish, each lower than the previous one. For primary (day/peak) interconnection the rate fell from 0.709 (Euro/cents per minute) in March 2000 to 0.306 by March 2003. For British Telecom, interconnection rates fell four times between March 2002 and July 2004 (e.g., the call termination rate local exchange and PPP fell from .3875 to .2752 during this time period).

48.1 add an allowance for direct interconnect annual operating costs of [ ]TNZRI (para 27). This is equivalent to [ ]TNZRI c/min; and

As noted earlier, we believe Telecom's total operating cost is overstated by at least [ ]CRI. Additionally, we use a 'retail/wholesale' loading on investment in the model, rather than a direct loading on a per-minute of use basis. The current value for the 'retail/wholesale' loading is 1.5% (which is based in part on the [ ]CRI in annual expenses). This translates to [ ]CRI.

48.2 deduct [ ]CRI to account for the TSO overlap (**Annex 4**). This, divided by the number of interconnect minutes, is [ ]CRI and TNZRI c/min.

We do not agree that the development of the Telecom adjustment for Commercially Non-Viable Customers (CNVCs) meets the requirements of the principles paper. Total CNVC costs are not excluded and total traffic volumes of CNVC customers are not removed (please see our comments in Annex 4).

49 This gives a final interconnect modelled cost of 1.86 c/min.

Based upon use of the adapted CostProNZ model loaded with an input data set that incorporates a number the recommendations within this report, we believe Telecom's reported value is overstated. In addition, as noted above, this value is high when compared to other comparable jurisdictions. In the final analysis, we would expect that interconnection costs will be below 1 cent per minute.

[12] http://www.analysys.com/atlas/default.asp?Mode=document&intDocumentId=1514

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ANNEX 1: DETAILS OF CHANGES REQUIRED TO CONVERT THE COMMISSION'S TSO MODEL TO A TSLRIC MODEL

A1.1 The CostPro model models the PSTN calling network. The Commission has said it will use the same model, suitably modified, for its TSLRIC calculation. The CostPro model has obviously been designed to do a TSLRIC calculation as well as its TSO cost calculation. Hence the modifications necessary to convert the model to a useful TSLRIC model in this case are straightforward:

a. Use of the 'working cost' definition rather than 'capacity cost',

Agreed

b. Use of a long run incremental operating cost estimate rather than the avoidable operating cost concept used in the TSO modelling,

Agreed

c. Addition of some common costs related to switching which were excluded in the TSO modelling.

Common costs for Telecom are captured throughout the adapted CostProNZ model. We are not sure these adjustments are required given the common factors that are utilized and the use of 'working' costs.

A1.2 Our assumptions on each of these are addressed in turn in this Annex.

Working vs Capacity cost

A1.3 The CostPro model encompasses two main definitions of cost – capacity cost and working cost. These are described in Para A7.38 – A7.40 in the TSO 02/03 draft determination. The capacity cost measurement does not include the unused capacity of equipment and is deemed by the Commission to be the most appropriate measurement in the TSO context. The working cost concept represents the

> '… *unitization of the network investments by the working capacity rather than useable capacity. This Working cost is akin to the FCC's TELRIC costs.'* Para A7.39

Agreed.

A1.4 As far as we can ascertain the working cost concept is the nearest appropriate cost concept to meet the definition of TSLRIC in the *Principles Paper* that the model readily supports. It meets the definition of the increment (para 247) and long run (para 267). There is some debate, as yet unresolved[13], as to whether a TELRIC model produces the same cost numbers as a TSLRIC model. At this point we have put that issue to one

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[13] See Gans J, King S.: Comparing TSLRIC and TELRIC: A Report on behalf of AAPT Ltd, 2003

side. The Commission in the *Principles Paper* has stated its opinion ' … that an element-based approach is the most appropriate for TSLRIC modelling' (para 104). Hence our modelling has used 'working cost' rather than 'capacity cost'.

The model produces costs that are consistent with the principles paper.

Operating costs

A1.5 Operating costs are identified in the *Principles Paper* to include: '… *both costs that are directly attributable, and costs that are indirectly attributable...'* (para 300)

These are captured in the Adapted model through the use of a 'Common' loading.

A1.6 The Commission's preferred approach to calculating operating costs is then stated as:

> ' *In modelling interconnection services, operating and maintenance costs and indirect costs should be calculated using percentage markups applied to the capital asset base'.* (para 327)

This is the most straight-forward approach.

A1.7 In para 328 the Commission suggests that, where possible, the same rate should be used in the TSO and TSLIC modelling. However it notes that:

> '…*some adjustments may be required, due to differences in how the Act defines costs for the TSO and interconnection services'.*

It is important to note again that different 'scenario' inputs should be used when running the model to produce TSO versus TSLRIC. While many of the inputs will remain the same, there are some key input assumptions that change between TSO and TSLRIC. To help users avoid the issue of using TSO inputs in TSLRIC reports or vice versa, the adapted model has been modified so that a user must define the basis of the inputs, either TSO or TSLRIC. Based on this selection, the reports from the model will be limited to how the inputs are defined.

A1.8 In this case we do consider adjustments are required. The TSO cost calculation is an avoidable cost calculation. It seeks to establish what costs would be saved if the CNVC were not served. This calculation should not usually include common costs. In the interconnect cost calculation on the other hand the Act specifically allows for an allocation of common costs.

A1.9 Given that an adjustment is required the Commission then suggests that:

> ' *… the mark-up rate should be developed after considering the rates used by other regimes.'* (para 329)

A1.10 The Commission provides three suggestions from other regimes in Appendix A (ACCC/NERA modelling in Australia), Appendix B (EER/EU Adaptable Interconnection model), and Appendix C (Data from analysis of the German Network by WIK) of the *Principles Paper*. The WIK data is specifically for a USO calculation and, as such, presumably on an avoided cost basis. The mark-ups are similar to those used in the TSO modelling, as would be expected. They are considerably lower than the other two reports which are specific to a TSLRIC interconnect calculation. Further, unlike the other two reports, the WIK study has no suggested mark-up for indirect costs. For these reasons we prefer the ACCC/NERA and EER/EU rates. In practice these two reports give very similar numbers.

The Principles Paper (20 February 2004) Appendix C WIK results are consistent with our prior discussion of markups. The only maintenance and operations factor (applied to investment) greater than 5% is for buildings (which account for less than 6% of the total interconnect investment). Based on the percentage of investment in the CostProNZ, the WIK results imply a total (weighted average) annual charge factor of 19.26% (See Attachment 2 for details). Indeed, using the annual charge factors in WIK against the investments produced by CostProNZ yields a cost for bypass interconnection of approximately 0.61c/min. Therefore our annual charge factors, including our operations and maintenance factors appear conservatively high, yielding conservatively high cost estimates.

Unfortunately, the values in the Principles Paper Appendices A & B may have been misinterpreted by the data provider. In Appendix B, the relevant column heading is "Operating costs as a percentage of equipment capital cost (%)." A value of 11.2% (e.g., for the fixed cost of the processor) is approximately equivalent to a 2.24% factor applied to capital investment.[14] Similarly, Appendix A has key headings of "Operational costs as a % of capital cost" and indirect operating costs as a percentage of direct network operating costs." In each case these are described as cost-to-cost factor relationships. Even though we understand that NERA is using these factors against investment, we are not certain that the initial provider of the data (which appears to be Optus) developed the factor as a cost-to-investment factor. Based on our observation, these factors appear to be multiples (3 to 11 times) of what we have seen throughout the industry. As a result, we assume that they are cost-to-cost factors, which would need to be adjusted before they are used in the Commission's model.

A1.11 We have used the ACCC/NERA mark-ups here. These have been sourced largely from a new entrant (Optus), although other data and US ARMIS data in particular was also used. Unlike the EER/EU rates, the ACCC/NERA rates have been subject to considerable scrutiny and debate in a regulatory process.

Direct operating costs

The attribution of costs that are caused by an activity, but which are not easily traceable, or not readily apparent, can be performed via a variety of methods or steps. Often these less obvious costs can be approximated with a relationship factor (e.g., 10% additional costs for internal engineering, furnishing and installing vendor equipment to be used in a central office). These factors tend to fall into the following categories: investment-to-investment; investment-to-physical dimension (e.g., $/meter); operating expense-to-investment; operating expense-to-physical dimension; and time related factors (e.g., annual cost factors multiplied times investment values). Other types of operating

[14] Imagine a $1,000 capital investment for the fixed portion of the switch processor. A typical annual charge factor for the costs of money, depreciation, and income taxes is no greater than .2. That is, these capital costs are no greater than $200/year.. 11.2% of $200 is $22.40 or 2.24% of the initial capital investment.

expense factors can be used based on the relationship between final investment values or direct cost values, and operating expenses.

One danger is that current, or recent operating expenses reflect the expenses related to older technologies. Typically, new technology leads to lower operating expenses (this is one reason why a new technology may be adopted). Therefore, factors based on recent or historical levels of operating expenses typically overstate operating expenses that would exist in a scorched node environment, where all new technology is deployed.

The critical issue in any approach is that the factors are consistent with the initial directly attributable investment and operating costs, and that prudently incurred costs are recovered, but not double counted. Generally, factors studies and shared/common cost studies are produced to ensure that methods are appropriate and costs are not double counted. At this point, there is not sufficient detail to determine if Telecom's approach is consistent.

From our knowledge of direct operation expenses for maintenance and repair, we rarely see factors above 5% and typically see values well below 5% applied to investment. Given New Zealand's relatively lower labour costs, these factors should be lower than in other higher-labour cost countries. If the factors are applied to capital costs, the values are acceptable; however, in the current version of CostPro and CostProNZ these factors are applied to investment, not capital costs.

In regard to other cost loadings (indirect, common, shared), it is not completely clear all of the ways in which Telecom has incorporated indirect shared and common costs. One obvious location is in the operational costs markup table below.

One can look to other jurisdictions for comparison. In the United States such markups are typically applied to costs, not investments. The combined effects of wholesale shared (e.g., wholesale/unbundling/interconnection operations, this component alone calculated by Telecom to equal 5.7 million or about 10% of the interconnection cost) and common costs range from approximately 15%-17% for BellSouth (across its 9 states). In SBC states, combined wholesale, shared, and common costs appear to range from between 17% and 28%. It is noteworthy that SBC UNE direct costs (and therefore rates) are significantly lower than those in BellSouth states. It is also noteworthy that the wholesale shared costs may well be larger for U.S. ILECs since they must provide both unbundled network elements (e.g., loops and switch port) and interconnection (reciprocal compensation).

In order to convert these values to investment-based factors, a rough and ready method is to multiply an expense factor by ~0.2 - 0.25 to convert it into an investment based factor. Additionally, it is difficult to accurately compare components of the expense loading factors. This is the result of inconsistencies between parties in definitions, approaches, and demarcation points used to develop the factors. It is better to look at the overall loading than to judge each individually.

Therefore, the comparable values are approximately 3.0 - 7% if applied to investment (15 -28% * 20 - 25%).

Finally, a better comparison is one in which the shared and common cost allocations used in the U.S. are converted to a dollar basis, to make any reasonable comparison. It is possible to use 20% as an approximate U.S. midpoint (if multiplied by the rate this value must be 16.67% (i.e., 20%/120%), since the % adder in the U.S. is originally applied to the direct cost, not the rate), and use the U.S. values in the International Benchmark Report to provide a range of dollar values (in NZ dollars). The range of

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shared and common costs is 0.040 to 0.073 c/min for local interconnection; 0.082 to .137 for single tandem; and .138 to .215 c/min for double tandem.[15]

If these dollar values are compared Telecom's 1.7c/min value (it is not clear what value in Telecom's calculation should be used as the reference point) this results in a factor of between 2.4% and 12.6% as a factor applied to cost. This would translate to a factor applied to investment of between [ ]CRI and [ ]CRI.

In CostProNZ we have used a shared/joint/common/wholesale cost of 5% applied to investment.

A1.12 For direct operating costs, the ACCC/NERA mark-ups are for a more detailed breakdown of capital costs than is used in the CostPro model. We have no data on which to average the NERA data to suit the CostPro classification. However since the mark-up is common across many items we have made an estimate of the appropriate number. The mark-ups used are shown in the second column of Table A1.

Table A1: Operating cost markups

Asset	Opex mark-up for direct costs	Opex allowance for Network Management	Opex mark-up for indirect costs	Mark-up for indirect capex cost	Total Opex mark-up used in model
Aerial Fibre	10%	1%	1.3416	1.0567	16%
Building	11%	1%	1.3416	1.0567	17%
Buried Fibre	11%	1%	1.3416	1.0567	17%
Circuit	6%	1%	1.3416	1.0567	10%
Conduit	10%	1%	1.3416	1.0567	16%
Land	11%	1%	1.3416	1.0567	17%
Pole	10%	1%	1.3416	1.0567	16%
Radio	11%	1%	1.3416	1.0567	17%
Submarine Fibre	11%	1%	1.3416	1.0567	17%
Switch	7%	1%	1.3416	1.0567	11%
Underground Fibre	11%	1%	1.3416	1.0567	17%

Based on our discussion above, the Opex and Total values are high. In the TSO proceeding, the Opex direct cost values were set no higher than [ ]CRI (transmission equipment) and were based upon data provided by Telecom. In the TSO proceeding, Telecom indicated that the Annualized Avoidable operating costs for the core network was [ ]TNZRI (a breakdown was provided between switching and transport). Based on additional information provided by Telecom, the direct investments associated with the core network were considered. From these values, the Commission developed opex rates of [ ]CRI for Switching-related investment and [ ]CRI for transport-related investment.

[15] Applying the 16.67% to the range of values in the International Benchmark Report for comparable U.S. states.

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Using the [ ]CRI and [ ]CRI values against the current Core network investments generated by CostProNZ, the model develops ~40M in opex costs. While this is higher than the [ ]TNZRI that Telecom provided, it does provide some contribution to any potential service costs associated with call-type services (also identified by Telecom).

In contrast, if one were to use the 7-11% values provided by Telecom in this table applied to Telecom's estimated investment (i.e., without adding the network management, the indirect costs, and indirect capex costs), the result is [ ]CRI of opex costs or a value about three times as large as the [ ]CRI currently generated by CostProNZ and more than five times as large as the [ ]TNZRI that Telecom originally provided. If one were to use the full opex loading (11-17%, which includes Telecom's values for network management, the indirect costs, and indirect capex costs) and Telecom's modeled investment values would produce [ ]CRI of Opex expenses (this includes the operation expense of [ ]TNZRI that Telecom noted earlier). This is much greater than the current TSLRIC CostPro value of [ ]CRI which was based on the TSO opex factors, a 5% Common factor (also applied to investment), and a 1.5% 'retail/wholesale' factor. Keep in mind, these values only represent the costs derived from the Call Type investment of the Core Network (i.e., it excludes the costs associated with the data traffic, the costs related to the Access Network, and the costs of non-core and non-access services)

The bottom line is that we believe the Telecom rates are overstated.

In sensitivity runs, each 100 basis point decrease in the loading values (e.g., a cut from 11% to 10%) (common, 'retail/wholesale', or opex), which in total are between 9 and 11% in the current model inputs, reduces interconnect costs by ~ 3%. It should hold true that a 100 basis point increase will increase interconnect costs by ~3%.

Network management

A1.13 ACCC/NERA use a markup of 62% per switch node to allow for the network management centre. We do not know how to apply this in the context of the CostPro model. We have therefore used the EER/EU percentage given in Appendix B of the *Principles Paper* which suggests 1% each for switching, transmission and infrastructure management. This is allowed for in the third column.

Indirect operating costs

A1.14 ACCC/NERA use US and BT data to estimate indirect operating costs relevant to interconnection. We have averaged the 'local' and 'trunk' uplift factors specified in Appendix A of the *Principles Paper*. These suggest an uplift factor of 34.16%.

Indirect capital cost.

A1.15 ACCC/NERA make adjustments for indirect capital costs. This adjustment is not mentioned in the *Principles Paper* but was covered in the earlier TSLRIC Pricing Methodology discussion paper. Here the Commission quoted the ACCC/NERA study which used 5.16% (this to be applied to capital costs) for the average of the local and trunk network. The ACCC/NERA report is silent on the opex costs associated with this capex. We have therefore followed the EER/EU report in Appendix B of the *Principles Paper* and used 10%. This gives a total of 5.67% (5.16*1.1). This is shown in the fourth column.

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Total opex mark-up

A1.16 The total Opex mark-up used is shown in the last column of Table A1. This is used in the Opex Rate field of the Annual Capital Cost Factors table in CostPro.

Adjustment for excluded costs

A1.17 One major cost is not included in the TSO version of the model but needs to be included here – the NEAX software file. There are two components of this – the general file which is common to all call types, and the part of the file that is specific to interconnect.

The original approach was designed around a lack of input data. Thus, the suggested change for the NEAX Software Base File is acceptable, in part, and reflects the specific engineering of Telecom. However, in implementing this change for developing interconnect costs, the reported values need to be apportioned between lines, calling features, and traffic, since the software supports all. Finally, we have not seen Interconnect software separately identified by vendors in the past. It may be that Telecom has already identified the portion of the total software costs attributable to interconnection.

We assume that this change along with the STP and SCP are captured in Telecom's summary switching investment tables identified in paragraph 20. If this is indeed the case, the estimated impact of these changes are captured within our discussion of paragraph 20. If this is not the case, both items need to be adjusted for inflation, and the Base software would need to be adjusted downward by ~50% to reflect the call type portion (~45% of the switch is line driven + some allocation to calling features).

[ ]TNZRI

A1.18 STP and SCP costs, although included in the CostPro model, are excluded in the calling cost calculation here due to the changes made in the SwitchLogic workbook. They have however been added back, along with the NEAX software costs above, in the processing of the cost outputs.

It is important to note that the adapted version of CostProNZ captures these costs, although perhaps not in the manner that Telecom would recommend. However, we believe the current approach we have used is acceptable.

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]CRI and TNZRI (the whole of Annex 2 is restricted).

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ANNEX 3 : COST OF CAPITAL (PWC REPORT)
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No Comments

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ANNEX 4: CALCULATING THE ALLOWANCE FOR THE TSO/TSLRIC OVERLAP

We believe that the Telecom approach does not meet the intent of the Commission's TSLRIC Principles paper. As paragraph 347 reads:

347. In implementing a TSLRIC model of interconnection services, it is important that the methodology ensures that the call traffic used in the final costings corresponds to the network being modelled. Hence the modeller should ensure that not only those costs which are recovered through the TSO are excluded from the final TSLRIC calculation, but also that the network traffic volumes are adjusted for that traffic associated with the commercially non-viable exchange service areas (ESAs).

In this paragraph, there is no mention of revenue offsets, or under-recovery of costs. Rather, those costs covered by the TSO are excluded while traffic volumes are adjusted. To implement this, the adapted CostProNZ model includes the traffic from CNVCs in the sizing and costing of the network (as is done in the TSO modeling). Components of the network investments are unitized (i.e., cost per call, cost per minute, or cost per line). Total call type investment are then aggregated to each customer within each ESA. Based upon a feed from the TSO proceeding, the model captures the customer counts in each ESA that are CNVC (while entire ESA's are non-viable, there are other ESAs with a proportion of lines that are non-viable and a portion that are NOT non-viable (i.e., are viable)). With the counts of customers and the call type investments per customer, the model simply removes the investment and the demand of these CNVCs from the calculation of TSLRIC costs. In the end, the TSLRIC calculation represents (by call type):

$$\frac{\textbf{Total investments of Core Network attributed to viable customers}}{\textbf{Total demand of viable customers}}$$

This value is converted to costs based on factors applied to investments. This includes common costs. As such, the TSLRIC only captures those costs (including common) incurred by all viable customers.

In review of the Telecom approach, there are a number of apparent issues that do not appear to meet the Principles Paper's approach.

- It does not remove traffic volumes
- It does not capture and remove costs from CNVC customers
- The TSO version of the model does not capture total call type costs. Rather it captures the net of call type costs for those costs not captured in the access model (e.g., the TSO version of the model only captures a small portion of the structure costs, since the Access model does not incorporate core network sharing in its development of costs). As such, call type costs in the TSLRIC (all else constant) should be higher since they should reflect a fair apportionment of costs rather than a net of cost (e.g., the net approach for structure was used to avoid double counting in the TSO proceeding

In regard to the issues noted, we believe that the adapted version of CostProNZ does meet the Principles Paper's approach.

A4.1 This Annex addresses a number of issues arising out of the application of the definition of "forward-looking common costs" in the Telecommunications Act 2001, and in particular the proviso "does not include any costs incurred by the service provider in relation to a TSO instrument".

Interpretation in the *Principles Paper*

A4.2 This definition has been the subject of submissions by Telecom and TelstraClear, at conference and post-conference, and the Commission has given its interpretation in its *Principles Paper* dated 20 February 2004.

A4.3 TSLRIC is defined by the Act to include "(b) a reasonable allocation of forward-looking common costs." The statutory definition of "forwardlooking common costs" states it "does not include any costs incurred by the service provider in relation to a TSO instrument".

A4.4 The key interpretation issue is the interpretation of the proviso "does not include any costs incurred by the service provider in relation to a TSO instrument". The Commission records its conclusion on the proper interpretation at paragraph 353 of the *Principles Paper*:

> *The Commission considers that a purposive approach to interpretation would therefore treat the reference to "… any costs … in relation to a TSO…" as referring to those costs that are recognised as qualifying for contribution from liable persons and the service provider because they were involved in discharging TSO obligations.*

A4.5 Telecom's calculation is consistent with this interpretation.

Applying the Commission's interpretation in the *Principles Paper*

A4.6 As noted above, Telecom agrees with the Commission that what must be deducted from the calculation of forward-looking common costs is a proportion of the TSO cost (paragraph 353 of the *Principles Paper*). Telecom also agrees the plain objective of the statutory provision is to avoid double recovery (paragraph 356 of the *Principles Paper*).

A4.7 This does mean, however, that the Commission will have to refine the methodology described in paragraphs 348 to 356 of the *Principles Paper*. Some parts of that discussion appear to propose that all network asset costs from a non-viable ESA will be deducted from forward-looking common costs, without any consideration of the revenue earned by Telecom in that ESA (see for example para 348). That is inconsistent with the interpretation of the Act that the relevant cost is the TSO cost.

A4.8 It is also the case that not all of the assets in a non-viable ESA will be relevant to the TSLRIC calculation. The Commission's position in the *Principles Paper* is that the access network is not a common cost for interconnection. This means that assets in the access network in the ESA, even when contributing to the TSO cost, should not be deducted from the calculation of forward-looking common costs. Only those assets that would otherwise be a common cost in the TSLRIC calculation are relevant, as the relevant proviso is only a gloss on the definition of forward-looking common costs.

A4.9 Further, only those TSO costs allocated to, and paid for by, other carriers should be excluded from the calculation of forward looking common costs. This is consistent with the objective of avoiding double recovery by

Telecom. The outcome required by the Act is that the costs paid for by liable persons under the TSO should not appear in the TSLRIC calculation.

A4.10 Telecom notes the *Principles Paper* also suggests all traffic from an unprofitable ESA should be excluded. For similar reasons, Telecom does not think this is consistent with the statutory definition. Traffic in an unprofitable ESA will have generated revenues that offset the core network costs in the TSO calculation. For this reason, the traffic should not be excluded.

Telecom's calculation

A4.11 For the 02/03 draft TSO determination 144 ESAs were determined to be non-viable. The table below summarises all related revenues and costs for those ESAs.

[ ]CRI

A4.12 The incremental traffic costs (calculated by the CostPro model) exclude any contribution to common costs. The ESA costs are the costs of local switches and associated transmission costs which are saved where the ESA as a whole is not viable.

A4.13 It is these ESA call related costs that are common to both the TSO and TSLRIC calculation. However these costs are, in the TSO cost calculation, offset by the call revenues. To identify the contribution to the TSO cost call revenues must be deducted, which gives the [ ]CRI net call cost included in the Commission's TSO cost determination.

A4.14 Liable persons contribute 26.5% of the TSO cost. 26.5% of the portion of the TSO cost arising from costs common to both the TSO and TSLRIC calculations is [ ]CRI. Therefore, to avoid double dipping between the TSO and TSLRIC, the TSLRIC annualised costs need to be reduced by [ ]CRI.

The Commission has identified two problems with Telecom's reasoning. First as the ESAs in question are by definition unprofitable, it can not be assumed that the ESA-specific core network costs were fully offset by revenue even after allowing for indirect revenue from calls received (i.e. it can't be assumed that the core network was profitable or even broke even). Telecom's modelling did not provide data demonstrating that this assumption is correct. In the context of a TSLRIC model the core network costs would include costs associated with free local calls (which generate no revenue) and an allocation of common and shared costs (e.g. a share of the costs for maintaining the exchange building).

Telecom argued:

> A4.9 Further, only those TSO costs allocated to, and paid for by, other carriers should be excluded from the calculation of forward looking common costs. This is consistent with the objective of avoiding double recovery by Telecom. The outcome required by the Act is that the costs paid for by liable persons under the TSO should not appear in the TSLRIC calculation.

A problem with Telecom's argument is that it results in double dipping as the rest of the industry (which includes liable persons), will incur a share of the TSO costs greater than

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the percentage amount liable persons are required to contribute under the TSO for those costs common to the core network and TSO.

This is shown by considering the overall level of contribution that the liable persons (which includes interconnecting carriers) contribute to the net call cost calculated in A4.11 of Telecom's statement.

Of this [ ]CCRI, the liable persons contribute 26.5% [ ]CCRI via the TSO levy.

Telecom's calculation subtracts this [ ]CCRI from the cost of interconnection minutes, while not adjusting the remaining 73.5% (i.e. [ ]CCRI) which is allocated across the varying call types resulting in the appearance of increased call costs. If, for arguments sake, 5% of this cost was allocated to interconnection calls, then approximately [ ] CCRI of costs which relate to the loss on providing TSO will be added to the cost of those calls which are paid by other carriers.

This would result in the rest of the industry paying [ ] CCRI of the TSO costs which are common to core network (TSO levy of [ ] CCRI plus increased interconnection cost of [ ] CCRI). This exceeds the rest of the industry's liability under the TSO by [ ] CCRI and would result in double dipping.

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]CRI (the whole of Annex 5 is restricted).

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ANNEX 6: PROCEDURES TO RUN THE MODEL

The following is the procedure to be followed when re-running the CostPro TSLRIC database, so as to re-evaluate the final TSLRIC interconnect cost per minute for each of the 24 LICA Groups. It is complicated because of the workarounds we have made to allow for errors in the source code. Telecom would be happy to assist Commission staff in running the following procedure:

A6.1. Complete any changes required to the CostPro scenario.

A6.2. Run CostPro for that scenario (Process All).

A6.3. To correct RingPath distances that are incorrect due to an error in the CostPro code, follow the following steps:

a. Close CostPro and open the scenario database in Access.

b. Export a copy of the tblSYSRingTraffic table as an Excel file with this name. For later use, export a copy of the tblSYSRingPathMaster file as well, and then close Access.

c. In Excell, open the two exported files (tblSYSRingTraffic.xls and tblSYSRingPathMaster.xls), plus the scenario TransportLogic workbook.

d. In the PreProcessing sheet, click the macro button labled "Click button to update table after opening copy of tblSYSRingTraffic.xls" at cell A9. This will paste a sorted copy of the tblSYSRingTraffic data into the ProProcessing sheet at B12, and close the tblSYSRingTraffic.xls file.

e. Click also the macro button labled "Click button to update table after opening copy of tblSYSRingPathMaster.xls" at cell A1018. This will paste a copy of the tblSYSRingPathMaster data into the ProProcessing sheet at B1021, and close the tblSYSRingPathMaster.xls file. Although this step is not required to update Ring distances, it is a convenient time to do it.

f. If cell F8 still says "yes", then there has been no change to the rings since the last time the scenario was run that would necessitate the recalculation of corrected distances over in column BW. Close the file and proceed to step A6.4.

g. If cell F8 says "no", then click on the macro button at cell F9 labled "Click if, after running macro at left, above cell indicates "No"". This will recalculate the distances over in column BW. Save the updated TransportLogic file, and start again at A6.2 above, ie, rerun CostPro for this scenario (Process All).

While this issue has been addressed in the adapted version of CostProNZ, the recommended workaround and logic changes of Telecom appear to work as specified. If it is determined that the Telecom version of the model is to be used, these manual workarounds can be avoided by implementing a system level source code change.

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A6.4. To correct the error of a missing factor of 2 in SumStep16 (top of page 60) of the current CostPro code (which causes the calltype cost reports, when multiplied by call volumes, not to reconcile with Density cost reports for MOU and SU costs), follow the following steps:

- Close CostPro and open the scenario database in Access. There are a series of queries (qryRPTxxx) which have been added into the scenario database
- Run qryRPT2 (updates ESATouchMOUs for 'Remote' CostElement, applying the correction provided by CostQuest) by double clicking on it and clicking on "yes" in each of the two dialog boxes that will appear.
- Run qryRPT3 (runs the first short SQL on page 60).
- Run qryRPT4 (runs the second short SQL on page 60).
- Run qryRPT5_MOU (runs the third short SQL on page 60 – for MOU).
- Run qryRPT6_Lines (runs the last short SQL on page 60 – for LINES).
- Run qryRPT7_SU (runs the first short SQL on page 61 – for SU).
- Run qryRPT8_TotDirESA (runs the 2-line SQL on page 62, calculating TotalDirectESAInv and TotalDirectESACost in every record).
- Run qryRPT9_PerCust (runs the last SQL on page 61, calculating per customer Capacity investment and cost, and per customer Working investment and cost).
- Compact the database (Tools, Database Utilities, Compact and Repair Database), then close Access

While this issue has been addressed in the adapted version of CostProNZ, the recommended workaround and logic changes of Telecom appear to work as specified. If it is determined that the Telecom version of the model is to be used, these manual workarounds can be avoided by implementing a system level source code change.

A6.5. So as to calculate total Land and Building investment markup on Transmission equipment, and to check the total Transport Investment calculated in the TransportLogic workbook compared to the total investment passed back to CostPro:

- Open CostPro again and create a TransportLogicCheck file.
- Open the TransportLogicCheck file in Excel, go to the Node Investment Summary sheet and click the macro button at C16 to run a macro which runs all the tblSYSRingTraffic records through the workbook and records the investment result for each record. Note that total Land and Building investment markup, which is not currently passed back to CostPro, is given in cells P11:Q11. Similarly, click the button in Segment Investment Summary sheet cell C16 to run a macro which runs all the tblSYSRingPathMaster records through and records the

result.

We do not necessarily agree that this correction is required. Please refer to the discussion in A2.37b.

A6.6. If a check is wanted of the total Switching Investment calculated in the SwitchLogic workbook compared to the total investment passed back to CostPro, create a SwitchLogicAudit file by using the CostPro audit option. Open the excel file created, and click on the button at cell B39 in the Investment Summary sheet to run a macro which runs all the PreProcessing records through and records the result.

Since this calculation does not impact results, we did not verify the values cell by cell. However, we did review the macro and the logic of the worksheet and it appears to work as Telecom has specified.

A6.7. If parameters in the Annual Capital Cost Factors table have been changed, go to the input screen in CostPro and select Common, Annual Capital Cost Factors, and send a copy to excel. Open Excel and paste a copy of the exported table into the ACF sheet of the TSLRIC Output Report excel file at cell B3.

A6.8. If Call Volumes have been changed, close CostPro, open the scenario dB in Access, and run qryCallTypeQTYByESA. Export the resulting table to Excel, and paste a copy into the Volume Report sheet of the TSLRIC Output Report excel file at cell B4.

A6.9. In CostPro, run the following five reports, pasting a copy of each into the TSLRIC Output Report excel file as directed:

- Density report by Cost Family, Cost Component, Cost Primitive, for Sum of Total Working Investment, and Sum of Total Working Cost. Paste a copy into the DensityReport sheet at cell A3, and refresh the two pivot tables at H3 and H21 by clicking on them and selecting "Refresh Data" from the Data menu.

- ESA CallType report by Cost Primitive, for Sum of CallType Working Investment, and Sum of CallType Working Cost. Sort the report by CostPrimitive descending, by ESA ascending, by CallType ascending, and paste a copy into the ESACallType sheet at cell A7. The rest of the sheet should recalculate automatically. Check that the total variance in Total Working Investment compared to the Density report at cell H5 is not excessive (say not greater than +-$50,000). A table at column J will calculate the total cost per minute by CallType by ESA from the CostPro table. A third table at column R calculates the weighted average total cost per minute for Toll-Bypass Interconnect calls by major LICA group. Note these are still only CostPro costs, to which additional costs not in the CostPro costs still have to be added (t his is done in the TSLRIC Interconnect sheet).

- Density report by Cost Primitive, by USOA Category for Sum Total Working Investment, and Sum Total Working Cost. Paste a copy into the DensityUSOA sheet at cell A3, refresh the pivot table at G3, and check the total variance in Total Working Investment compared to the first Density report at cell K18 (should be $0). The pivot table at G3 calculates the annual costs by major cost category as required by the Notice.

- ESA report by Cost Element by Cost Primitive for Sum Total Working Inv and Sum Total Working Cost, and paste a copy into the ESACostElement sheet at cell A3. Refresh the pivot table at cell H3, and check the total variance in Total Working Investment compared to the first Density report at cell K36 (should be $0). The pivot table at H3 calculates the capital investment by elementtype and LICA group, as required by the Notice.

- Density report by Cost element, by Cost Primitive for Per Customer SU, Per Customer Calls, Per Customer MOU, for Sum Total Working Inv and Sum Total Working Cost. Paste a copy into the DensityCostElement sheet at cell A3, and check the total variance in Total Working Investment compared to the first Density report at cell M12 (should be $0). The small table at L3 calculates the per minute cost by cost element (see cells O5:O9), as required by the Notice.

A6.10. The Summary Investment sheet gives a comparison of total Switching and Transport investments by Cost Primitive by Cost Component from the Density report with the total investme nts from the SwitchLogicAudit and TransportLogicCheck workbooks, once the linkages in the Summary Investment sheet (B20:G25) to these Logic workbooks are updated. A6.11. The TSRIC Interconnect sheet calculates the total cost per minute of Toll By-pass Interconnect calls for the 24 main LICA groups, including the addition of a portion of common costs not included within the CostPro model results (see rows 58 – 87). The final payable Interconnect price is determined by adjusting these costs as in Section D of this report to allow for direct interconnect opex costs and TSO overlap.

The basic functionality of the Output spreadsheet from Telecom appears reasonable.

The LICA functionality of this spreadsheet is captured in the adapted version of CostProNZ. CostProNZ does not capture a number of the identified common costs values (e.g., software) identified by Telecom throughout this report. However, we do <u>not</u> agree with all of the adjustments that Telecom captures. Specifically, Transport Land and building are already captured. Even if it were not already captured, the Telecom adder would need to be adjusted downward to reflect a sharing with the data network (at least 35% of the cost would be allocated to data). Additionally, the current version of the model already captures the STP investment

We estimate that the upper level of 'common' costs that may <u>not</u> be captured directly by the current adapted version of CostPro is less than 0.75% (as a percentage of interconnect cost), which one could assume is already captured by the use of a 5% common factor.